

Management of Pelvic Organ Prolapse for Doctors

Reference and
Learner's Guide
September 2015



Government of Nepal
Ministry of Health and Population
National Health Training Center



Management of Pelvic Organ Prolapse

Permissions:

Animations of Pelvic Organ Prolapse, Sacral Colpopexy, and Uterosacral Suspension, ©Samantha Welker 2014.

The vaginal pessary for prolapse: An educational video, © Teresa Tam. Published in: Pessaries for vaginal prolapse: Critical factors to successful fit and continued use. OBG Manag 2013; 25(12): 42–44, 48–52, 59. © Frontline Medical Communications.

Videos for Simple vaginal hysterectomy, Vaginal hysterectomy for uterovaginal prolapse, Anterior colporrhaphy with Kelly plication, Posterior colporrhaphy, Perineorrhaphy, High uterosacral vaginal vault suspension for complete uterine procidentia, Rectocele and enterocele repair, and Rectocele repair associated with external anal sphincter repair, © International Academy of Pelvic Surgery.

Virkud, A. (2013, February 27). LeFort Colpocleisis.mov [Video file]. Ajit Virkud from Mumbai, India demonstrates LeFort partial colpocleisis operation. Retrieved from https://www.youtube.com/watch?v=hAms8b_iGM4.

Manchester Fothergills video, Ajit Virkud, Prof. of Obstetrics & Gynecology, Mumbai India, Modern Gynecology, II Edition, APC Publishers, Mumbai. Chapter 18, Pelvic Organ Prolapse.

Permissions pending for Figures 2-1, 2-2, 2-3.1, and 2-3.2. Richard Snell. 2011. Clinical Anatomy by Regions, 9th edition. Lippincott Williams & Wilkins.



Government of Nepal
Ministry of Health & Population

Tel. : 4261436
: 4261712
Fax : 4262238

DEPARTMENT OF HEALTH SERVICES

(.....)



Pachali, Teku
Kathmandu, Nepal

Ref. No.

Date:.....



PREFACE

Pelvic organ prolapse (POP) is a significant reproductive morbidity among postmenopausal and women of reproductive age in Nepal. Pelvic Organ prolapse (POP) is widely prevalent all over Nepal and with overall prevalence of 10% among women of reproductive age group (15-49 years). In Nepal an estimation of 600,000 Nepali women are suffering from varying degrees of uterine prolapse. Approximately one third of the women suffer prolapse severe enough to warrant reconstructive surgery. The huge burden of prolapse in Nepal ranks high on the public health agenda as a priority program for the government of Nepal and related stakeholders.

Till date, there was no competency based training package for standardizing surgery skills of gynecologists. The current approach of surgery camp programs was started without standardized technique to perform prolapse. Hence this package is designed to develop the capacity of the gynecologists to provide quality-assurance standards of care for women undergoing surgery for prolapse.

I am very pleased to introduce this long awaited competency based training package which would definitely help gynecologists to practice standardized surgical skills to perform Pelvic Organ Prolapse management. An ultimate goal of developing this competency based training package is to provide quality of services and help prevent women from social, physical and emotional isolation from family and society and live normal lives.

I would like to commend National Health Training Center for developing this package and also would like to appreciate the partners, UNFPA and Jhpiego Corporation for providing support in the process of developing this competency based training package.

I would like to thank all the national and international experts from various organizations for their contribution in development and publication of this package.


.....
Dr. Pushpa Chaudhary
Director



Government of Nepal
Ministry of Health & Population
Department of Health Services
National Health Training Centre

Phone: 4-255892
4-262161
Fax: 977-1- 4-261817

Ref. No.:

Subjects:-



Pachali, Teku
Kathmandu, Nepal

Date:



Acknowledgement

The risk factors for Pelvic organ prolapse (POP) include pregnancy, childbirth, and menopause resulting in weakness of the pelvic floor. In Nepal, the prevalence of POP is relatively high. Although Pelvic Organ Prolapse is treatable condition, many women do not receive quality care, particularly in many low-income countries like Nepal. This could be due to lack of awareness about treatment options and lack of control over when to seek medical treatment. Furthermore, access to quality services from trained service providers is limited in most of the remote places in Nepal. Therefore, in Nepal, it is estimated that only about 25% of women with Pelvic Organ Prolapse receive treatment because of these barriers to quality health care.

In order to provide quality services to the women suffering from this morbidity the National Health Training Center in coordination with Family Health Division, UNFPA and Jhpiego has developed this competency based training package for service providers. This package will be used to provide training to Gynecologists so as to enable them to provide quality care in POP management, adhering to national standard. The package has adopted a combined approach of individualized learning and clinical practicum sessions. Thus the training approach is a blended learning approach in which the participants do individual learning (theory session) at their own work site for two weeks, followed by 6-days clinical practicum at designated training centers.

I would like to thank Family Health Division, Jhpiego Corporation and UNFPA for their technical support and also express my gratitude to UNFPA for the financial support in developing this training package. I would like to acknowledge with much appreciation Dr Kiran Regmi for her guidance during the process. Special thanks to Dr. Shilu Adhikari, RH Specialist, UNFPA; Ms. Neera Thakur, RH Officer, UNFPA; Dr. Kusum Thapa, ANE Regional Technical Advisor, Jhpiego; Dr. Blami Dao, Director, Maternal and Newborn Health, Jhpiego/Baltimore and Ms. Julia Bluestone, Sr. Technical Advisor, Global Learning Office Jhpiego/Baltimore for their valuable technical inputs in the document. Thanks to Ms. Sandhya Limbu, Program Officer, Jhpiego for her support for coordination.

I would like to thank and acknowledge all the national experts who have provided their valuable input during the various workshops organized during the drafting and finalization of this training package.

.....
Achyut Lamichhane
Director

Contributors' Names for Development of Training Package

Dr. Alka Singh, Associate Professor, Patan Hospital
Dr. Anjana Dongol, Associate Professor, KUSMS
Dr. Archana Amatya, Associate Professor, TUTH
Dr. Aruna Karki, HOD, Kathmandu Model Hospital
Ms. Bishwoshanti Malla, Program Officer, One-heart-worldwide
Dr. Blami Dao, Director, Maternal and Newborn Health, Jhpiego-Baltimore
Ms. Catherine Breen Mamkong, Deputy Representative, UNFPA
Ms. Chandeswori Tamrakar, Health Team Leader, ADRA
Ms. Chandra Rai, Country Director, Jhpiego-Nepal
Dr. Dhana Bahadur Rana Magar, Consultant, Nepal Police Hospital
Dr. Ganesh Bahadur Singh, Medical Superintendent, Seti Zonal Hospital
Dr. Ganesh Dangal, Sr. Consultant, Kathmandu Model Hospital
Dr. Gehanath Baral, Professor, Sr. Consultant, Paropakar Maternity and Women's Hospital
Dr. Heera Tuladhar, General Secretary, NESOG
Dr. Jageshwar Gautam, Director, Paropakar Maternity and Women's Hospital
Ms. Julia Bluestone, Sr. Technical Advisor, Global Learning Office Jhpiego-Baltimore
Dr. Khageswor Gelal, Sr. IMO, Child Health Division
Dr. Khagendra Raj Bhatta, Sr. Medical Officer, Seti Zonal Hospital
Dr. Kiran Regmi, Ministry of Health and Population
Dr. Kundu Yangzom, Sr. Consultant, Norvic/B&B Hospital
Dr. Kusum Thapa, ANE Regional Technical Advisor, Jhpiego
Dr. Madhu Tumbahamphe, Consultant, Paropakar Maternity and Women's Hospital
Dr. Madhu Shrestha, Consultant, Paropakar Maternity and Women's Hospital
Mr. Mahendra Prasad Shrestha, Director, National Health Training Center
Dr. Meena Jha, Consultant, Paropakar Maternity and Women's Hospital
Dr. Mohan Chandra Regmi, Associate Professor, BPKIHS
Ms. Neera Thakur, RH Program Officer, UNFPA
Dr. Neelam Pradhan, HOD, Tribhuvan University and Teaching Hospital
Dr. Nira Singh Shrestha, Associate Professor, Kathmandu Medical College and Teaching Hospital
Dr. Pushpa Chaudhary, Director, Family Health Division
Dr. Rachana Sah, Associate Professor, Kathmandu Medical College and Teaching Hospital
Dr. Ramila Devkota, Medical Officer, National Health Training Center
Dr. Saroja Pande, Consultant, Paropakar Maternity and Women's Hospital
Dr. Sapana Amatya, Registrar, Paropakar Maternity and Women's Hospital
Dr. Shilu Aryal, Sr. Consultant, Family Health Division
Dr. Shilu Adhikari, RH Specialist, UNFPA
Dr. Shirley Heywood, Gynecologist, INF
Dr. Smriti Maskey, Lecturer, KIST MTCH
Dr. Swaraj Rajbhandari, Consultant, OBGYN

Table of Contents

Management of Pelvic Organ Prolapse	iii
Contributors' Names for Development of Training Package	ix
Table of Contents	iii
PART I	1
INTRODUCTION	1
Overview of the Training Approach	1
Learning Approaches	1
COURSE SYLLABUS	3
Course Description	3
Facilitator Selection Criteria	3
Participant Selection Criteria	3
Training Site	3
Course Goal	4
Competencies	4
Learning Objectives	5
Methods of Assessment	6
OVERALL COURSE SCHEDULE (PELVIC ORGAN PROLAPSE)	8
KNOWLEDGE ASSESSMENT	11
Knowledge Assessment	11
EVALUATION OF PELVIC ORGAN PROLAPSE MANAGEMENT TRAINING	17
PART II	18
MODULE ONE: EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND STRATEGIES FOR PREVENTION OF PELVIC ORGAN PROLAPSE	20
Introduction	20
Magnitude of POP	20
Pathophysiology of POP	22
Risk Factors for POP	23
Genetic and Ethnic Predisposition	24
Neurological Factors	24
Tissue Remodeling during Pregnancy	25
Childbirth	25
Strategies for Prevention of POP	27
Primary Level of Prevention	28
Secondary Level of Prevention	28
Tertiary Level of Prevention	28

Key Points.....	29
References for Module One.....	30
Exercises.....	34
Module Two: Anatomy of the Uterus, Vagina, and Pelvic Floor	36
Functional Anatomy of Supports of the Uterus and Vagina	36
Muscular Supports of the Pelvic Floor	37
Three Levels of Support	41
Functions of the Pelvic Floor.....	43
Key Points.....	43
References for Module Two.....	44
Exercises.....	45
Module Three: Infection Prevention	46
Background	46
Standard Infection Prevention Practices	46
Standard Precautions.....	46
Personal Protective Equipment	52
Types of PPE.....	52
The Role of Drapes.....	54
Antiseptics.....	56
Instructions for Cervical or Vaginal Preparation.....	57
Infection Prevention: Instrument Processing	57
Sterilization or High-Level Disinfection.....	58
Waste Management	59
References for Module Three	61
Reflective Practice—Infection Prevention	61
Module Four: Assessment of Women.....	64
Symptoms	64
History.....	66
Clinical Examination	66
Pelvic Examination	66
Pelvic Muscle Function Assessment.....	66
Bladder Function Evaluation	67
Bowel Function Evaluation	67
Grading of POP	67
Standard POP-Q System.....	68
Simplified POP-Q (S-POP-Q).....	69
Outcome Assessments.....	72

Key Points.....	73
References for Module Four	75
Exercises.....	77
Case Studies	78
Checklist for Assessment of Woman with POP.....	81
Module Five: Non-Surgical Management of Pelvic Organ Prolapse	86
Adjunct Therapy.....	86
Pelvic Floor Muscle Training	86
Pessaries.....	87
Role of Pessary	88
Key Points	91
References for Module Five	92
Exercises.....	94
Checklist for Pessary Insertion.....	95
Checklist for Pelvic Floor Exercise	97
Module Six: Surgical Management for POP	98
Introduction	98
Pre-Operative Care	98
Standards of Peri-Operative Care	100
Quality of Life.....	102
Preparation for Surgery	103
Post-Operative Instructions after Prolapse Surgery	104
Anesthesia for POP Surgery	104
Intra-Operative Monitoring	105
Basic Surgical Techniques for POP Surgery.....	105
Types of Surgery.....	106
Brief review of surgical Procedures for Prolapse.....	107
Posterior Compartment Defect Repair.....	110
Apical Defect	112
Special Conditions.....	113
Key Points.....	117
Counseling.....	117
References for Module Six.....	118
Checklist for Pre-Operative Counseling for Women with POP	119
Checklist for Counseling Women Scheduled for Surgery	120
Checklist for Anterior Compartment Defect Repair.....	123
Checklist for Vaginal Hysterectomy	124

Checklist for Colpoclesis.....	125
Checklist for Fothergill's.....	126
Checklist for Posterior Compartment Defect Repair with Perineorrhaphy (When Indicated)...	127
Module Seven: Post-Surgical Follow-Up and Management.....	128
Diagnosis and Management of Early Complications	128
Hemorrhage	128
Bladder Injuries	128
Ureteric Injuries	129
Bowel Injury	129
Retention of Urine	129
Vault Hematoma/Abscess.....	130
Infection (Cuff Cellulitis).....	130
Other Complications	130
Late Complications.....	130
Follow-Up.....	130
Key Points.....	131
References for Module Seven.....	132
Case Studies	133
Module Eight: Organization and Management for High-Quality Services	136
Dimensions of Quality.....	136
Elements of Quality of Care	136
Roles and Responsibilities in Quality Improvement	137
Follow-Up and Referral Steps	137
Importance of Reporting.....	138
Management of Commodities	138
References for Module Eight	140
Appendix A: Patient Selection Criteria	141
Appendix B: Instruments for Surgery.....	142
A. Anterior Repair	1422
B. Posterior Compartment.....	142
C. Hysterectomy.....	142
Appendix C: Requirements as Per the Guideline	143
Equipment.....	143
Instruments.....	143
Table: Instrument Required Per Case of Prolapse Surgery.....	144
Supplies (Surgical)	1445

Stationeries	146
Team of Human Resources for Prolapse Surgery	146

PART I

INTRODUCTION

Overview of the Training Approach

This course is designed as an individualized learning approach to allow the course to be completed in a flexible manner within the time available. The priority is to increase efficiency and reduce absenteeism of the service providers from their work sites so that they have to come to the training site only for practicum for clinical practice and for competency of surgery.

1. **The learner**, who is already an ob/gyn, uses the course materials to self-assess and reflect, manage their personal development plan, complete learning activities, and document their learning using provided tools.
2. **The facilitator**, who is also a trained ob/gyn, provides mobile support during the individualized learning component and manages the clinical learning opportunity.
3. **The coordinator** is responsible for coordinating training and providing logistics support.

As the learner completes individualized learning activities, he/she will be in contact with the facilitator for any query by telephonic/e-mail communication to ensure/check progress even after completion of the formal training. During the clinical training, the learner will practice clinical skills in simulation with anatomic models and also when working with clients.

Key to the success of this individualized, structured, self-paced program is the motivation of the learner and facilitator. The learner must be willing to participate in surgery whenever there is an opportunity, together with reading and completing other assignments, during the training period while staying on a schedule, in order to complete training in a reasonable period of time. The learner must be willing to self-assess and self-reflect, observe the facilitator, and ask questions. The facilitator must be willing to take the necessary time to mentor, teach, and work closely with the learner, and ensure client safety, in addition to providing high-quality services, throughout the course.

Learning Approaches

The primary learning approaches used in this course follow as below.

Apprenticeship: focuses on making complex skills easy for a learner to observe and learn. In this process:

- The mentor (or trainer) demonstrates steps and models behaviors for the apprentice (or learner);
- The mentor explains his/her decisions and thought processes while he/she works;
- The apprentice (learner) practices alongside the mentor, getting continual mentoring/coaching; and
- Over time, as the apprentice (learner) becomes more competent, she/he performs more and more independently.

Mastery learning: 100% of those trained should master the desired competencies and be able to demonstrate the desired performance. Mastery learning assumes that all learners can become competent, given sufficient time and opportunity to study and practice.

Adult learning principles:

1. Training builds on the learner's abilities and is designed or revised to recognize the learner's experience and expertise.
2. Training is designed and continuously revised to ensure that it is efficient, effective, and relevant.
3. Training actively involves the learners in setting their learning goals and in assessment of their progress.

Humanistic: This type of approach reduces learner stress and protects the safety and dignity of the learners and clients involved in the learning process. This approach involves practicing and mastering clinical services in simulation before working with clients, to reduce the risk of client harm or discomfort, and increases learner confidence by having learners practice in a safe environment.

COURSE SYLLABUS

Course Description

This is self-paced training for the management of pelvic organ prolapse for the health care providers (gynecologists). It is covered in **2 weeks of individualized learning plus a 6-day clinical practicum**. During the 6 days, the learner will:

- Self-assess comfort and experience and create a personal development plan
- See outpatients with facilitator guidance and supervision
- Observe surgery
- Assist during surgery
- Perform surgery under supervision

The learner will follow the schedule, prioritizing opportunities to practice with clients and receive feedback.

Facilitator Selection Criteria

- Identified Nepalese gynecologist with experience in performing and teaching a full range of POP surgery, evaluation, and management
- Gynecologist working in identified center or providing services during the duration of the training
- Gynecologist who has completed the Clinical Training Skills (CTS) course and attended a POP training orientation/training skills standardization
- International guest surgeons who specialize in pelvic organ repair surgeries

Participant Selection Criteria

- Medical doctor with post-graduate degree/diploma (MD and DGO) in obstetrics and gynecology
- Willing to complete individualized learning on his or her own
- Interested in and committed to continuing to provide POP surgery in their practices
- Committed to accurate recordkeeping, database entry, and documenting and reporting outcomes

Training Site

Comprehensive Emergency Obstetric and Newborn Care (CEONC) sites accredited by National Health Training Center (NHTC).

Course Goal

The purpose of this training is to enable dedicated gynecologists to acquire the knowledge, skills, and professionalism needed to provide proper surgical, medical, and psychological care to women with POP.

Competencies

This course is designed to prepare ob/gyns to be able to master and perform the following competencies:

1. Perform client assessment and history, including abdominal, genital, and pelvic examinations.
2. Assess and grade stage of uterine prolapse, using the simplified POP-Q staging system.
3. Teach pelvic floor exercises when required.
4. Teach use of pessary when required.
5. Select appropriate medical or surgical treatment.
6. Counsel clients on condition and proposed treatment plan, whether surgical or non-surgical.
7. Provide pre-operative counseling.
8. Obtain and document informed consent when required.
9. Implement infection prevention practices.
10. Perform:
 - a. Required:
 - Vaginal hysterectomy with McCall culdoplasty
 - Anterior colporrhaphy
 - Posterior colporrhaphy
 - b. Optional: (if case and time permits)
 - Forthergill's repair.
 - Colpocleisis
11. Provide post-operation follow-up instruction and education.
12. Manage post-operative clients, including any related post-operative complications.
13. Identify and refer patients to higher center for following conditions:
14. Prolapse with SUI/UI
 - Recurrent prolapse
 - Procdentia
 - Vault prolapse

Learning Objectives

Chapter 1: Epidemiology and Pathophysiology of POP

1. Describe the incidence/prevalence of POP globally and in Nepal.
2. Describe the pathophysiology of POP, including etiology and risk factors.
3. Explain the strategies for prevention of POP.

Chapter 2: Anatomy of the Uterus, Vagina, and Pelvic Floor

1. Explain the functional anatomy of the uterus and vagina and the muscles that support them.
2. Describe the anatomy of the female pelvic floor, including a list of parts.

Chapter 3: Infection Prevention

1. Perform standard infection precaution practices before, during, and after surgery.
2. Demonstrate proper processing of surgical instruments by decontamination and washing.
3. Demonstrate how to properly process surgical instruments by sterilization.
4. Demonstrate how to properly process surgical instruments by high-level disinfection.
5. Demonstrate how to properly store processed surgical instruments.
6. Demonstrate how to properly dispose of medical waste.

Chapter 4: Assessment of Patients

1. Demonstrate skills of proper history-taking.
2. Assess POP symptoms.
3. Perform a clinical examination.
4. Ascertain correct grading of POP.
5. Identify appropriate management based on assessment.
6. Explain outcome assessment.

Chapter 5: Non-Surgical Management of POP

1. List indications for non-surgical management of POP.
2. Explain precautions for non-surgical management of POP.
3. Explain role of pessaries in the management of POP.
4. Demonstrate the use of a pessary.
5. Describe pessary follow-up.
6. Explain benefits of pelvic muscle exercises.
7. Describe the pelvic floor muscle training technique.

Chapter 6: Surgical Management of POP

8. Describe the benefits/limitations of different surgical procedures.
9. Demonstrate the use of the WHO surgical safety checklist.
10. Demonstrate how to counsel a patient pre-operatively.
11. Explain pre- and peri-operative care for POP surgery.
 1. Explain type of anesthesia required for POP surgery.
 2. Perform basic surgical procedure for uncomplicated POP.
 3. Demonstrate post-operative advice prior to discharge.

Chapter 7: Post-Surgical Follow-Up and Management

1. Demonstrate how to provide follow-up care after surgery.
2. Describe common complications following POP surgery.
3. Manage early complications of POP surgery.
4. Manage late complications of POP surgery.

Chapter 8: Organization and Management for High-Quality Services

1. List common indicators for POP surgery program.
2. Describe key elements of quality of care.
3. Explain the importance of assessing client outcomes and reporting.
4. Explain the integration of POP services with other existing services.
5. Describe follow-up and referral steps.
6. List the key commodities needed for quality services.

Methods of Assessment

Knowledge will be assessed by a post-test questionnaire, skills by checklist, and attitude (professionalism) by role plays or observation of interaction with clients, and decision-making by case studies.

Qualification of Learners

- Learners are assessed as competent based on the following criteria:
- Completion of the final knowledge assessment with a score more than the criterion-referenced score of 80%
- Able to perform all three of these procedures consistent with the checklists:
 - Vaginal hysterectomy with McCall culdoplasty
 - Anterior colporrhaphy
 - Posterior colporrhaphy

Trainer/Participant Ratio: 1:1:1

- 1 Facilitator (ob/gyn)
- 1 Participant (ob/gyn)
- 1 Coordinator (coordinates all training processes, orients to package and follow-up)

OVERALL COURSE SCHEDULE (PELVIC ORGAN PROLAPSE)

Self-paced (Theory), Weeks 1–2:

Week 1:

- Part 1:
 - Self-assessment quiz
 - Follow-up phone call
 - Virtual discussion forum
 - Complete Modules 1, 2, and 3
- Part 2:
 - Complete Modules 4 and 5

Week 2:

- Part 1:
 - Virtual discussion forum
 - Complete Modules 6 and 7
- Part 2:
 - Complete Modules 8 and 9
 - Self-assessment quiz

Clinical Practice, 6 Days at CEONC/SBA Training Site

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
<ol style="list-style-type: none"> 1. Post-test of self-study content 2. Pre-test of clinical skills 3. Facility tour 4. Outpatient observation 	<ol style="list-style-type: none"> 1. Client assess (client assessment), Dx (diagnosis) and post-op orders and clinical rounds 2. Surgical observation and debrief 3. Surgical assist and debrief 	<ol style="list-style-type: none"> 1. Client assess, Dx and post-op orders and clinical rounds 2. Surgical observation and debrief 3. Surgical assist, perform, and debrief 	<ol style="list-style-type: none"> 1. Client assess, Dx and post-op orders and clinical rounds 2. Surgical assist, perform, and debrief 	<ol style="list-style-type: none"> 1. Client assess, Dx and post-op orders and clinical rounds 2. Surgical assist, perform, and debrief 	<ol style="list-style-type: none"> 1. Client assess, Dx and post-op orders and clinical rounds 2. Surgical assist, perform, and debrief 3. Post-test 4. Individual debrief of test results and clinical performance during the week

Week #	Self-Paced Learning Activities
Week One, Part One	
Course Overview	<p>___ Read and Study: Approach to Learning, Course Syllabus, and Course Schedule</p> <p>___ Complete the Confidence and Experience Questionnaire</p> <p>___ Participate in a call with your facilitator to plan for clinical practice</p> <p>___ Watch: Overview of Uterine Prolapse: http://samanthawelker.com/project/pelvic-organ-prolapse</p>
Module I: Epidemiology Pathophysiology, and Strategies for Prevention of Pelvic Organ Prolapse	<p>___ Read and Study: Module I</p> <p>___ Apply your learning: Exercise, Epidemiology</p> <p>Optional: Review the PowerPoint summary on your flash drive</p>
Module II: Anatomy of the Uterus, Vagina, and Pelvic Floor	<p>___ Read and Study: Module II</p> <p>___ Apply your learning: Exercise, Label Anatomy</p> <p>___ Apply your learning, Exercise, Match Function and Anatomy</p> <p>Optional: Review the PowerPoint summary on your flash drive</p>
Module III: Infection Prevention	<p>___ Read and Study: Module III</p> <p>___ Apply your learning: Exercise, Infection Prevention Quiz</p> <p>___ Apply your learning: Review Standard Precautions Job Aid</p> <p>___ Evaluate your practice: Complete the self-reflection form on infection prevention practices</p> <p>Optional: Review the PowerPoint summary on your flash drive</p>
Week One, Part Two: Participate in a call with your facilitator regarding infection prevention practices and progress on the module	
Module IV: Assessment of Women	<p>___ Read and Study: Module IV</p> <p>___ Apply your learning: Exercise, Assess Pelvic Organ Prolapse</p> <p>___ Read and study: Review the pelvic organ prolapse client assessment checklist</p> <p>___ Apply your learning: Complete case studies</p> <p>Optional: Review the PowerPoint summary on your flash drive</p>
Module V: Non-Surgical Management of POP	<p>___ Read and study: Module V</p> <p>___ Apply your learning: Exercise, Non-Surgical Management</p> <p>___ Watch: Use of pessary animation. It is 15 minutes long, the animation at the beginning is useful: https://www.youtube.com/watch?v=rnMz2XTogbE&index=7&list=PLBBFF240C275CE1C0</p> <p>Reflect on your practice: Identify if silicon pessaries are available in your facility stock room, and, if not, discuss with the stock room in-charge about adding several to your stock list</p> <p>Read and study: Review the checklist for pessary use and for teaching pelvic floor exercises</p> <p>Optional: Review the PowerPoint summary on your flash drive</p>

Week #	Self-Paced Learning Activities
Week Two, Part 1: Participate in a call with your facilitator	
Module VI: Surgical Management for POP	<p>___ Read and study: Module VI</p> <p>___ Evaluate your practice: Review the WHO safe surgery checklist, complete that section of the surgical reflective practice form</p> <p>___ Watch this instructional video: Vaginal hysterectomy, anterior and posterior repair: http://www.academyofpelvicsurgery.com/vaginal-correction-of-anterior-and-posterior-vaginal-wall-prolapse-with-and-without-vaginal-hysterectomy/video/1204-video-4-anterior-colporrhaphy</p> <p>___ Evaluate your practice, review the vaginal hysterectomy checklist, and complete that section of the surgical reflective practice form</p> <p>___ Evaluate your practice, review the anterior repair checklist, and complete that section the reflective practice surgical form</p> <p>___ Evaluate your practice, review the posterior repair checklist, and complete that section the reflective practice surgical form</p> <p>___ Watch this instructional video: Perineorrhaphy: http://www.academyofpelvicsurgery.com/vaginal-correction-of-anterior-and-posterior-vaginal-wall-prolapse-with-and-without-vaginal-hysterectomy/video/1210-video-10-perineorrhaphy</p> <p>___ Evaluate your practice, review the posterior repair checklist, and complete that section of the reflective practice form</p> <p>Optional: Watch: McCall culdoplasty: http://www.academyofpelvicsurgery.com/vaginal-correction-of-anterior-and-posterior-vaginal-wall-prolapse-with-and-without-vaginal-hysterectomy/video/1211-video-11-vaginal-hysterectomy-with-mccall-culdoplasty-and-anterior-posterior-repair</p> <p>http://www.academyofpelvicsurgery.com/techniques-to-correct-enterocele-and-vaginal-vault-prolapse/video/1302-video-2-mccall-culdoplasty-video-demonstration</p> <p>___ Optional: Watch: Colpocleisis video: https://www.youtube.com/watch?v=hAms8b_jGM4</p> <p>___ Optional: Watch: Manchester Fothergill's video: https://www.youtube.com/watch?v=zg4gOwCIMSA</p>
Week Two, Part 2: Participate in a call with your facilitator	
Module VII: Management of Complications of Prolapse Surgery	<p>___ Read and study: Module VII</p> <p>___ Apply your learning: Case studies, Managing Complications</p> <p>Optional: Review the PowerPoint summary on your flash drive</p>
Module VIII: Organization and Management for High-Quality Services	<p>___ Read and study: Module VIII</p> <p>___ Review the key indicators for POP surgical repair</p> <p>___ Evaluate your practice, complete the Organization and Management for High-Quality Services reflective practice form</p>

KNOWLEDGE ASSESSMENT

Knowledge Assessment

Module I. Epidemiology and Risk Factors

1. A UNFPA/IOM study in Nepal in 2006 identified a POP prevalence in women of reproductive age group of:
 - a. 5%
 - b. 10%
 - c. 60%

2. The following are established risk factors for POP (1 point for each)

Conditions	True	False
Chronic urinary retention		
Infant birth weight of 4650 g		
History of C-section		
Obesity		

3. Studies of POP in Nepal identified that women with prolapse suffered for an average of:
 - a. 2–5 years
 - b. 5–7 years
 - c. 7–11 years

Module II – Anatomy of the Uterus, Vagina, and Pelvic Floor

4. The levator ani is composed of:
 - a. Pubococcygeus and iliococcygeus
 - b. Pubococcygeus and sacrococcygeus
 - c. Iliococcygeus and sacrococcygeus
5. Level I support of pelvic organ is:
 - a. Perineal body
 - b. Cardinal ligament
 - c. Broad ligament
6. The anterior part of the levator ani muscle complex:
 - a. Acts as a sling around the mid-urethra, vagina, and rectum
 - b. Elevates and stabilizes the upper vagina
 - c. Forms a sling around the upper urethra, vagina, and rectum

7. Which of the following are functions of the levator ani muscle?

Function	True	False
Narrows the genital hiatus		
Relaxes the genital hiatus		
Facilitates urinary and fecal continence		
Suspends the uterus		

Module III – Infection Prevention

8. Select the best answer, the primary objective of infection prevention in the health care facility (hospitals and clinics) is to:

- Minimize the cost of drugs and supplies used in surgery
- Develop standards for use of prophylactic antibiotics
- Minimize transmission of infection in health facilities

9. Which of the following is a physical barrier to prevent infection during surgery?

- Personal protective equipment
- Handwashing
- Using antiseptic to cleanse the skin

10. The surgical scrub includes rubbing the hands and forearms vigorously for:

- 3-5 minutes
- 7 minutes
- 10 minutes

11. Which of the following is correct about handwashing?

- Perform before putting gloves on
- It is NOT critical after glove removal if gloves are intact
- Perform randomly in case your hands have been contaminated

12. Antiseptics are chemicals that can be used:

- Safely on skin to kill or reduce microorganisms
- To disinfect and decontaminate inanimate surfaces
- For routine handwashing

13. Surgical instruments that have been decontaminated and thoroughly cleaned can be sterilized by:

- Heat (autoclave or dry heat sterilizer)
- Soaking them for 30 minutes in fresh 1% chlorine solution
- Exposure to ultraviolet light for 1 hour

Module IV – Assessment of women with POP

14. Which of the following is a common symptom attributed to uterine prolapse:
- Rectal bleeding
 - Sensation of bulge or protrusion
 - Polymenorrhagia
15. Fecal incontinence in women with POP is present in:
- 5–10%
 - 15–20%
 - 25–30%
16. In POP-Q staging, Point A is located on the anterior vaginal wall:
- Approximately 3 cm proximal to the urethral meatus
 - Almost all the way up to anterior vagina
 - Approximately halfway up to anterior vagina
 - Just inside the anterior vagina
17. Which of the following indicates POP-Q stage II? The most distal portion of prolapsed is:
- 1 cm or less proximal to or distal to the plane of the hymen
 - 2 cm below the plane of the hymen
 - More than 3 cm above the plane of the hymen
18. Which is correct about pelvic examination when assessing for POP?
- Sterile gloves are mandatory
 - You must perform a test for rebound tenderness
 - Ask the patient to perform the Valsalva maneuver

Module V - Non-surgical POP management

19. There is evidence that correct performance of Kegel exercises will:
- Reduce urinary and fecal incontinence symptoms
 - Decrease the strength, bulk, and tone of pelvic muscle
 - Have no effect on the stage of POP
20. Pelvic floor exercises should be performed at least:
- Once a day
 - Twice a day
 - Thrice a day

21. The BEST advantage of a silicon pessary over rubber pessary is:

- a. Reduced absorption of odors and secretions
- b. A shorter half life
- c. reduced chance of allergic reaction

22. Which of the following are indications for pessary use?

Condition	Indication	Not indication
POP-Q Stage 3		
80-year-old with heart disease and stage 2		
Temporary relief during pregnancy		
Vaginal erosion		

23. After insertion of pessary, women who are not able to perform self-care should be advised to attend the outpatient department for a change of pessary at:

- a. 2-week interval
- b. 1-month interval
- c. 3-month interval

24. The approximate size of pessary required is determined by:

- a. Digital assessment of the length of vagina
- b. Degree of prolapse
- c. Weight of the patient

25. After first insertion of a ring pessary, the patient should be advised of the following potential side effects.

Side Effects	Yes	No
1. Foul-smelling discharge		
2. Coital difficulty		
3. Heartburn and nausea		

26. Improvement of symptoms of incontinence for a patient performing pelvic floor exercises is expected after:

- a. 6 weeks
- b. 8 weeks
- c. 12–16 weeks

27. How should a silicone pessary be cleaned?

- a. Soak in Dettol for 30 minutes every month
- b. Wash with soap and water every 6 months
- c. Boil it for 30 minutes every other month

Module VI - Surgical management of POP

28. Which step is included for anterior vaginal repair?

- Dissection of vaginal epithelium
- Plication of levator ani
- Lateral plication of the vaginal muscularis

29. Which steps are included in a posterior compartment defect repair?

Steps	Includes	Does Not Include
Separation of the vaginal epithelium from rectovaginal septum		
Plication of levator ani for all women		
Routine trimming of excess vaginal mucosa		

30. Enterocele repair:

- Is routinely performed during pelvic organ surgery
- Needs special expertise
- Should be done only when indicated

31. Indicate the correct answers for pre-operative preparation for vaginal hysterectomy:
(4 points, 1 for each):

	Includes	Does Not Include
Involves routine shaving of operative area		
Requires routine administration of prophylactic antibiotics		
Physical examination by surgeon is mandatory		
Routine ECG		

32. During use of the WHO safe surgical checklist, which of the following questions do you ask immediately before the induction of anesthesia?

	Ask	Do not need to ask
1. Patient identity		
2. History of allergy		
3. Difficulty in bowel habits		
4. Risk of bleeding		

Module VII - Management of complications of surgery for POP

33. Secondary hemorrhage usually occurs between:

- 1–2 days of surgery
- 3–5 days of surgery
- 7–10 days of surgery

34. Immediate post-operative period vaginal bleeding below the cuff is managed by:
- Re-opening of incision
 - IV fluids and careful observation
 - Suturing the bleeding site
35. Intra-operative methylene blue test is used to identify suspected:
- Bladder injury
 - Rectal injury
 - Ureteral injury
36. Intra-operative bladder injury is managed by repairing it into two layers with 2-0:
- Absorbable continuous suture and continuous catheter for 7–10 days
 - Delayed absorbable continuous suture and continuous catheter for 7–10 days
 - Non-absorbable continuous suture and continuous catheter for 7–10 days
37. Women may develop early menopausal symptoms if one of the following procedure is performed during POP surgery:
- Anterior colporrhaphy
 - Posterior colpoperineorrhaphy
 - Removal of uterus with bilateral ovaries

38. Signs of post-surgical complications include: (1 point for each, total of 5 possible)

	True	False
Suprapubic pain		
Flank pain		
Epigastric pain		
Constipation		
Incontinence of urine		

39. Following prolapse surgery, women should:
- Rest in bed for 1 month
 - Abstain from intercourse for 6 weeks
 - Perform abdominal palpation every 6 hours for 24 hours

40. During post-operative 6 week, follow-up visit, the following should be performed:

	True	False
Ask about urinary and fecal incontinence		
Perform pelvic exam		
Perform routine urine analysis		
Ask about foul-smelling vaginal discharge		

EVALUATION OF PELVIC ORGAN PROLAPSE MANAGEMENT TRAINING

(To be completed by participants)

Please indicate your opinion regarding the training using a 1–5 scale

5–Excellent 4–Very good 3–Satisfactory 2–Needs Improvement 1–Unsatisfactory

S. No	Contents	Scoring
1.	All the modules are very useful in the process of learning.	
2.	All appendices are very useful in the process of learning.	
3.	Learning objectives of the training course are appropriate.	
4.	The course outline helped me to walk through entire training period very effectively.	
5.	Training duration is sufficient to be competent to provide prolapse surgery.	
6.	There was sufficient client load for hands-on practice.	
7.	Discussion sessions, exercises, role plays, and case studies were very useful.	
8.	I am competent and confident to provide pre-operative counseling.	
9.	I am competent and confident to provide counseling of women scheduled for surgery.	
10.	I am competent and confident to provide anterior compartment defect repair.	
11.	I am competent and confident to perform vaginal hysterectomy surgery.	
12.	I am competent and confident to provide posterior compartment defect repair.	
13.	I am confident to provide surgery without supervision from a master trainer.	
14.	The training approach was every effective during individualized learning for theory and clinical practice sessions.	

Please write your suggestions on how to improve this training course, if any.

PART II

MODULE ONE: EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND STRATEGIES FOR PREVENTION OF PELVIC ORGAN PROLAPSE

Introduction

Pelvic organ prolapse (POP) is a common reproductive morbidity affecting women. In fact, the problem of uterine prolapse and its treatment is described in the oldest documented medical literature; it is defined as the descent of one or more of the anterior vaginal walls, the posterior vaginal wall, the apex of the vagina (cervix/uterus), or vault (cuff) after hysterectomy. It remains an ongoing challenge for gynecological surgeons because of the risk of recurrence and complications inherent in all soft-tissue reconstructive surgery. POP affects almost half of all women older than 50. Due to changing demography and the increasing geriatric population, a huge epidemic of POP cases is anticipated in the future with significant consequences on health expenditures (Drutz 2006).

Women suffer from POP worldwide with variable impacts on their quality of life, depending upon the patient's characteristics and socio-cultural influences. Globally, women's increasing life expectancy means that this condition is more common among women at or after menopause. However, women living in developing countries, like Nepal, suffer prolapse much earlier in their reproductive and productive years of life due to factors that are poorly understood. It may be genetic, nutritional, or related to repetitive strain injury specific to the lifestyle of Nepalese women.

Magnitude of POP

POP affects millions of women worldwide. The global prevalence of genital prolapse is estimated to be 2–20% in women under the age of 45. (World Health Organization [WHO] 1995) The exact magnitude of the problem is difficult to quantify due to lack of comprehensive, large-scale epidemiological studies, even in developed nations. Available hospital data show that prolapse is among the most common indication for gynecological surgery. In the United States, prolapse is the third most commonly cited indication for hysterectomy (Hoffman 2008). A separate U.S. study reported an 11% lifetime risk of surgery for prolapse or incontinence. (Oslen 1997) A recent 2009 survey of data from Germany, France, and England revealed prolapse as the primary indication for 20% of hysterectomies performed for benign disease. The Women's Health Initiative (WHI) trial in the United States showed that about 40% of women had some degree of prolapse. In the United States, the number of women with POP will increase by 46% from 3.3 to 4.9 million according to one estimation (Wu 2010) and over the next 30 years, and the rate of women seeking treatment for POP will double (Wu 2009). On the other hand, in developing countries, the magnitude of POP seems to be high, but the true extent of the problem is less understood.

POP is one of the leading reproductive health problems among Nepalese women, particularly among women in rural Nepal, being prevalent in all ethnicity/caste, all age groups, and in all ecological zones and development regions (Uterine Prolapse Study 2006). In contrast to western countries where POP is primarily a problem of post-menopausal women, POP appears to be quite prevalent among younger women in Nepal. The study on POP conducted by the Institute of

Medicine and the United Nations Population Fund estimated that 600,000 women suffer from varying degrees of uterine prolapse with overall prevalence of 10% among women of reproductive age group (15–49 years). In this study, 25.2% of POP was among women under the age of 35, including 2.8% among adolescents with the mean age of onset at 27.9 years and mean years of sufferings of 7.89 years. This study also highlighted that approximately one-third of women had severe prolapse needing surgery (UNFPA/IOM 2006).

According to the Nepal Demographic and Health Survey (2011), 6% of women of the reproductive age group (15–49 years) were suffering from POP, including 1.6% among 15–19 years of age and 2.4% among those 20–24. However, a hospital-based study at Tribhuvan University Teaching Hospital TUTH reported a prevalence of 2.6% among patients reporting to the gynecology outpatient department and the majority of them were 40 years or older (85%), including 35% in the age group of 41–50 years (Darshan 2009).

Table: 1-1. Prevalence Studies on Utrovaginal Prolapse in Nepal

Coverage	Prevalence Rate (%)	Type of Quantification	Sample Size	Year of Report	Remarks/Source, Reference
Overall estimation	9–30%	Observation		2006	Dr. Rajendra Gurung, presentation at UNFPA seminar
8 districts	10%	Clinic based	2,207	2006	A commissioned study for UNFPA
Siraha	30%	Population based	969	2006	Survey undertaken by the Centre for Agro-Ecology and Development Nepal(CAED)-Women's Reproductive Rights Program-Lahan
Saptari	42%	Population based	1,301	2006	Survey undertaken by CAED-Women's Reproductive Rights Program-Lahan
10 districts	9%	Clinic based	4,518	2005	A study by the Safe Motherhood Network Federation
Achham/Doti	25%	Clinic based	2,072	2002	GTZ/HSSP's mobile clinic in Doti, Accham-report
Ramechhap	37%	Clinic based	Not known	2002	Among the visitors of Manthali Health Post (Kantipur-3/4-2059)
Dang	35%	Clinic based	426	2002	Number of women among those affected who required immediate surgery (Gorkhapatra 28/10/2059)
Dolakha	20%	Clinic based	985	2002	Data from the clinic (Rajdhani, 10/5/2059)
Southern Achham	44%	Population based	250	2000	Survey undertaken by CAED-Sustainable Livelihood Programme Surveys in 5 village development committees (VDCs) in Accham
Jumla	17%	Not known	Not known	1996	Mentioned in GTZ/HSSP report

Report of UP prevalence in Nepal (CAED 2006)

A survey conducted by the CAED among 2,268 women from two districts in Nepal showed a prevalence rate that ranged from 11% to 72% among the 24 village development committees (VDCs) with an average percentage of 37%. In this study, 65% of the women with POP gave birth to their first child before the age of 19, and mean years of suffering was 11 years ranging from 6 months to 45 years. Researchers used questionnaires to identify women with prolapse

symptoms, but did not perform any gynecologic examinations in this study. However, symptoms of something bulging in or dropping out of their vagina had a sensitivity of 84% and a specificity of 94% for POP at or beyond the hymeneal ring on examination showing good correlation between self-reporting of POP symptoms and findings.

Pathophysiology of POP

Prolapse most commonly affects the anterior vaginal wall, followed by the posterior vaginal wall, and least commonly the apical compartment—uterus or apex of the vagina, usually in some combination (Abrams 2002). The pathophysiology of POP is multifactorial and a clear understanding of the etiology is the focus of ongoing research worldwide. POP is believed to occur under a “multiple-hit” process in which genetically susceptible women, exposed to various etiologic factors, develop POP.

Normal support to pelvic organs is provided by the uterosacral/cardinal ligament complex, pelvic floor muscles, and the endopelvic fascia between the bladder and vagina and between the rectum and vagina, holding the organs adjacent to the vagina in proper position.

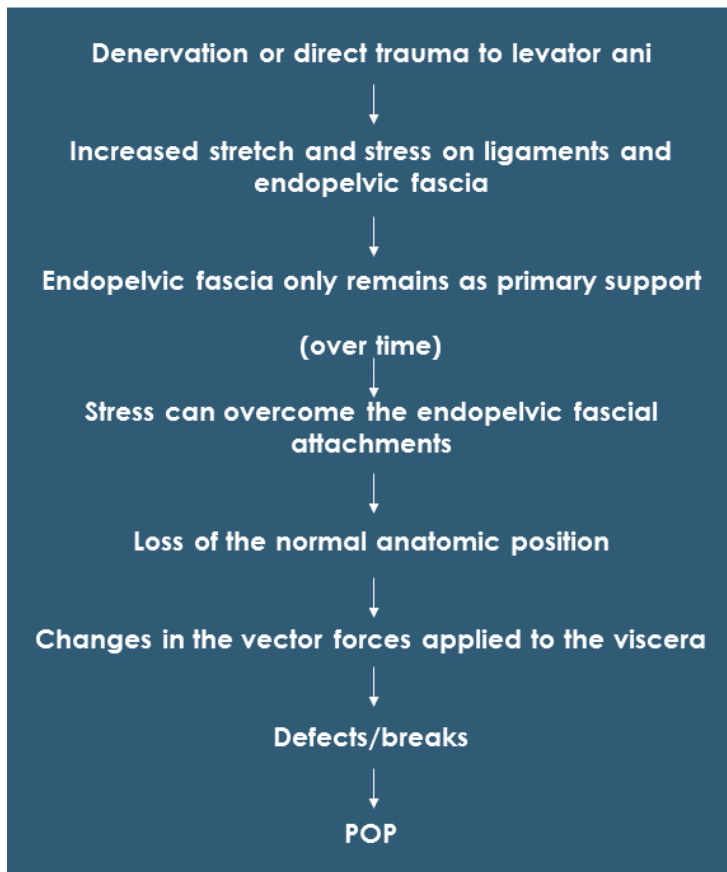
The levator ani muscles comprise both type I and type II fibers:

1. Type I muscle fibers are slow-twitch fibers that provide sustained tonicity of the pelvic floor, resulting in dynamic pelvic floor support and alleviating the mechanical stress on the endopelvic connective tissue attachments.
2. Type II fibers consist of fast-twitch fibers that cause the reflex contractions of the pelvic floor associated with sudden increases in intra-abdominal pressure.

By virtue of its character, the levator ani muscle complex fulfills multiple functions:

1. First, the tonic contraction of the pubococcygeus muscle narrows the genital hiatus.
2. Second, contraction of the pelvic floor leads to the elongation and elevation of the pelvic organs, facilitating urinary and fecal continence.
3. Additionally, posterior levator ani tonicity elevates the upper vagina and stabilizes it into a horizontal plane near the hollow of the sacrum.

Sequence of Events in POP



Defects could be confined to one compartment and there could be multi-compartmental defects or several defects within the same compartment (Christian 2011).

Risk Factors for POP

Many risk factors are believed to contribute to the high prevalence of POP in Nepal, each warranting adequate clinical trials to prove or disprove their veracity. Among risk factors commonly cited are:

- Lack of skilled care during birth
- Harmful traditional birthing practices in which traditional birth attendants use push and pull methods
- Poor nutrition
- Young age at delivery
- Multiparity
- Inadequate rest in the postpartum period
- Early resumption of household and field work postpartum
- Heavy lifting and immediate/early resumption of heavy work postpartum

There is association of illiteracy, multi fertility, smoking, malnutrition, early resumption of work after delivery (Marahatta 2003).

Risk factors for development of prolapse can be categorized as:

1. Inciting factors (pregnancy and delivery, hysterectomy, neuropathy)
2. Promoting factors (obesity, smoking, chronic cough, constipation, heavy and frequent weight lifting)
3. Decompensating factors (aging, menopause, neuropathy, debilitation, etc.)

Interplay of these factors in isolation or in combination may lead to POP in any given woman.

These factors may be further categorized as risk factors (Abrams 2009):

1. Intrinsic (genetic, age, postmenopausal status)
2. Extrinsic (parity, history of previous hysterectomy, co-morbidities, occupation)

In the Oxford Family Planning Association prolapse epidemiology study, parity was found to be the strongest risk factor for the development of prolapse. However, compared with nullipara, vaginal birth was not associated with pelvic organ prolapse quantification system (POP-Q) stages III and IV prolapse, but it is associated with an increase in POPQ stage II defect (Dallenbach 2007).

History of conditions suggestive of deficient connective tissue (varicose veins/hernia/hemorrhoids), family history of prolapse, heavy lifting at work, and presence of constipation, hard stools, or difficult evacuation all were found to be independently, significantly, and positively associated with the presence of symptomatic prolapse. Variations in shape and orientation of the bony pelvis can also affect maternal soft-tissue damage and nerve injury during parturition and increase risk of POP.

Genetic and Ethnic Predisposition

Comparative studies have drawn attention to the higher incidence of pelvic floor dysfunction among relatives, most notably among identical twins (Altman 2007; Hansell 2004; Rinne 1999). Familial incidence of POP was reported as high as 30% (Rinne 1999). Genetic variants have been documented that run in families with an increased incidence of POP. Also, it has long been suspected and recently been studied that connective tissue diseases like Ehlers-Danlos syndromes and Marfan syndrome predispose women to POP (Carley 2000). Young women with POP are more likely to have neurological or connective tissue diseases and congenital abnormalities (Strobhen 1997). Intrinsic joint hyper mobility is another well-recognized connective tissue disease that is associated with POP (Zs 1982; Bai 2002; Marshman 1987; Norton 1995).

Many studies have found alterations in supportive tissues in women with POP such as alterations of collagen, elastin, and smooth muscle of the vaginal and supportive tissues (Suzme 2007).

Neurological Factors

Intact innervation of the levator ani muscle, anal sphincter and urethral sphincters is critical to normal pelvic function. It has been suggested that neurological damage induced by transvaginal reconstructive surgery results in suboptimal outcome (Welgoss 1999). Vaginal birth is an established factor for nerve damage. Prospective EMG studies performed before and after

childbirth substantiated the evidence of childbirth-induced pelvic floor denervation detecting increased fiber density after vaginal delivery. Aging leads to further deterioration of pelvic floor denervation (Dolan 2003, Snooks 1990).

Tissue Remodeling during Pregnancy

Recently, some studies have drawn attention to the occurrence of clinically significant POP during pregnancy in nulliparous women (O'Boyle 2003; O'Boyle 2002; Miodrag 1988; Sze 2002).

The causes of the development of POP during pregnancy might be multifactorial, but hormones and enzymes are certainly involved. Progesterone is known to reduce the tone in ureters, the bladder, and urethra because of its smooth muscle relaxing and estrogen antagonizing effects (Miodrag 1988). As a likely result of connective tissue remodeling in preparation for birth, Landon and colleagues (Landon 1990) found that the connective tissue of the rectus sheath fascia and the obturator fascia could be stretched to greater length during pregnancy, but it is also much weaker. In some women these changes may be irreversible or further stretching beyond physiological limits may result in permanent dysfunction.

Childbirth

Vaginal birth has long been considered the most important risk factor for POP. Most epidemiological studies demonstrate an association with parity in general (Bergman 1988; Bump 1995; Klutke 2000; Landon 1990; Handa 2004; Nygaard 2004) and specifically with vaginal birth (Lieschen 2010). Mechanical damage to the pelvic floor musculature, connective tissue, and nerve supply occurs particularly during the second stage of labor when the fetal head distends and stretches the pelvic floor. Apart from direct muscle rupture and muscle and connective tissue stretching there might also be biochemical damage to the soft tissue, especially in prolonged second stage. However, the cesarean section is only partially protective.

In most postpartum and long-term studies, cesarean section might reduce, but not totally prevent urinary and anal incontinence. POP, however, seemed considerably lower after cesarean section (Maclennan 2000; Langer 1995), but was still described in a rare prospective study before and 6 weeks after childbirth in 35% of 26 women after cesarean section during active labor compared to 32% of 41 women who had spontaneous vaginal deliveries.

Age at first delivery may theoretically have an impact on the development of POP. However, studies are controversial considering younger ages (25 versus 28 years of age) (Ismail 2010), as well as in older ages (more than 30 years), with first delivery a risk factor. Another large study did not reveal an association at all (Rortveit 2007). A higher birth weight, especially more than 4,500 gm has been shown to increase the risk for POP in univariate and multivariate analyses (Rortveit 2007; Swift 2005). An extensive vaginal rupture has also been associated with prolapse (Tegerstedt 2006).

Instrumental delivery is an established risk factor for anal incontinence but has only been shown in one study to be associated with prolapse (Moalli 2003). The vaginal delivery may stretch and tear pelvic connective tissue and the levator muscle, causing permanent changes in the integrity of pelvic support (Quiroz 2010). In the Oxford Family Planning Association prolapse

epidemiology study, parity was the strongest risk factor associated with prolapse. While risk increased with increasing parity, the rate of increase slowed down after two deliveries. Abdominal delivery appears to be a relatively protective factor (Mant 1997).

Obesity: Body Mass Index and Waist Circumference

Many studies have examined the influence of obesity on POP prevalence. Body mass index (BMI) and waist circumference are the most commonly measured variables. A higher BMI increases the risk for prolapse (Swift 2005 and specifically for progressive rectoceles (Handa 2004).

Chronic Pelvic Floor Stress

Similar to obesity, constipation has frequently been attributed to increase the risk for POP (Bradley 2007; Arya 2005), and has never been found to be protective. Constipation exerts sustained increase in intra-abdominal pressure and strain to pelvic floor supports, thus leading to increased risk for POP.

Occupational heavy lifting has long been associated with POP. Prolapse was more prevalent in laborers or factory workers compared with housewives or service workers (Chiaffariono 1999; Woodman 2006).

Previous Surgery

In some epidemiological studies, previous hysterectomy seems to predispose to prolapse and further reconstructive surgery (Swift 2000). Evidence suggests that hysterectomy done for a prolapse indication is a risk factor for development of recurrent POP (Dallenbach 2007). Vaginal vault prolapse was 11.6% in women who underwent hysterectomy for prolapse (after 9-13 years of surgery) and 1.8% in women who had the hysterectomy for other benign disease (Marchionni 1999). Women undergoing surgery for POP sustained a 13% reoperation rate for POP recurrence within 5 years of the first POP surgery in Clark's 2003 epidemiologic review. Continence procedures might lead to defects in other pelvic compartments, particularly the Burch colposuspension, which has been shown to predispose to enterocele and rectocele formation. Vaginal hysterectomy has more risks than abdominal hysterectomy; however, any kind of hysterectomy is a risk factor, regardless of indication.

The Bony Pelvis

There is evidence from several case control studies that variations in axial and pelvic skeletal structure can be associated with increased risks of POP. These include increasing degrees of thoracic kyphosis, a decrease in lumbar lordosis and in vertical orientation of the pelvic inlet, and an increase in the transverse diameter of the pelvic inlet (Lind 1996; Nguyen 2000).

Established and Potential Risk Factors for Prolapse

Established risk factors:

- Vaginal delivery
- Advancing age
- Obesity

Potential risk factors:

- Pregnancy irrespective of mode of delivery
- Forceps delivery
- Young age at first delivery
- Prolonged second stage of labor
- Infant birth weight > 4500 gms
- Shape or orientation of bony pelvis
- Family history of pelvic organ prolapse
- Race or ethnic origin
- Occupation entailing heavy lifting
- Constipation
- Connective tissue disorder
- Previous hysterectomy
- Selective estrogen receptor modulators

Source: J Eric Jelovsek, Christopher Maher, Matthew D Barber. Pelvic Organ Prolapse (The Lancet. 2007), vol 369, issue 9566, p 1027-1)

However, other studies recently have failed to find an association between obesity and prolapse (4th international consultation on Incontinence, 2009m Health Publication, page 35–113).

Strategies for Prevention of POP

POP is most often a result of tissue damage caused by labor and childbirth. Although it may not be possible to prevent damage to the pelvic organs caused by childbearing, one may be able to control the progression of prolapse. Reproductive health interventions as part of a broad prevention strategy can legitimately challenge the social causation of prolapse (Earth 2002).

Specific steps include:

- Improving access to health education, screening, and counseling
- Ensuring early treatment (Walker 2011)
 - Pelvic floor exercise training as a routine component of postnatal care
 - Fitting a pessary for mild symptomatic prolapse
- Reducing chronic pelvic pressure (clinical protocol for management of POP 2012, Family Health Division (FHD))
 - Hard physical work
 - Chronic cough
 - Obesity
 - Smoking
 - Constipation

Primary Level of Prevention

Interventions to Prevent Occurrence of POP Include

- Empower women with education and employment opportunities.
- Create awareness about the legal age of marriage and negative consequences of early childbirth on women's health.
- Ensure:
 - Evidence-based labor management at health facilities through local health management committees, such as use of partograph to identify delay in progress and timely referral to emergency obstetric care (EmOC) services; and
 - Availability of nutritious diet to girl children and adolescents as well as pregnant and lactating mothers.
- Encourage:
 - Family planning methods for birth spacing and to limit the number of children; and
 - Antenatal care for health counseling, birth preparedness, and to seek skilled care during childbirth.
- Educate women (through community health workers [CHWs]/skilled birth attendants[SBA])to:
- Avoid carrying heavy loads and not to perform heavy work after delivery (at least six weeks postpartum).
- Perform pelvic floor exercise during pregnancy and postpartum.
- Stop smoking and working in smoky environments.
- Avoid constipation by consumption of fiber in diet such as vegetables and enough liquids.

Secondary Level of Prevention

- Secondary level of prevention includes interventions that can be done to prevent the progression of disease once it has already started, for example, by treating pre-clinical or early stages of the disease.
- Identify at-risk women (young mothers, multiparas, previous difficult delivery, occupation that involves carrying heavy weight, malnourished women) to detect early stage of POP-Q (stages 1 and 2).
- Provide health education/counseling as well as non-surgical treatments such as pelvic floor muscle training and pessaries to women with early stage POP.

Tertiary Level of Prevention

Tertiary level of prevention includes interventions aimed to manage complications of the disease in a timely way, as well as morbidity associated with treatment itself and risk of recurrence. This level of prevention is mostly instituted by specialists (gynecologists).

- Offer and promote non-surgical treatments as first-line of treatment for POP:

- Emphasize the importance of care of pessaries and follow-up after fitting pessary.
- Provide important information as any operative procedure is associated with operative morbidity, including infection, risk of injury to adjacent organs such as bladder or ureter and risk of recurrence of the disease.
- Discourage pregnancy after conservative prolapse surgery:
 - Counsel women who are willing to undergo POP surgery that subsequent vaginal births can cause a recurrence of the problem and ensure that they must have access to cesarean section for any subsequent pregnancy.
- Delay surgical treatment for POP in younger women, given that they are at substantial risk of recurrence in later life.
- Organize follow-up visits after any surgical treatment to address de novo morbidities such as urinary incontinence, overactive bladder, dyspareunia, etc.

Key Points

- POP affects millions of women worldwide and is one of the leading reproductive health problems in Nepal.
- Pathophysiology of POP is multifactorial and leads to weakening of the support of pelvic organs.
- Risk factors for POP are broadly categorized into established and potential risk factors.
- Strongest risk factor for POP is vaginal delivery.
- Three levels of prevention strategies for POP exist: primary, secondary, and tertiary.
- Primary prevention emphasizes educating and empowering women; creating awareness at the family, community, and national levels; providing skilled care during pregnancy and childbirth; ensuring proper postpartum care; performing pelvic floor exercises; practicing birth spacing; accessing family planning methods; and avoiding risk factors like smoking, constipation, and heavy weight lifting.
- Secondary level prevention: diagnosis of POP at the early stage and taking measures to prevent its progress, such as conservative management like Kegel's exercise and ring pessary, and avoiding further risk factors that will aggravate the condition.
- Tertiary level prevention: timely management of POP to prevent complications, including surgical and non-surgical methods.

References for Module One

- Abrams P, Cardozo L, Fall M, et al. 2002. The standardization of terminology of lower urinary tract function: report from the standardization sub-committee of the International Continence Society. *Neurourology and Urodynamics* 21:167–178.
- Abrams P, Cardozo L, Khoury S, 2009. Incontinence, 4th edition, Paris; Health Publication Ltd
- Altman D, et al. 2007. Genetic influence on stress urinary incontinence and pelvic organ prolapse. *Eur Urol* 54(4):918–22.
- Arya LA, et al. 2005. Pelvic organ prolapse, constipation, and dietary fibre intake in women: a case-control study. *Am J Obstet Gynecol* 192(5): 1687–91.
- Bai SW, et al. 2002. Pelvic organ prolapse and connective tissue abnormalities in Korean women. *J Reprod Med* 47(3): 231–4.
- Bergman A, Koonings PP, and Ballard CA. 1988. Predicting postoperative urinary incontinence development in women undergoing operation for genitourinary prolapse. *Am J Obstet Gynecol* 158(5): 1171–5.
- Bradley CS, et al. 2007. Natural history of pelvic organ prolapsed in postmenopausal women. *Obstet Gynecol* 109(4): 848–54.
- Bump RC, et al. 1995. Randomized prospective comparison of needle colposuspension versus endopelvic fascia plaction for potential stress incontinence prophylaxis in women undergoing vaginal reconstruction for stage III or IV pelvic organ prolapse. The Continence Program for Women Research Group. *Am J Obstet Gynecol* 175(2): 326–33.
- Carley, ME and Schaffer J. 2000. Urinary incontinence and pelvic organ prolapse in women with Marfan or Ehlers Danlos syndrome. *Am J Obstet Gynecol* 182(5): 1021–3.
- Center for Agro-Ecology and Development, Nepal. 2006. *Uterine Prolapse Study Report*.
- Chiaffarino F., et al. 1999. Reproductive factors, family history, occupation and risk of urogenital prolapse. *Eur J Obstet Gynecol Reprod Biol* 82(1): 63–7.
- Christian J, et al. 2011. “Vaginal and Abdominal Reconstructive Surgery for Pelvic Organ Prolapse.” Chapter 72 in *Wein Campbell Walsh Urology*, 10th edition.
<http://www.mdconsult.com>.
- Dällenbach P, Kaelin-Gambirasio I, Dubuisson JB, et al. 2007. Risk factors for pelvic organ prolapse repair after hysterectomy. *Obstet Gynecol* 110(3): 625–32.
- Darshan A. 2009. Prevalence of uterine prolapsed amongst gynecology OPD patients in Tribhuvan university teaching hospital in Nepal and its socio-cultural determinants, Kuala Lumpur, Malaysia: *The Asian Pacific research and resource centre for women (ARROW)*
- Dolan LM, et al. 2003. Stress incontinence and pelvic floor neurophysiology 15 years after the first delivery. *BJOG* 110(12): 1107–14.
- Drutz HP, Alarab M. 2006. Pelvic organ prolapse: demographics and future prospects. *Int Urogynecol J pelvic floor Dysfunct.* 17 Suppl 7:6-9 abstract
- Earth B and Sthapit S. 2002. Uterine prolapsed in rural Nepal :Gender and human rights implications. A mandate for development, culture, health and sexuality. 4(3): 281–296.

- Handa VL, et al. 2004. Progression and remission of pelvic organ prolapse: A longitudinal study of menopausal women. *Am J Obstet Gynecol* 190(1): 27–32.
- Hansell NK, et al. 2004. Genetic covariation of pelvic organ and elbow mobility in twins and their sisters. *Twin Res* 7(3): 254–60.
- Hoffman B, et al. 2008. “Female Pelvic Medicine and Reconstructive Surgery” in *Williams Gynecology*, Chapter 24. The McGraw-Hill Companies.
- Ismail SI, Bain C, Hagen S. 2010. Oestrogens for treatment or prevention of pelvic organ prolapse in postmenopausal women. *Cochrane Database of Systematic Reviews*, Issue 9.
- J Eric Jelovsek, Christopher Maher, Matthew D Barber. 2007. Pelvic Organ Prolapse. *The Lancet*. 369(9566) 1027–1.
- Klutke JJ and Ramos S. 2000. Urodynamic outcome after surgery for severe prolapse and potential stress incontinence. *Am J Obstet Gynecol* 182(6): 1378–81.
- Landon, CR, et al. 1990. Mechanical properties of fascia during pregnancy: A possible factor in the development of stress incontinence of urine. *Contemp Rev Obstet Gynaecol* (2): 40–46.
- Langer R, et al. 1995. Continence mechanism after colpo-needle suspension for stress urinary incontinence. *J Reprod Med* 40(10): 699–702.
- Lieschen H, Quiroz M.D., Alvaro M, Ph.D., Stuart H. Shippey, M.D., Robert E. Gutman, M.D., and Victoria L. Handa, M.D. 2010. *J Reprod Med* Mar-Apr; 55(3-4): 93–98.
- Lind LR, Lucente V, and Kohn N. 1996. Thoracic kyphosis and the prevalence of advanced uterine prolapse. *Obstet Gynecol* 87(4): 605–9.
- MacLennan AH, Taylor AW, Wilson DH, Wilson D. 2000. The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery. *British Journal of Obstetrics and Gynaecology*;107(12):1460-70. [MEDLINE: 21029149]
- Mant J, Painter R, and Vessey M. 1997. Epidemiology of genital prolapse: Observations from the Oxford Family Planning Association study. *Br J Obstet Gynaecol* 104: 579–85.
- Marahatta, RK and Shah A. 2003. Genital prolapse in women of Bhaktapur, Nepal. *Nepal Med Coll J* 5(1): 31–3 [abstract].
- Marshman D, et al. 1987. Rectal prolapse: Relationship with joint mobility. *Aust N Z J Surg* 57(11): 827–9.
- Marchionni M, Bracco GL, Checucci V, et al. 1999. True incidence of vaginal vault prolapse: Thirteen years of experience. *J Reprod Med* 44:679–84.
- Miodrag A, Castleden CM, and Vallance TR. 1988. Sex hormones and the female urinary tract. *Drugs* 36(4): 491–504.
- Ministry of Health and Population (MOHP): Nepal Demographic and Health Survey 2011. Nepal: Ministry of Health and Population
- Moalli PA, et al. 2003. Risk factors associated with pelvic floor disorders in women undergoing surgical repair. *Obstet Gynecol* 101(5 Pt 1): 869-74.
- Nepal Institute of Medicine and Tribhuvan University. 2006. *The status of Reproductive Morbidities in Nepal; A reproductive morbidity report on clinic based study*. UNFPA.

- Nguyen JK, et al. 2000. Lumbosacral spine and pelvic inlet changes associated with pelvic organ prolapse. *Obstet Gynecol* 95(3): 332–6.
- Norton PA, et al. 1995. Genitourinary prolapse and joint hypermobility in women. *Obstet Gynecol* 85(2): 225–8.
- Nygaard I, Bradley C, and Brandt D. 2004. Pelvic organ prolapsed in older women: Prevalence and risk factors. *Obstet Gynecol* 104(3): 489–97.
- O’Boyle AL, et al. 2002. Pelvic organ support in nulliparous pregnant and nonpregnant women: A case control study. *Am J Obstet Gynecol* 187(1): 99–102.
- O’Boyle AL, et al. 2003. The natural history of pelvic organ support in pregnancy. *Int Urogynecol J Pelvic Floor Dysfunct* 14(1): 46–9.
- Olsen AL, Smith VJ, Bergstrom JO, et al. 1997. Epidemiology of surgically managed pelvic organ prolapse and urinary incontinence. *Obstet Gynecol* 89: 501–6 [abstract]. Parity, Mode of delivery and pelvic floor disorders. Lkacz E et al, *Obstetrics and gynecology* 107(6):1253-60
- Quiroz LH, Muñoz A, Shippey SH, et al. 2010. Vaginal parity and pelvic organ prolapse. *J Reprod Med* 55(3–4): 93–8.
- Rinne KM and Kirkinen PP. 1999. What predisposes young women to genital prolapse? *Eur J Obstet Gynecol Reprod* 84(1): 23–5.
- Rortveit, G, et al. 2007. Symptomatic pelvic organ prolapse: prevalence and risk factors in a population-based, racially diverse cohort. *Obstet Gynecol* 109(6): 1396–403.
- Snooks SJ, et al. 1990. Effect of vaginal delivery on the pelvic floor: A 5-year follow-up. *Br J Surg* 77(12): 1358–60.
- Suzme R, et al. 2007. Connective tissue alterations in women with pelvic organ prolapse and urinary incontinence. *Acta Obstet Gynecol Scand* 86(7): 882–8.
- Swift S, et al. 2005. Pelvic Organ Support Study (POSST): The distribution, clinical definition, and epidemiologic condition of pelvic organ support defects. *Am J Obstet Gynecol* 192(3): 795–806.
- Swift SE. 2000. The distribution of pelvic organ support in population of female subjects seen for routine gynecologic health care. *Am J Obstet Gynecol* 183(2):277–85.
- Sze EH, Sherard GB 3rd, and Dolezal JM. 2002. Pregnancy, labor, delivery, and pelvic organ prolapse. *Obstet Gynecol* 100(5 Pt 1): 981–6.
- Tegerstedt G., et al. 2006. Obstetric risk factors for symptomatic prolapse: A population-based approach. *Am J Obstet Gynecol* 194(1): 75–81.
- Walker GJ and Gunasekera P. 2011. Pelvic organ prolapsed and incontinence in developing countries: Review of prevalence and risk factors. *Int Urogynecol J* 22: 127–135.
- Welgoss JA, et al. 1999. Relationship between surgically induced neuropathy and outcome of pelvic organ prolapse surgery. *Int Urogynecol J Pelvic Floor Dysfunct* 10(1): 11–4.
- Woodman PJ, et al. 2006. Prevalence of severe pelvic organ prolapse in relation to job description and socioeconomic status: A multicenter cross-sectional study. *Int Urogynecol J Pelvic Floor Dysfunct* 17(4): 340–5.

World Health Organization. 1995. *Report on the Regional Reproductive Health Strategy*. Workshop: South-East Asia Region. Geneva: WHO.

Wu JM, Hundley AF, Fulton RG, et al. 2009. Forecasting the prevalence of pelvic floor disorders in U.S. Women: 2010 to 2050. *Obstet Gynecol* 114(6): 1278–83 [abstract].

Zs ALR and Al-Rawi ZT. 1982. Joint hypermobility in women with genital prolapse. *Lancet* 1(8287): 1439–41.

Exercises

Module One: Epidemiology, Pathophysiology, and Strategies for Prevention of Pelvic Organ Prolapse

1. What is the global prevalence of POP in women under 45?

Answer _____

2. Risk factors for POP include:

- a. Axis of vagina lying in horizontal plane (anorectal angle)
- b. Decrease in intra-abdominal pressure
- c. Older age at first childbirth

3. According to the Nepal Demography and Health Survey (2011), what is the prevalence of POP in the reproductive age group?

Answer _____

4. List risk factors that contribute to the high prevalence of POP in Nepal.

Answer:

5. What is the strongest risk factor for developing POP?

Answer: _____

6. Match the following with the correct description

a. Skilled care during childbirth	1. Tertiary level of prevention
b. Fitting ring pessary in early stage of prolapse	2. Primary level of prevention
c. Discourage pregnancy after conservative surgery for prolapse	3. Secondary level of prevention
d. Obesity	4. Potential risk factor for POP
e. Heavy weight lifting	5. Established risk factor for POP
	6. Definitive treatment of POP

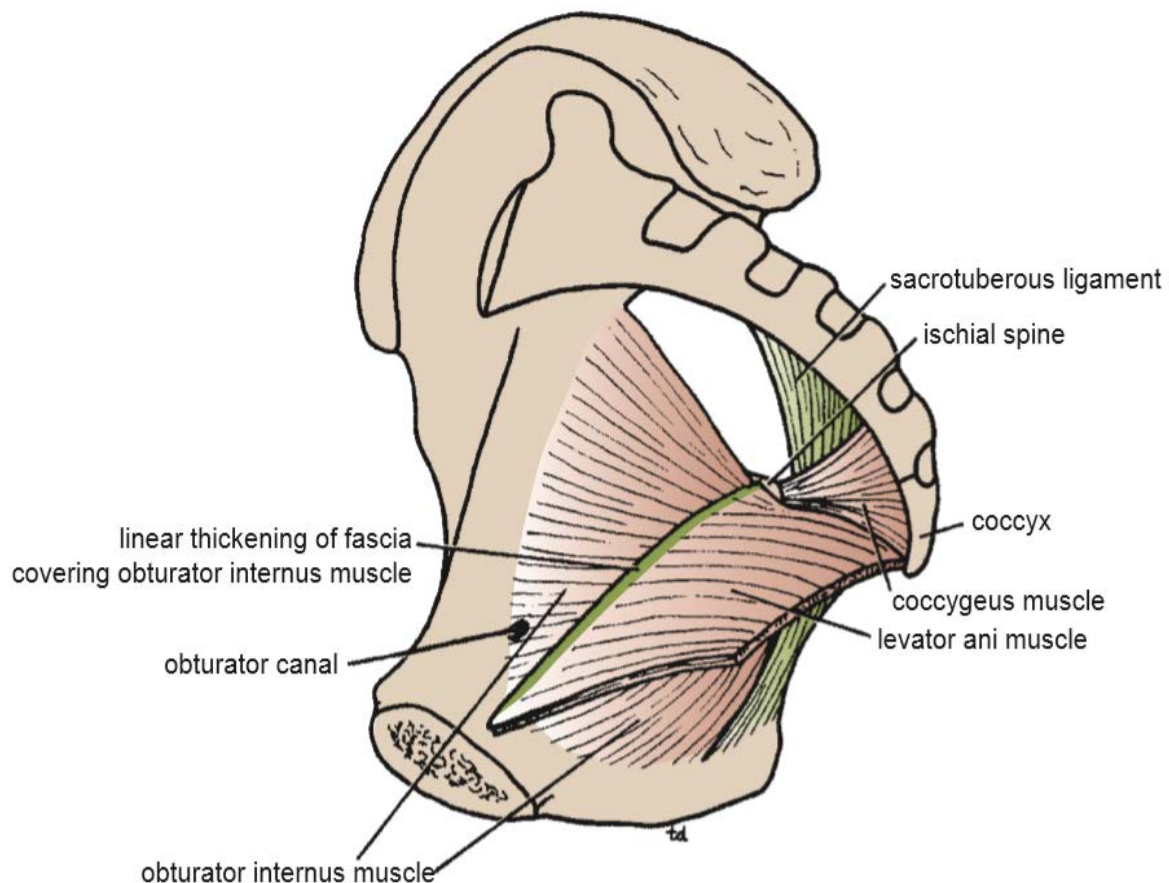
MODULE TWO: ANATOMY OF THE UTERUS, VAGINA, AND PELVIC FLOOR

Functional Anatomy of Supports of the Uterus and Vagina

The support system of the pelvis consists of the bony pelvis, the pelvic floor muscles, and the endopelvic fascia—a three-tiered system of support (Bonney 1934).

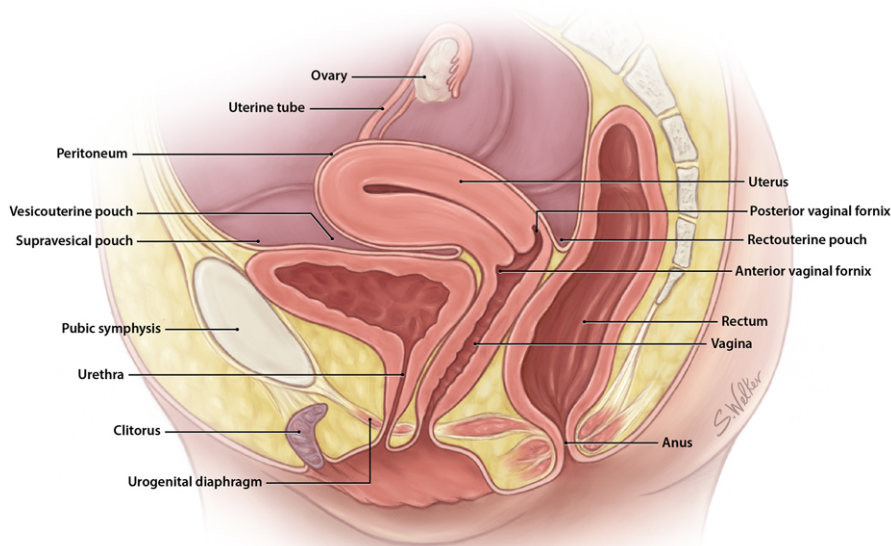
The bony pelvis: The bones of the pelvis provide support to the soft tissues (muscles, ligaments, and fascia). The bony pelvis (pelvic girdle) consists of paired innominate or hip bones, further divided into the ileum, the ischium, and the pubis, placed on either side of the sacrum. The ischial spine provides attachment for the arcus tendineus fasciae pelvis (ATFP), the sacrospinous ligament, and the coccygeus muscle (Barber 2005). (Figure 2-1 and Figure 2-2)

Figure 2-1. Lateral View of the Inside of the Pelvis



(Source: Snell R. 2012. *Clinical Anatomy by Regions*, 9th edition.)

Figure 2-2. Normal Anatomy: Sagittal Section of Pelvis



The female pelvis has a wider diameter and a more circular shape than that of the male. The wider inlet facilitates head engagement and parturition. The wider outlet is predisposed to subsequent pelvic floor weakness. Numerous projections and contours provide attachment sites for ligaments, muscles, and fascial layers. The thin and triangular sacrospinous ligament extends from the ischial spines to the lateral margins of the sacrum and coccyx anteriorly to the sacrotuberous ligament. Its anterior surface is muscular and constitutes the coccygeus; the ligament is often regarded as the degenerate part of the muscle. (Lawer 2003) The greater and lesser sciatic foramina are above and below the ligament (Herschorn 2004).

Muscular Supports of the Pelvic Floor

Pelvic Diaphragm

The levator ani and coccygeus muscles that are attached to the inner surface of the minor pelvis form the muscular floor of the pelvis. With their corresponding muscles from the opposite side, they form the pelvic diaphragm. The levator ani is composed of two major muscles from medial to lateral: the pubococcygeus and iliococcygeus muscles (Figure 2-3, Figure 2-4 and Figure 2-5). The bulkier medial portion of the levator ani is the pubococcygeus muscle that arises from the back of the body of the pubis and anterior portion of the arcus tendineus. The arcus tendineus of the levator ani is a dense connective tissue structure that runs from the pubic ramus to the ischial spine and courses along the surface of the obturator internus muscle. The muscle passes back almost horizontally to behind the rectum.

The inner border forms the margin of the levator (urogenital) hiatus, through which passes the urethra, vagina, and anorectum. Various muscle subdivisions have been assigned to the medial portions of the pubococcygeus to reflect the attachments of the muscle to the urethra, vagina, anus, and rectum (Strohbehn 1998). These portions are referred as the pubourethralis, pubovaginalis, puboanalis, and puborectalis—or collectively as the pubovisceralis because of their association and attachment to the midline viscera (Lawson 1974) The urethral portion forms part

of the periurethral musculature, and the vaginal and anorectal portions insert into the vaginal walls, perineal body, and external anal sphincter muscle.

Figure 2-3.1: Pelvic Muscles

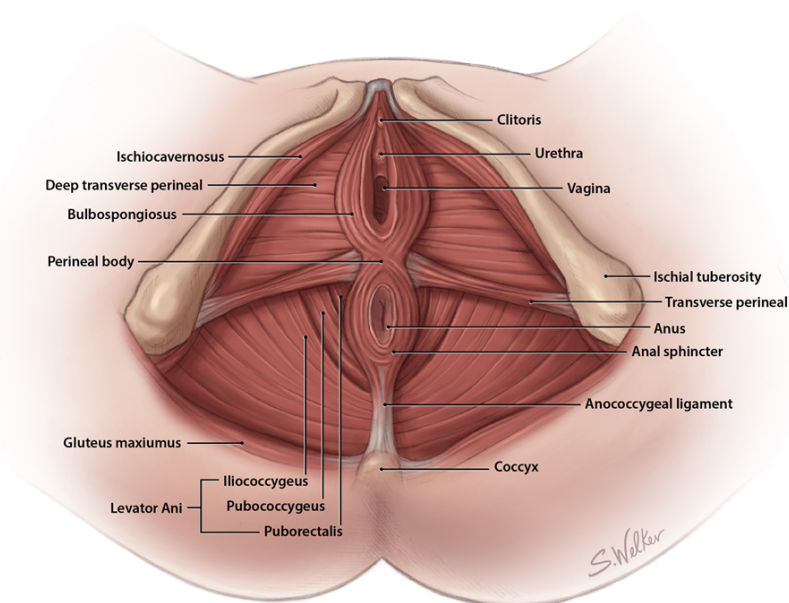
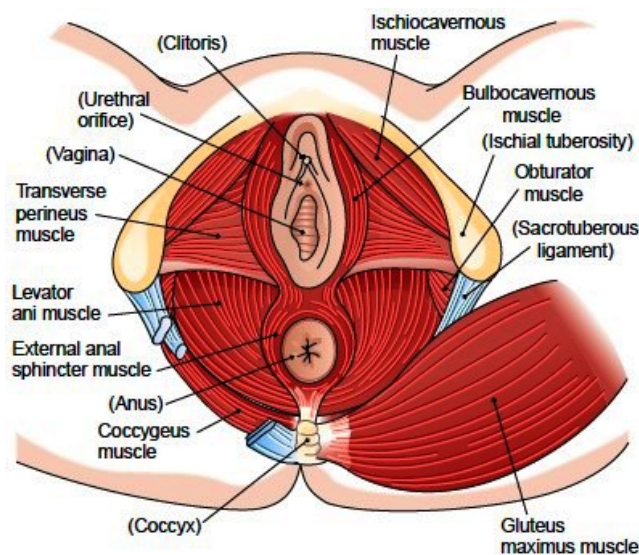


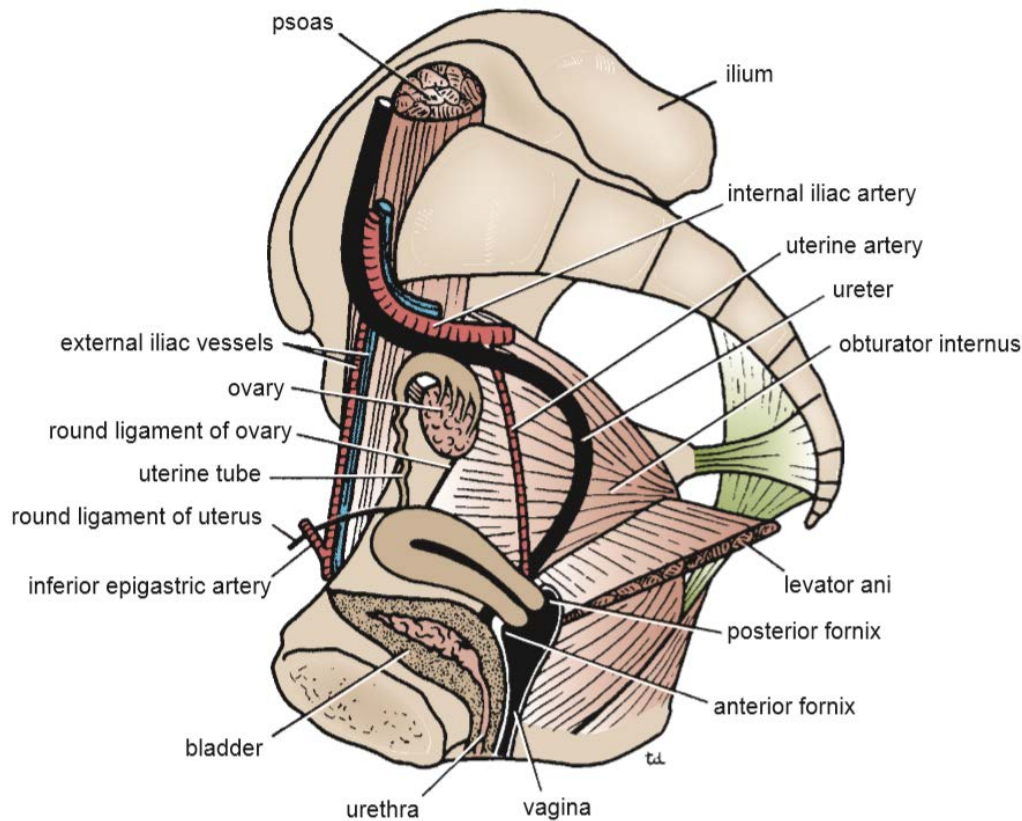
Figure 2-3.2: Pelvic Muscles



Source: Retrieved from: <http://www.pregnancy-yoga-resource.com/pelvic-floor-exercises.html>.

The puborectalis portion passes behind the rectum and fuses with its counterpart from the opposite side to form a sling behind the anorectum. Other more posterior parts of the pubococcygeus attach to the coccyx.

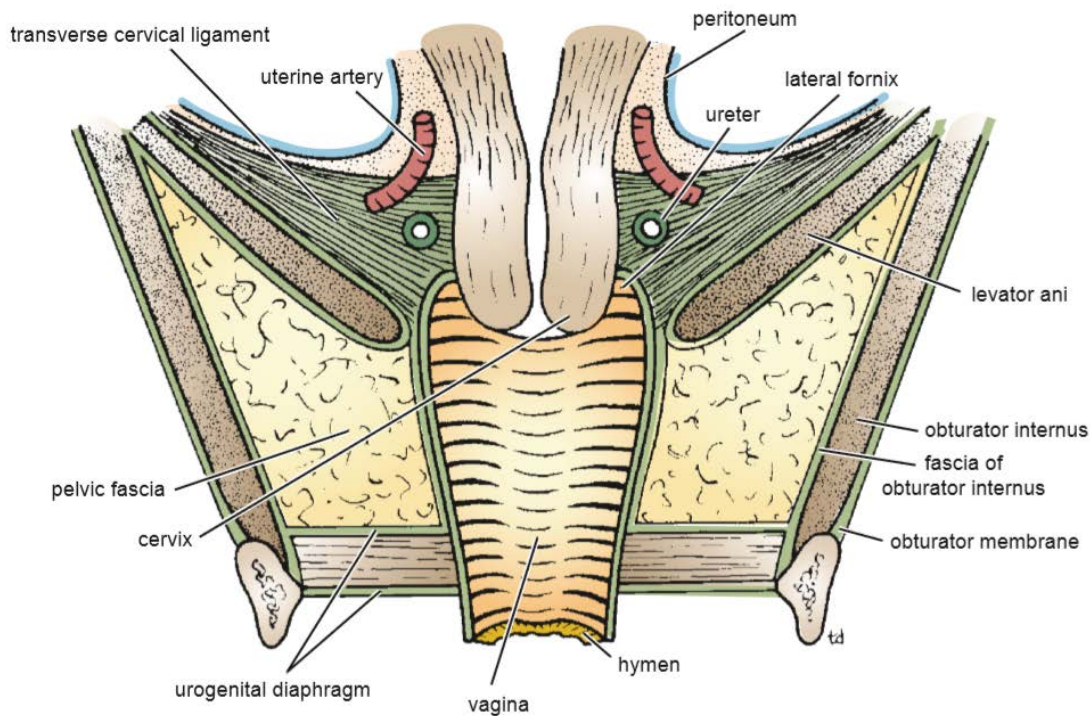
Figure 2-4: Right Half of Pelvic Structures



(Source: Snell R. 2012. *Clinical Anatomy by Regions*, 9th edition)

The thin lateral part of the levator ani is the iliococcygeus muscle, which arises from the arcus tendineus of the levator ani to the ischial spine. Posteriorly it attaches to the last two segments of the coccyx. The fibers from both sides also fuse to form a raphe and contribute to the anococcygeal ligament. This median raphe between the anus and the coccyx is called the levator plate and is the shelf on which the pelvic organs rest. It is formed by the fusion of the iliococcygeus and the posterior fibers of the pubococcygeus muscles. When the body is in a standing position, the levator plate is horizontal and supports the rectum and upper two-thirds of vagina above it. Weakness of the levator ani may loosen the sling behind the anorectum and cause the levator plate to sag (Berglas 1953). This opens the urogenital hiatus and predisposes to POP (Figure 2-3). The coccygeus muscle that extends from the ischial spine to the coccyx and lower sacrum forms the posterior part of the pelvic diaphragm. It sits on the anterior surface of the sacrospinous ligament.

Figure 2-5: Coronal Section of the Pelvis



(Source: Snell R. 2012. *Clinical Anatomy by Regions*, 9th edition)

Figure 2-5 shows the relation of the levator ani muscles and the transverse cervical ligaments to the uterus and vagina. Note that the transverse cervical ligaments are formed from a condensation of visceral pelvic fascia.

Urogenital Diaphragm (Perineal Membrane)

Another musculofascial structure, the urogenital diaphragm, is located over the anterior pelvic outlet below the pelvic diaphragm. It is also called the triangular ligament. The more superficial ischiocavernosus and bulbocavernosus muscles, as well as the thin slips of the superficial transverse perineal muscles, complete the inferior aspect of the urogenital diaphragm. The structure bridges the gap between the inferior pubic rami bilaterally and the perineal body. It closes the urogenital (levator) hiatus; supports and has a sphincter-like effect at the distal vagina; and, because it is attached to periurethral striated muscles, contributes to continence. It also provides structural support for the distal urethra. The posterior triangle around the anus does not have a corresponding diaphragm or membrane. The ischioanal fossae are the spaces lateral to the anus below the pelvic diaphragm.

Endopelvic Fascia and Connective Tissue Supports

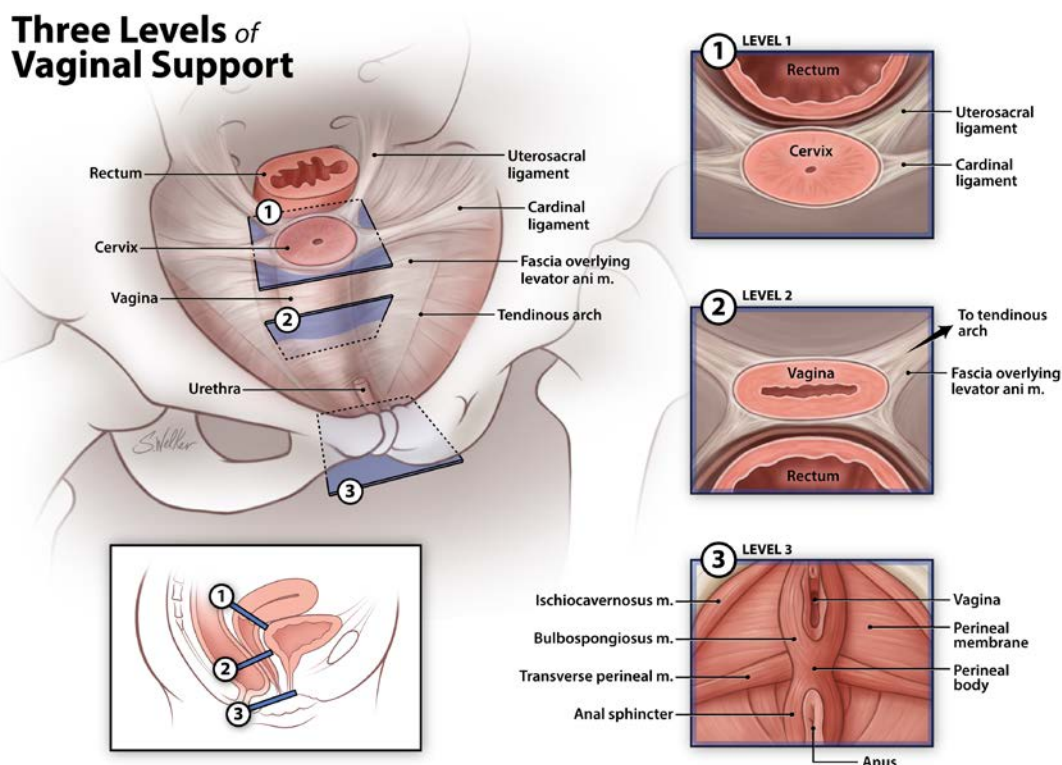
The bladder and urethra and the vagina and uterus are attached to the pelvic walls by a system of connective tissue called the endopelvic fascia. This structure lies immediately beneath the peritoneum and is one continuous unit with various thickenings or condensations in specific areas. The endopelvic fascia is continuous with the visceral fascia, which provides a capsule containing the organs and allows displacements and changes in volume. The distinct regions of this structure are given individual names, specifically ligaments and fascia, with variable internal structure. Endopelvic fascia and ligaments are a mesh-like group of collagen fibers interlaced with elastin, smooth muscle cells, fibroblasts, and vascular structures. The structures that attach the

uterus to the pelvic wall, the cardinal ligaments, derive strength from the supportive collagen forming the walls of arteries and veins. Other structures, such as the pelvic side wall attachment of the endopelvic fascia (arcus tendineus of the pelvic fascia), are predominantly fibrous collagen (Norton 1993).

Three Levels of Support

DeLancey (1992) described the three levels of support of the vagina. (Figures 2-6 and 2-7)

Figure 2-6: Three Levels of Vaginal Support



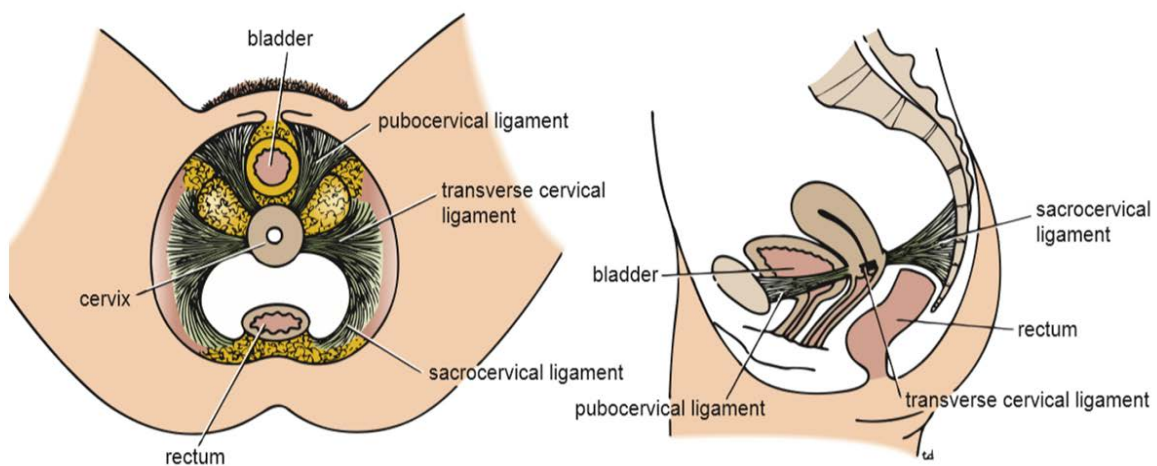
Level 1 support is made up of the cardinal/uterosacral ligament complex, originating from the greater sciatic foramen, the sacroiliac region, and the lateral sacrum. These are the longest fibers of the endopelvic fascia, primarily vertically oriented, which suspend the uterus and upper 2 to 3 cm of the vagina. Loss of level 1 support contributes to prolapse of the uterus and/or vaginal apex.

Level 2 support is at the mid vagina. These fibers are shorter than level 1 support, but longer than those at level 3, laterally oriented and denser than the cardinal/uterosacral ligament complex. The anterior level 2 supports suspend the mid portion of the anterior vaginal wall. Detachment of these lateral supports can lead to paravaginal defects and prolapse of the anterior vaginal wall. The attachment of posterior vaginal wall to the pelvic sidewall is more complex. The distal half of the posterior vaginal wall fuses with the aponeurosis of the levator ani muscle from the perineal body along a line referred to as the arcus tendineus rectovaginalis. Along the proximal half of the vagina, the anterior and posterior vaginal walls are both supported laterally to the arcus tendineus fasciae pelvis (ATFP). This arrangement accounts for the H-shape of the

distal vagina when viewed in cross-section and the flattened-tube configuration seen in the upper vagina. Anteriorly, the pubocervical and periurethral fascia and posteriorly, rectovaginal fascia are downward continuation of endopelvic fascia that provide support to bladder and urethra anteriorly and rectum posteriorly. However, the existence of pubocervical and rectovaginal fascia has been challenged and it is suggested that these are tissues of the vaginal muscularis itself and not a distinct fascia.

Level 3 support of the vagina starts at the introitus and extends 2 to 3 cm above the hymenal ring. At level 3, the vagina fuses with the urethra anteriorly and with the perineal body posteriorly. Anterior disruption of level 3 support can result in urethral hypermobility and stress incontinence, whereas posterior disruption may result in distal rectocele and/or perineal descent.

Figure 2-7: Ligamentous Supports of the Uterus



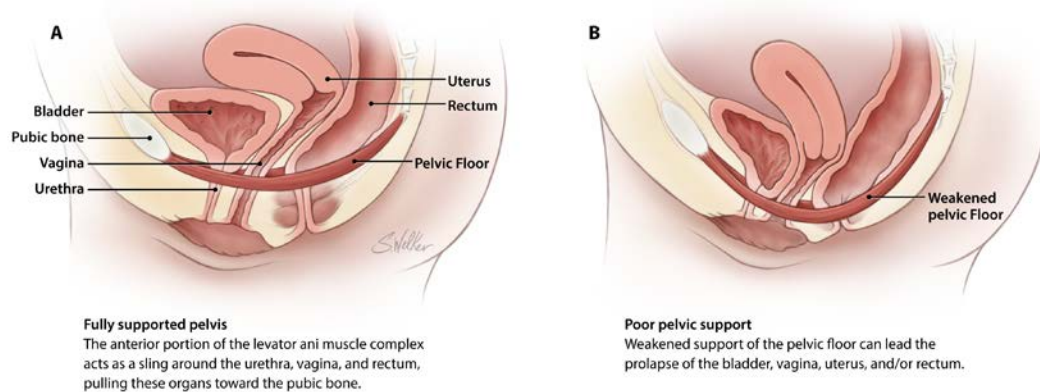
(Source: Clinical anatomy by regions 9e 2012, Richard S. Snell)

Figure 2-7 shows the ligamentous supports of the uterus as seen from below and the lateral view. These ligaments are formed from visceral pelvic fascia.

Compartment wise, major support of the anterior compartment (support is level 1 and 2) are the endopelvic fascia (periurethral and pubocervical fascia), ATRF, and the levator ani muscles. Apical (middle) compartment support is provided by the cardinal/uterosacral ligament complex-level 1 support of DeLancey. Posterior compartment support is provided by the rectovaginal fascia, which is continuous with the cardinal/uterosacral ligament complex in the upper vagina where the uterosacral ligament merges with the rectovaginal fascia.

Functions of the Pelvic Floor

Figure 2-8: Functions of the Pelvic Floor (Mid-Sagittal Section of Pelvis)



The anterior part of the levator ani muscle complex (pubococcygeus and puborectalis) acts as a sling around the mid-urethra, vagina, and anorectum, closing the urogenital hiatus and pulling the urethra, vagina, perineum, and anorectum toward the pubic bone. The posterior part (the iliococcygeus), the levator plate acts as a supportive diaphragm behind the pelvic viscera by elevating and stabilizing the upper vagina. (Figure 2-8)

Normally, the upper two thirds of the vagina, the bladder, and the rectum lie directly over the levator plate in standing position. Intra-abdominal and gravitational forces are perpendicular to the vagina, while the pelvic floor muscles close the urogenital hiatus by its constant tone. Furthermore, in times of acute stress, such as a cough or a sneeze, there is a reflex contraction of the pelvic floor musculature, countering and further stabilizing the viscera. The genital hiatus also responds by narrowing to maintain level III support.

Direct muscular damage, neuromuscular dysfunction, and inherent tissue defects may result in a dysfunction of the levator ani musculature. If levator ani complex is weak, endopelvic fascia takes major burden of support resulting in weakening of these fascias, leading to various “breaks” and defects in vaginal support (Bodner 2007). The pelvic organs align in a more vertical axis if fascial supports are weak and herniation of pelvic organs through the genital hiatus if intra-abdominal pressure is increased.

Key Points

- Supports of pelvic organ consist of bony pelvis, pelvic floor muscles and endopelvic fascia.
- Musculofascial support includes pelvic diaphragm, urogenital diaphragm, endopelvic fascia and connective tissue supports.
- DeLancey has described three levels of pelvic supports: Levels 1, 2 and 3.
- Level 1 support includes cardinal/uterosacral ligament complex and loss of it leads to prolapse of uterus and/or vaginal apex.
- Level 2 support includes endopelvic fascia
- Level 3 support includes perineal body and tissue surrounding urethra, vagina and anus.
- When levator ani complex and endopelvic fascia weakens, pelvic organs align in a vertical axis and herniate through the genital hiatus during increased intra-abdominal pressure.

References for Module Two

- Barber MD. Contemporary views on female pelvic anatomy. 2005. *Cleve Clin J Med* 72 Suppl 4 3–11.
- Berglas B and Rubin IC. 1953. Study of the supportive structures of the uterus by levator myography. *Surg Gynecol Obstet* 97:677–692.
- Bodner-Adler B, Shrivastava C, and Bodner K. 2007. Risk factors for uterine prolapse in Nepal. *Int Urogynecol J Pelvic Floor Dysfunct* 18: 1343–1346.
- Bonney V. 1934. The principles that should underlie all operations for prolapse. *Br J Obstet. Gynecol* 41:669–686. (Secondary source: Ross W. 1997. Apical Vault repair, the cornerstone or pelvic vault reconstruction. *Int Urogynecol J* 8:146–152.
- Herschorn S. 2004. Female pelvic floor anatomy: The pelvic floor, supporting structures, and pelvic organs. *Rev Urol* 6(suppl 5): S2–S10
- Lawson JO. 1974. Pelvic anatomy I: Pelvic floor muscles. *Ann R Coll Surg Engl* 54:244–252.
- Lower A. 2003. Surgical Anatomy part 1 in *Gynecology*, third edition, edited by Robert W. Shaw, Stuart L. Stanton and W.P. Soutter. Churchill Livingstone.
- Norton PA. 1993. Pelvic floor disorders: The role of fascia and ligaments. *Clin Obstet Gynecol* 36:926–938.
- Strohbehn K. 1998. Normal pelvic floor anatomy. *Obstet Gynecol Clin North Am* 25(4): 683–705.

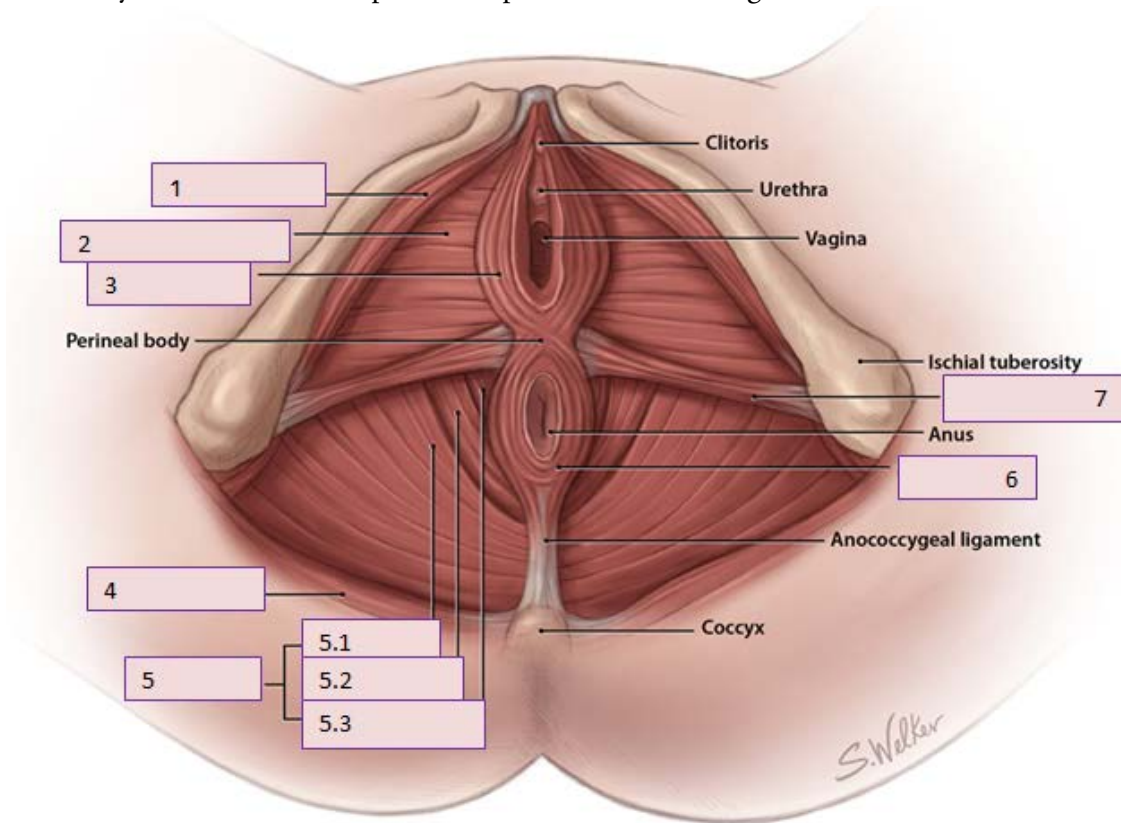
Exercises

Module Two: Anatomy

1. Match the following function with anatomy

1. Pelvic diaphragm	a. Level II support
2. Levator ani	b. Muscular floor of pelvis
3. Urogenital diaphragm	c. Attach the uterus to the pelvic sidewall
4. Cardinal ligament	d. Ischio/bulbocavernosus and superficial transverse perineai
	e. Pubococcygeus and ilioccygeus

2. Identify the muscles of the pelvis and perineum in the diagram.



1	
2	
3	
4	
5	
5.1	
5.2	
5.3	
6	
7	

MODULE THREE: INFECTION PREVENTION

Background

People undergoing surgery are at a risk of being infected unless precautions are taken to prevent infection. To prevent problems caused by infection, aseptic techniques, including correct surgical techniques, must be followed during each procedure.

To reduce the risk of infection, appropriately processed sterile instruments should be used. When sterilization facilities are not available, high-level disinfection (HLD) is the only acceptable alternative. The emphasis in this chapter is on the use of infection prevention practices that are practical and feasible in any country and setting.

Standard Infection Prevention Practices

Standard Precautions

Standard Precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where healthcare is delivered. These practices are designed to both protect HCP and prevent HCP from spreading infections among patients.

- Hand hygiene,
- Personal protective equipment (e.g., gloves, gowns, masks),
- Safe injection practices, Environmental cleaning
- Instrument processing
- Respiratory Hygiene/Cough Etiquette

(Source CDC)

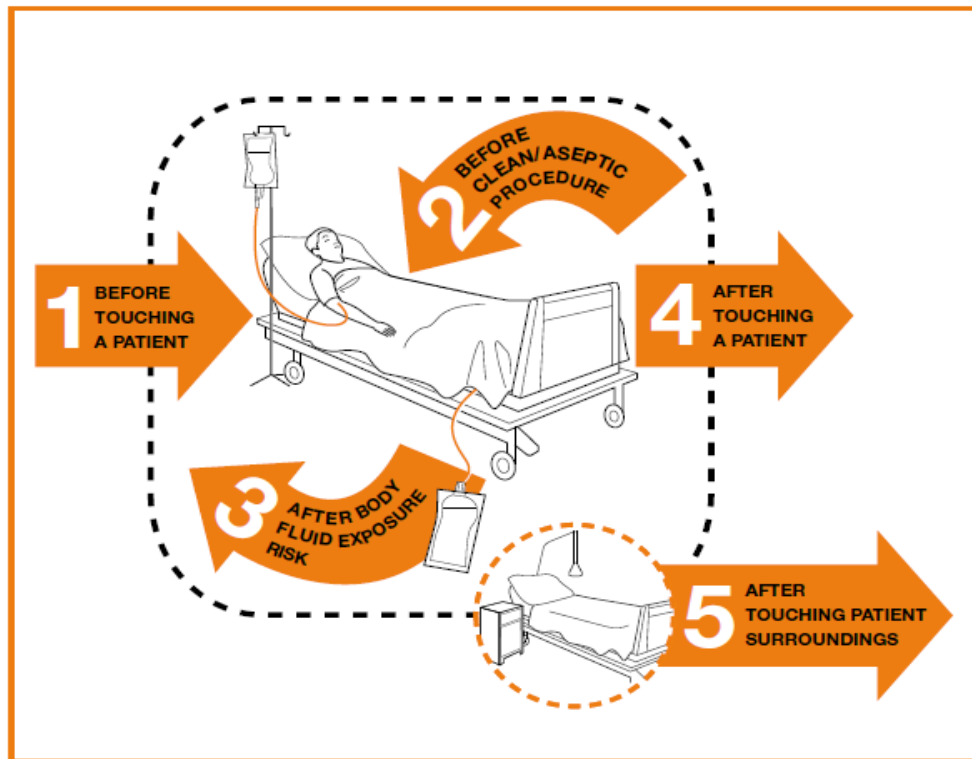
Hand Hygiene

Good hand hygiene, including use of alcohol-based hand rubs and handwashing with soap and water, is critical to reduce the risk of spreading infections in ambulatory care settings.

My five moments for hand hygiene (WHO 2009)

WHO has implemented the principles of handwashing in the model of “My five moments for hand hygiene”. Since its development in the context of the Swiss National Hand Hygiene Campaign and its integration in the WHO Multimodal Hand Hygiene Improvement Strategy, the concept of “My five moments for hand hygiene” has been widely adopted in more than 400 hospitals worldwide in 2006–2008.

Figure I.21.5b
Unified visuals for "My five moments for hand hygiene"



The patient zone, health-care area, and critical sites with inserted time-space representation of "My five moments for hand hygiene" (Figure I.21.5b).
Reprinted from Sax, 2007¹ with permission from Elsevier.

Before Touching Patient:

Clean your hands before touching a patient when approaching him/her

Example: shaking hands, helping a patient to move around, clinical examination

2- Before clean/aseptic task:

Clean your hands immediately before any aseptic task

Example: shaking oral/dental care, secretion aspiration, wound dressing, catheter insertion, preparation of food, medications

3- After body fluid exposure risk:

Clean your hands immediately after an exposure risk to body fluids (and after glove removal)

Example: oral/dental care, secretion aspiration, drawing and manipulating blood, clearing up urine, feces, handling waste.

4- After touching patient :

Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side

Example: shaking hands, helping a patient to move around, clinical examination

5- After touching patient surroundings:

Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched

Example: changing bed linen, perfusion speed adjustment

Handwashing

The purpose of handwashing is to mechanically remove soil, debris, and microorganisms from the skin. Handwashing with plain soap and **clean** water is as effective as washing with

antimicrobial soaps (Pereira, Lee, and Wade 1997).¹ In addition, plain soap causes much less skin irritation (Pereira, Lee, and Wade 1990).

Handwashing should be done before:

- Examining (direct contact with) a patient
- Wearing examination gloves for routine procedures such as a pelvic examination

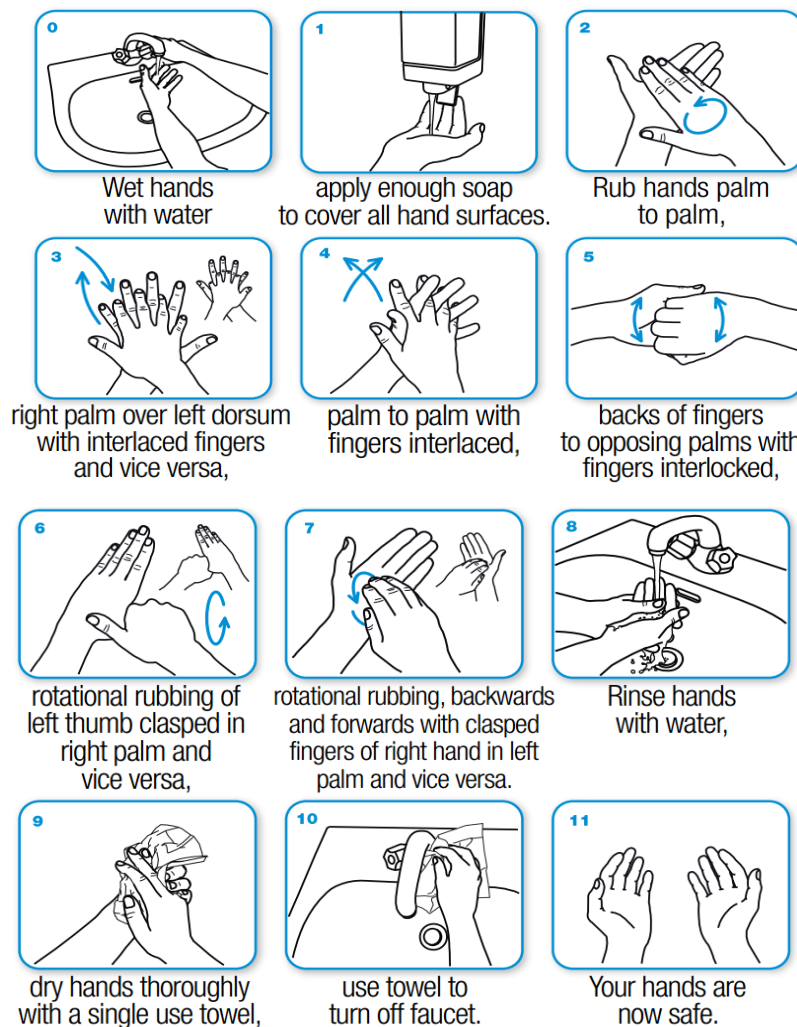
Handwashing should be done **after**:

- Any situation in which hands may become contaminated, such as:
- Handling soiled instruments and other items;
- Touching mucous membranes, blood, or other body fluids (secretions or excretions); and
- Examining a patient.

Hands should be washed with soap and clean water (or an antiseptic hand rub can be used) **after** removing gloves because the gloves now may have tiny holes or tears, and bacteria can rapidly multiply on gloved hands due to the moist, warm environment within the glove (CDC 1989; Korniewicz et al. 1990).

To encourage handwashing, program managers should make every effort to provide soap and a continuous supply of clean water, either from the tap or a bucket, and single-use towels.

Steps of Handwashing



• Wash hands when visibly soiled! Otherwise, use a hand rub.

Source: <http://who.int/gpsc/tools/Pocket-Leaflet.pdf>

Antiseptic Hand Rub

¹ If tap water is contaminated, however, handwashing with plain soap is only effective in removing dirt and debris.

Use of an antiseptic hand rub (alcohol based) is more effective in killing transient and resident flora than handwashing with antimicrobial agents or plain soap and water, is quick and convenient to perform, and gives a greater initial reduction in hand flora (Girou et al. 2002). Antiseptic hand rubs also contain a small amount of an emollient such as glycerin, propylene glycol, or sorbitol that protects and softens skin.

The technique for correct use of an antiseptic hand rub is:

STEP 1: Apply enough antiseptic hand rub to cover the entire surface of hands and fingers (about a teaspoonful).

STEP 2: Rub the solution vigorously into hands, especially between fingers and under nails, until dry.

To be effective, an adequate amount of hand rub solution should be used. For example, by increasing the amount of hand rub from 1 mL to 5 mL per application (about 1 teaspoonful), the effectiveness increased significantly (Larson 1988).

Since antiseptic hand rubs do not remove soil or organic matter, if hands are visibly soiled or contaminated with blood or body fluids, handwashing with soap and water should be done first. In addition, to reduce the “build up” of emollients on hands after repeated use of antiseptic hand rubs, washing hands with soap and water after every 5–10 applications is recommended. Finally, hand rubs containing only alcohol as the active ingredient have limited residual effect (i.e., ability to prevent growth of bacteria) compared to those containing alcohol plus an antiseptic such as chlorhexidine.

Steps of Hand Rub (WHO 2009)



- Rub hands for hand hygiene! Wash hands only when visibly soiled!
- Duration of the entire procedure: 20–30 seconds

Source:
<http://who.int/gpsc/tools/Pocket-Leaflet.pdf>

Surgical Hand Scrub

The purpose of the surgical hand scrub is to mechanically remove soil, debris, eliminate transient microorganisms and reduce resident microorganism that maybe transmitted from the hands of surgeon and assistants during surgery.

The general surgical scrub technique (after removing rings, watches, and bracelets) is illustrate below.

Surgical hand preparation technique (WHO 2009)

The handrubbing technique for surgical hand preparation must be performed on perfectly clean, dry hands. On arrival in the operating theatre and after having donned theatre clothing (cap/hat/bonnet and mask), hands must be washed with soap and water. After the operation when removing gloves, hands must be rubbed with an alcohol-based formulation or washed with soap and water if any residual talc or biological fluids are present (e.g. the glove is punctured).

Surgical procedures may be carried out one after the other without the need for handwashing, provided that the handrubbing technique for surgical hand preparation is followed (Images 1 to 17).



1
Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the dispenser



2
Dip the fingertips of your right hand in the handrub to decontaminate under the nails (5 seconds)



3
Images 3–7: Smear the handrub on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)



4
See legend for Image 3



5
See legend for Image 3



6
See legend for Image 3



7
See legend for Image 3



8
Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your right hand, using the elbow of your other arm to operate the dispenser



9
Dip the fingertips of your left hand in the handrub to decontaminate under the nails (5 seconds)

Surgical hand preparation technique with an alcohol-based handrub formulation (Cont.)



10

Smear the handrub on the left forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)



11

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the distributor. Rub both hands at the same time up to the wrists, and ensure that all the steps represented in Images 12-17 are followed (20-30 seconds)



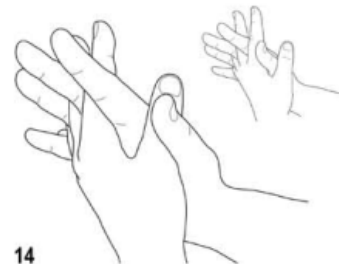
12

Cover the whole surface of the hands up to the wrist with alcohol-based handrub, rubbing palm against palm with a rotating movement



13

Rub the back of the left hand, including the wrist, moving the right palm back and forth, and vice-versa



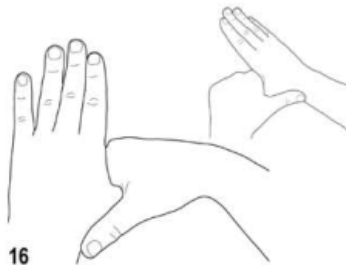
14

Rub palm against palm back and forth with fingers interlinked



15

Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement



16

Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa



17

When the hands are dry, sterile surgical clothing and gloves can be donned

Repeat the above-illustrated sequence (average duration, 60 sec) according to the number of times corresponding to the total duration recommended by the manufacturer for surgical hand preparation with an alcohol-based handrub.

Source: WHO Guidelines on Hand hygiene in Health Care, 2009

Surgical hand scrub must be done before wearing **sterile** surgical gloves prior to a surgery.

Personal Protective Equipment (PPE)

What Is PPE?

Protective barriers, now commonly referred to as personal protective equipment (PPE), have been used for many years to protect patients from microorganisms present on staff working in the health care setting as well as protect healthcare staff from accidental exposure to blood and body fluids potentially infected with blood borne pathogens.

Personal protective equipment includes: gloves, masks/respirators, eyewear (face shields, goggles or glasses), caps, gowns, aprons, boots, and other items. The most effective barriers, however, are made of treated fabrics or synthetic materials that do not allow water or other liquids (blood or body fluids) to penetrate them. These fluid-resistant materials are not, however, widely available because they are expensive.

Types of PPE

Gloves protect hands from infectious materials and protect patients from microorganisms on staff members' hands. They are the most important physical barrier for preventing the spread of infection, but they must be changed between each patient contact to avoid cross-contamination. For example, examination gloves should be worn when handling blood, body fluids, secretions, and excretions (except sweat), contaminated surfaces or equipment, and when touching non-intact skin or mucous membranes.

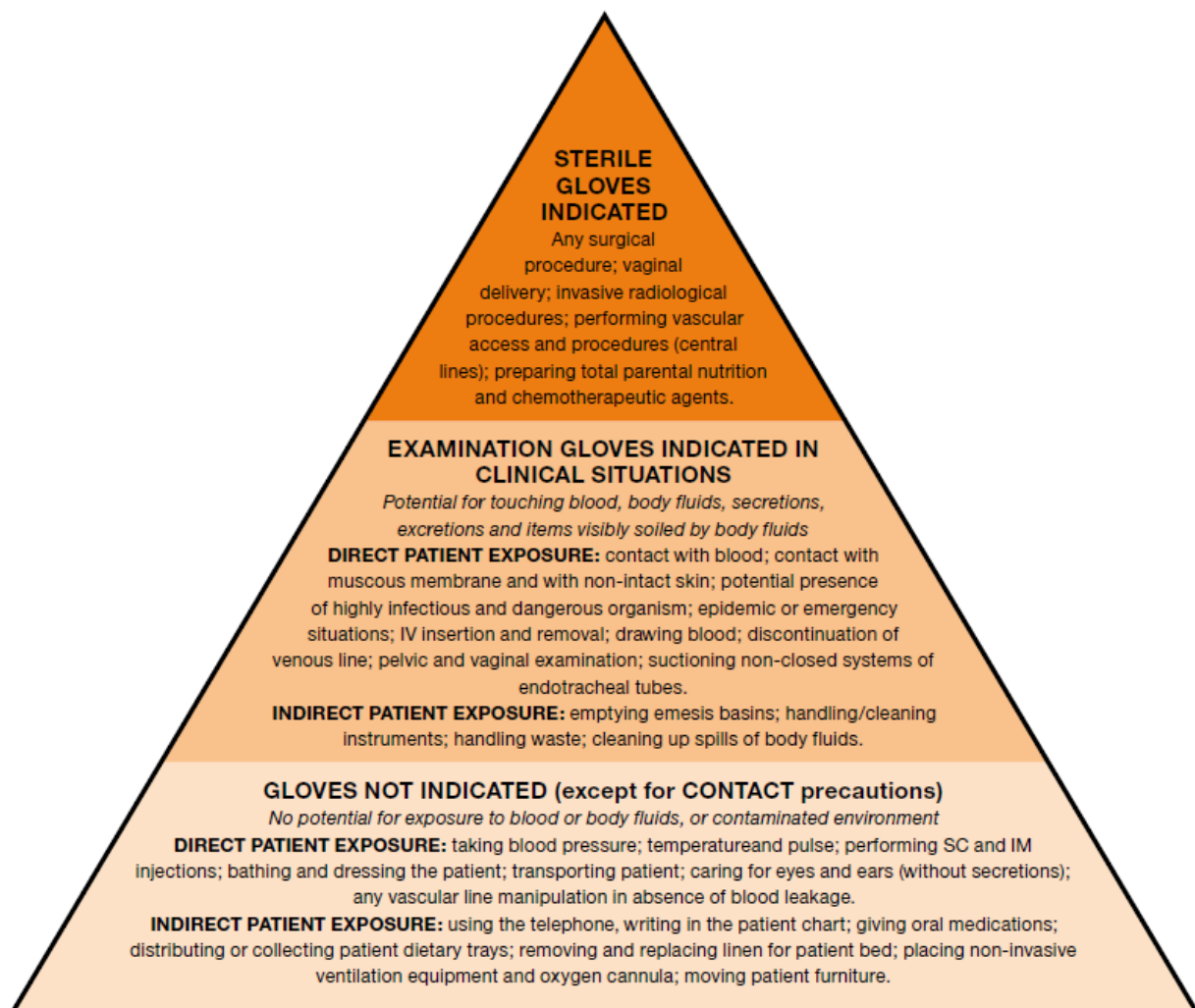
When to Wear Gloves

Although the effectiveness of gloves in preventing contamination of health care workers' hands has been repeatedly confirmed (Tenorio et al. 2001), **wearing gloves does not replace the need for handwashing**. For example, even the best quality latex surgical gloves may have small, imperceptible defects, gloves may be torn during use, and hands can become contaminated during removal (Bagg, Jenkins and Barker 1990; Davis 2001). There are three types of gloves available,

- Sterile surgical gloves
- Examination gloves (clean or sterile)
- Utility gloves.

The figure below summarizes the recommendations for gloves use.

Situations requiring and not requiring glove use



Gloves must be worn according to STANDARD and CONTACT PRECAUTIONS. The pyramid details some clinical examples in which gloves are not indicated, and others in which examination or sterile gloves are indicated. Hand hygiene should be performed when appropriate regardless indications for glove use.

Remember: Wash hands or use an antiseptic hand scrub before putting on gloves and after removing them.

Depending on the situation, clean **examination** or **utility** gloves should be worn by all staff when:

- There is reasonable chance of hand contact with blood or other body fluids, mucous membranes, or non-intact skin;
- Performing invasive medical procedures (e.g., inserting vascular devices such as peripheral venous lines); or
- Handling contaminated waste items or touching contaminated surfaces.

Note: Gloves should be changed as soon as possible when visibly soiled, torn or punctured.

A separate pair of gloves must be used for each patient to avoid cross-contamination (CDC 1987). Wearing the same pair of gloves and washing gloved hands between patients or between dirty to clean body site care is not a safe practice. Doebbeling and colleagues (1988) recovered

significant amounts of bacteria on the hands of staff that were just washing their gloved hands, not changing gloves between patients.

Masks should be large enough to cover the nose, lower face, jaw, and facial hair. They are worn in an attempt to contain moisture droplets expelled as health workers or surgical staff speak, cough or sneeze, as well as to prevent accidental splashes of blood or other contaminated body fluids from entering the health workers' nose or mouth, if water resistant material is used for making masks. At present, the primary reason for wearing masks, especially those made of cotton gauze or paper (materials that are not fluid-resistant), are to provide some protection to the wearer from splashes or sprays of a patient's blood or potentially contaminated body fluids from entering the nose and mouth.

Eyewear protects staff in the event of an accidental splash of blood or other body fluid by covering the eyes. Eyewear includes clear plastic goggles, safety glasses, face shields, and visors. Prescription glasses or glasses with plain lenses also are acceptable.

Caps are used to keep the hair and scalp covered so that flakes of skin and hair are not shed into the wound during surgery. Caps should be large enough to cover all hair. While caps provide some protection to the patient, their primary purpose is to protect the wearer from blood or body fluid splashes and sprays.

Scrub suits are worn over, or instead of, street clothes. The main use of cover gowns is to protect the health care workers' clothing. Scrub suits usually consist of drawstring pants and a shirt.

Surgical gowns were first used to protect patients from microorganisms present on the abdomen and arms of health care staff during surgery. Surgical gowns made of fluid-resistant materials do play a role in keeping blood and other fluids, such as amniotic fluid, off the skin of personnel, particularly in operating, delivery, and emergency rooms. In addition, the cuffs of the surgical gloves should completely cover the end of the sleeves.

Aprons made of rubber or plastic provide a waterproof barrier along the front of the health worker's body. An apron should be worn when cleaning or during a procedure in which blood or body fluid spills are anticipated (e.g., cesarean section or vaginal delivery). Aprons keep contaminated fluids off the health care worker's clothing and skin.

Footwear is worn to protect feet from injury by sharps or heavy items that may accidentally fall on them. For this reason, sandals, "thongs" or shoes made of soft materials (cloth) should not be worn. Rubber boots or leather shoes provide more protection, but they must be kept clean and free of contamination from blood or other body fluid spills

The Role of Drapes

In many countries, drapes are usually made of hemmed linen squares of varying sizes. They are used to create an operative field around an incision, wrap instruments and other items for sterilization, cover tables in the operating room, and keep clients warm during surgical procedures (OR Manager 1990a). The main types of drapes are:

- Towel drapes are used for drying hands, squaring off the operative site (several towel drapes are needed for this), and wrapping small instruments and syringes. They are often made of heavier cotton cloth than other linen items, which makes them somewhat more water resistant.
- Drapes or lap sheets are used for covering the patient. They are large, usually made of lightweight cotton and provide only limited protection to patients or staff.
- Site drapes are made of cotton and have a circular opening in the center that is placed over the prepped operative site. These drapes are primarily intended for use with minor surgical procedures (small incisions).

The particular surgical procedure dictates the amount of skin that needs to be cleaned and prepped with antiseptic solution prior to placing the drapes. Although this area is often called the “sterile field,” it is only briefly sterile. Cloth drapes allow moisture to soak through them and can help spread organisms from skin, even after surgical cleansing with an antiseptic agent, into the incision. Thus, neither gloved hands (sterile or high-level disinfected) nor sterile or high-level disinfected instruments and other items should touch the towel drapes once they are in place. Because cloth drapes do not serve as an effective barrier, clean, dry towel drapes can be used if sterile towel drapes are not available.

The way in which the operative site is prepared and draped depends on the type of procedure to be performed. The following guidelines for draping are designed to reduce overuse of costly sterile items and to avoid unnecessary draping:

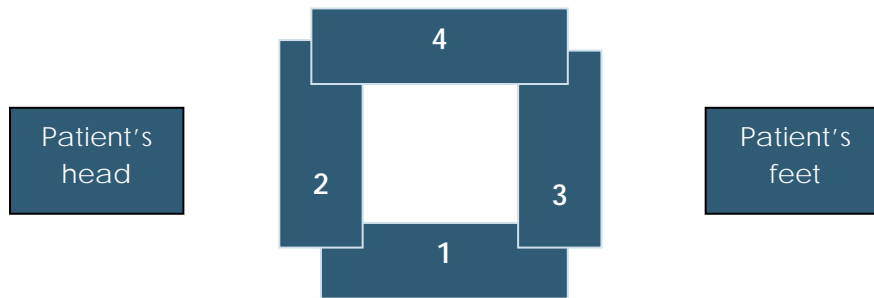
- All drapes should be applied around a completely dry, widely prepped area.
- If sterile drapes are used, sterile or high-level disinfected surgical gloves should be worn when placing the drapes. (When putting drapes in place, care must be taken not to touch the patient’s body with gloved hands.)
- Drapes should be handled as little as possible and should never be shaken or flapped. Always hold drapes above the area to be draped, and discard the drape if it falls below this area.

Major Surgical Procedures

Laparotomy or cesarean section

- Use large **drapes** or **lap sheets** to cover the patient’s body if it is necessary to keep her warm. These drapes do not need to be sterile because they will not be near the incision site (Belkin 1992). They should be clean and dry.
- After cleansing the skin with an antiseptic agent, place the towel drapes to square off the incision site (allow at least 5 cm or 2 inches of open skin around all sides of the proposed incision site).
- Begin by placing the towel drape closest to you to decrease the chance of contamination. Holding one side of the drape, allow the other side to touch the abdominal skin about 2 inches away from the proposed incision site. Gently drop the rest of the drape onto the abdomen. Once in place, the drape should never be moved closer to the incision. It can, however, be pulled away from it.
- Place three additional drapes (2, 3, and 4) to square off the work area as shown in figure 3-1.
- Use **non perforating** towel clips to secure the corners of the towel drapes.

Figure 3-1: Squaring Off a Work Area (Belkin 1992)



During Procedures

Do not use the patient's body or the draped area for placing instruments. Placing sterile or high-level disinfected instruments or other items on drapes, even if they were sterile initially will contaminate them. Also, doing this may make the items harder to find and may cause them to fall off the operating room table if the patient moves. If an instrument stand (Mayo table) covered with a sterile towel or drape is not available, a sterile or high-level disinfected plastic or metal instrument tray can be placed on the drape covering the patient and used to hold instruments during the procedure.

If a drape is torn or cut during a procedure, it should be covered with a new drape. Do not, however, place new drapes on top of a drape that has become wet. There is no evidence that this is effective in creating a barrier (OR Manager 1990b).

Vaginal surgeries

In case of vaginal surgeries (Pop surgery), draping should be done in the following sequence:

1. Complete surgical prep (vaginal, perineum, thighs, abdomen)
2. Tuck a drape under the buttocks
3. Cover woman's legs with legging/covers up to the knees.
4. Drape the right thigh and apply blunt towel clip
5. Drape the left thigh and apply blunt towel clip
6. Drape the perineum and vagina using a drape with a hole
7. Drape the pubic area and abdomen
8. Fix the drapes with towel clips as needed

Antiseptics

Definitions

- **Antiseptic or antimicrobial agent (terms used interchangeably).** Chemicals that are applied to the skin or other living tissue to inhibit or kill microorganisms (both transient and resident) thereby reducing the total bacterial count. Examples include alcohols (ethyl and isopropyl), dilute iodine solutions, iodophors, chlorhexidine, and triclosan.
- **Antisepsis.** Process of reducing the number of microorganisms on skin, mucous membranes, or other body tissue by applying an antimicrobial (antiseptic) agent.

Selection of Antiseptics

While plain soap and clean water physically remove dirt and other material, as well as some **transient** microorganisms from the skin, antiseptic solutions kill or inhibit almost all transient and many **resident** microorganisms, including most vegetative bacteria and all viruses. Antiseptics are designed to remove as many microorganisms as possible without damaging or irritating the skin or mucous membrane on which they are used. In addition, some antiseptic solutions have **residual effect**, meaning their killing action continues for a period of time after they have been applied to skin or mucous membranes.

Instructions for Cervical or Vaginal Preparation

For **cervical** and **vaginal antiseptics**, prior to prolapse surgery, select an aqueous (water-based) antiseptic such as an iodophor (povidone-iodine) or 2–4% chlorhexidine gluconate (e.g., Hibiclens if properly prepared). **Do not use alcohols or alcohol-containing preparations**, such as Dettol. Alcohols burn, and they also dry and irritate mucous membranes that in turn promote the growth of microorganisms.

STEP 1: Ask the patient about **allergic reactions** (e.g., to iodine preparations) before selecting an antiseptic solution.

STEP 2: If the external genital area is visibly soiled, gently wash it with soap and clean water and dry the area before applying the antiseptic.

STEP 3: After inserting the speculum, apply antiseptic solution liberally to the cervix and vagina (two times). It is not necessary to prep the external genital area with antiseptic solution if it appears clean.

STEP 4: If an iodophor is used, allow time (2 minutes) before proceeding.

Infection Prevention: Instrument Processing

Decontamination

More than 35 years ago it was shown that decontamination markedly reduces the level of microbial contamination of surgical instruments. For example, in the study by Nystrom (1981), 75% of previously soiled instruments had fewer than 10 microorganisms and 98% had fewer than 100 after being decontaminated prior to cleaning. Because of these findings, it was strongly recommended that if instruments and other items are to be cleaned by hand, they first should be decontaminated to minimize the risk of infection following accidental injury to cleaning staff as well as to reduce microbial contamination of their hands.

It is important, before cleaning, to decontaminate items by placing them in a 0.5% chlorine solution for 10 minutes. This step rapidly inactivates HBV, HCV and HIV and makes the items safer to handle by personnel who clean them (AORN 1990; ASHCSP 1986).

Decontamination Products

Chlorine solutions made from sodium hypochlorite generally are the least expensive and the most rapid-acting and effective products to use for decontamination, but other agents can also be used such as 70% ethyl or isopropyl alcohol and 0.5% phenolic compounds (Crutcher et al. 1991).

Decontamination Tips

- Use a plastic container for decontamination to help prevent:
- Dulling of sharps (e.g., scissors) due to contact with metal containers; and
- Rusting of instruments due to a chemical reaction (electrolysis) that can occur between two different metals (i.e., the instrument and container) when placed in water.
- Do not soak metal instruments that are electroplated (i.e., not 100% stainless steel) even in plain water for more than an hour because rusting will occur.

After decontamination, instruments should be rinsed immediately with cool water to remove visible organic material before being thoroughly cleaned. For example, some health care facilities keep two buckets in the procedure areas or operating rooms, one filled with 0.5% chlorine solution and one with water, so that the instruments can be placed in the water after soaking in the chlorine solution for 10 minutes. Although this will help to prevent corrosion, even leaving the instruments in plain water for more than 1 hour can lead to rusting.

Large surfaces, such as pelvic examination or operating tables that may have come in contact with blood and body fluids should be decontaminated. Wiping with a suitable disinfectant such as 0.5% chlorine solution before reuse or when visibly contaminated is an easy, inexpensive way to decontaminate these large surfaces.

Once instruments and other items have been decontaminated, they can safely be further processed. This consists of cleaning and finally either sterilization or high-level-disinfection.

Sterilization or High-Level Disinfection

Sterilization

Sterilization should be used for instruments, and other items that come in direct contact with blood stream or normally sterile tissues (Spaulding 1939). It can be achieved by high-pressure steam (autoclave), dry heat (oven), and chemical sterilants (gluteraldehyde or formaldehyde solutions) or physical agents (radiation). Because sterilization is a process, not a single event, all components must be carried out correctly for sterilization to occur.

Surgical gowns, linen drapes, and wrappers should be washed with liquid soap and water, removing all particles, rinsed with clean water, air or machine dry and sterilized.

High-Level Disinfection

Although sterilization is the safest and most effective method for the final processing of instruments, often sterilization equipment is either not available or not suitable (Rutala 1996). In these cases, HLD is the only acceptable alternative. The HLD process destroys all microorganisms (including vegetative bacteria, tuberculosis, yeasts, and viruses) except some bacterial endospores.

HLD can be achieved by boiling in water, steaming (moist heat), or soaking instruments in chemical disinfectants. To be effective, all steps of the process of performing each method must be monitored carefully. For detail please see 'Infection Prevention Guideline for Healthcare Facilities with Limited Resources, Jhpiego Corporation, 2003'.

Table 3-2: Guideline for Processing Linens and PPE

Items	Decontamination	Cleaning	HLD	Sterilization
Protective eyewear (plastic goggles and face shields)	Wipe with 0.5% chlorine solution. Rinse with clean water. After each procedure or when is visibly soiled.	Wash with liquid soap and water. Rinse with clean water, then air or towel dry. ¹ After each procedure or when visibly soiled.	Not necessary	Not necessary
Linens (caps, masks, scrub suits or cover gowns)	Not necessary. (Laundry staff should wear plastic aprons, gloves, and protective foot and eyewear when handling soiled items.)	Wash with liquid soap and water, removing all dirt particles. Rinse with clean water, air or machine dry. ¹ Air-dried attire can be ironed before use.	Not necessary	Not necessary
Aprons (heavy Wipe with 0.5% chlorine plastic or rubber)	Wipe with 0.5% chlorine solution. Rinse with clean water. Between each procedure or each time they are taken off.	Wash with liquid soap and water. Rinse with clean water, air or towel dry at the end of the day or when visibly soiled. ¹	Not necessary	Not necessary
Footwear (rubber shoes or boots)	Wipe with 0.5% chlorine solution. Rinse with clean water. At the end of the day or when visibly soiled.	Wash with liquid soap and water. Rinse with clean water, air or towel dry at the end of the day or when visibly soiled. ¹	Not necessary	
Surgical gowns, linen drapes, and wrappers	Not necessary. (Laundry staff should wear plastic aprons, gloves, and protective foot and eyewear when handling soiled items.)	Wash with liquid soap and water, removing all particles. Rinse with clean water, air or machine dry. ¹	Not practical	
Paper or disposable Place in plastic bag or plastic items	Place in plastic bag or leak-proof, covered waste container for disposal.			

¹ If tap water is contaminated, use water that has been boiled for 10 minutes and filtered to remove particulate matter (if necessary), or use chlorinated water—water treated with a dilute bleach solution (sodium hypochlorite) to make the final concentration 0.001%.

Waste Management

The purpose of waste management is to:

- Protect people who handle waste items from accidental injury.
- Prevent the spread of infection to health care workers who handle the waste.
- Prevent the spread of infection to the local community.
- Safely dispose of hazardous materials (toxic chemicals and radioactive compounds).

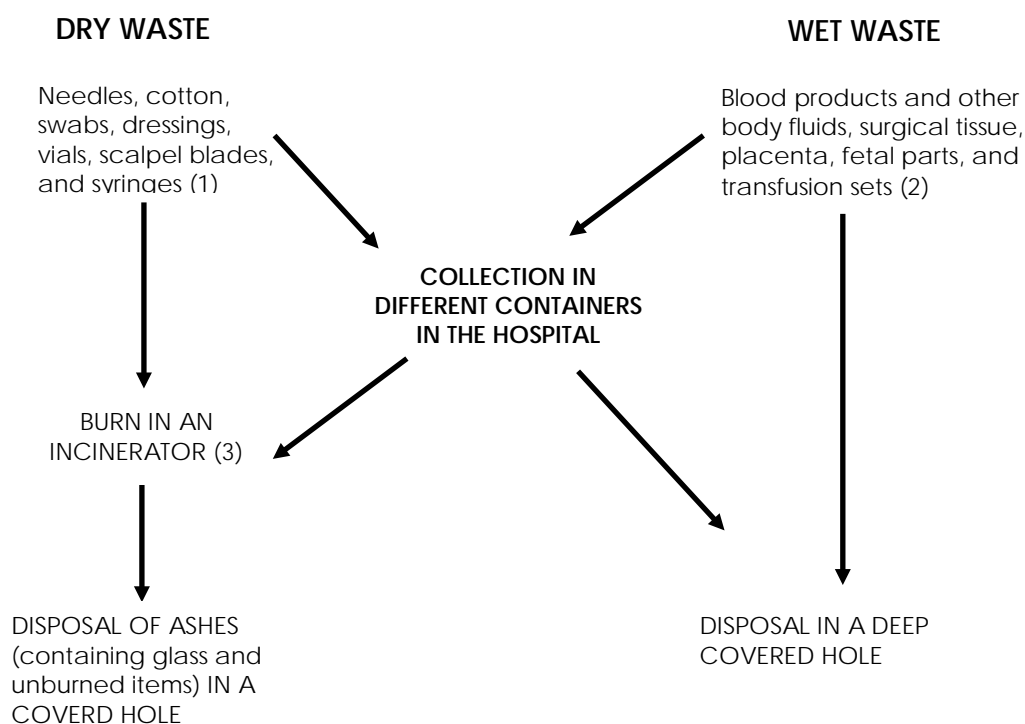
Disposal of contaminated waste:

- Pour liquids or wet waste directly into a safe sewerage system.
- Incinerate (burn) items to destroy the item as well as any microorganisms. (This is the best method for disposal of contaminated waste. Burning also reduces the bulk volume of waste and ensures that the items are not scavenged and reused.)²

² Burning may release toxic chemicals into the air.

- Bury all contaminated waste to minimize the spread of infection to health care personnel and to the local community. Whenever possible, contaminated waste should be collected and transported to disposal sites in leak-proof, covered waste containers.
- Use plastic or galvanized metal containers with tight-fitting covers for contaminated waste. Many facilities now use colored plastic bags to alert handlers to the contents and to keep the general (non-contaminated) waste separate from contaminated waste.
- Use puncture-resistant sharps containers for all disposable sharps (sharps that will not be reused) as they are the items most likely to injure healthcare workers who handle them as well as people in the community if they go to municipal landfill. When the container is three-quarters full, it should be removed from the procedure area for disposal. The needles should be destroyed in the syringe needle destroyer and then the syringe should be decontaminated in 0.5% chlorine solution before final disposal.
- Place waste containers close to where the waste is generated and where convenient for users (carrying waste from place to place increases the risk of infection for handlers). This is especially important for sharps, which carry the highest risk of injury for health workers and staff.
- Equipment that is used to hold and transport waste must not be used for any other purpose in the clinic or hospital. (Contaminated waste containers should be marked as such).
- Wash all waste containers with a disinfectant cleaning solution (0.5% chlorine solution plus soap) and rinse with water regularly.
- When possible, use separate containers for combustible and noncombustible waste prior to disposal immediately following their use. This step prevents workers from having to handle and separate waste by hand later.
- Use PPE when handling wastes (e.g., heavy-duty utility gloves and closed protective shoes)
- Wash hands or use a waterless, alcohol-based antiseptic hand rub after removing gloves when handling waste.

Figure 3-2: Flow Diagram: Collection and Disposal of Medical Waste



References for Module Three

- American Society for Hospital Central Service Personnel (ASHCSP) of the American Hospital Association. 1986. *Training Manual for Central Service Technicians*, edited by Enman C. ASHCSP: Chicago.
- Association of Operating Room Nurses (AORN). 1990. Clinical issues. *AORN J* 52: 613–615.
- Bagg J, S Jenkins and GR Barker. 1990. A laboratory assessment of the antimicrobial effectiveness of glove washing and re-use in dental practice. *J Hosp Infect* 15(1): 73–82.
- Belkin N. 1992. Barrier methods: Their influence on surgical wound infection. *AORN J* 55(6): 1521–1528.
- Crutcher JM, SH Lamm and TA Hall. 1991. *Procedures to protect healthcare workers from HIV infection: Category I (healthcare) workers. Am Ind Hyg Assoc J* 52(2): A100–103.
- Centers for Disease Control (CDC). 1987. Recommendations for prevention of HIV transmission in healthcare settings. *MMWR* 36(Suppl 2): 1S–18S.
- Centers for Disease Control (CDC). 1989. Guidelines for prevention of transmission of human immunodeficiency virus and hepatitis virus to health care and public-safety workers. *MMWR* 38(S-6): 5–6.
- Davis MS. 2001. Choices of effective personal protective equipment, in *Advanced Precautions for Today's OR: The Operating Room Professional's Handbook for the Prevention of Sharps Injuries and Bloodborne Exposures*, 2nd ed. Sweinbinder Publications LLC: Atlanta, pp 39–48.
- Deshmukh N, JW Kramer and SI Kjellberg. 1996. A comparison of 5-minute providone-iodine scrub and a 1-minute povidone-iodine scrub followed by alcohol foam. *Mil Med* 163(3): 145–147.
- Doebbeling BN et al. 1988. Removal of nosocomial pathogens from the contaminated glove. *Ann Intern Med* 109(5): 394–398.
- Gershon R and D Vlahov. 1992. Assessing and reducing HIV risk to the critical care nurse. *Critical Care Nursing Currents* 3: (No 3).
- Gershon R and B Zirkin. 1995. Behavioral factors in safety training, in *Laboratory Safety, Principles and Practices*, 2nd ed. Flemming DO et al (eds). AMS Press: Washington, DC, pp 269–277.
- Girou E et al. 2002. Efficacy of handrubbing with alcohol based solution versus standard handwashing with antiseptic soap: Randomized clinical trial. *BMJ* 325 (7360): 362–365.
- Infection Prevention practices. 2003. Adapted from: *Infection Prevention Guideline for Healthcare Facilities with Limited Resources* Jhpiego Corporation.
- Institute of Medicine. 1996. *Nursing Staff in Hospitals and Nursing Home—Is It Adequate?* National Academy Press: Washington, DC.
- Korniewicz D et al. 1990. Leakage of virus through used vinyl and latex examination gloves. *J Clin Microbiol* 28(4): 787–788.
- Larson E. 1988. Guideline for use of topical antimicrobial agents. *Am J Infect Control* 16(6): 253–266.

- Larson EL et al. 1995. APIC Guidelines for Infection Control Practice. Guidelines for handwashing and hand antisepsis in health care settings. *Am J Infect Control* 23(4): 251–269.
- Larson E et al. 2001. Comparison of different regimens for surgical hand preparation. *AORN J* 73(2):412–432.
- Nystrom B. 1981. Disinfection of surgical instruments. *J Hosp Infect* 2(4): 363–368
- OR Manager. 1990a. Draping controversy unveiled. *Today's OR Nurse* 12(8):3.
- OR Manager. 1990a. Draping: how much and which one? *Today's OR Nurse* 12(9):29.
- Pereira LJ, GM Lee and KJ Wade. 1997. An evaluation of five protocols for surgical handwashing in relation to skin condition and microbial counts. *J Hosp Infect* 36(1): 49–65.
- Pereira LJ, GM Lee and KJ Wade. 1990. The effect of surgical handwashing routines on the microbial counts of operating room nurses. *Am J Hosp Infect Control* 18(6):354–364.
- Spaulding EH 1939. *Studies on chemical sterilization of surgical instruments*. *Surg Gyne Obstet* 69: 738–744.
- Rutala WA and DJ Weber. 2001. Creutzfeldt-Jakob disease: recommendation for disinfection and sterilization. *Clinical Infectious Diseases* 32 (9): 1348–1356.
- Rutala WA. 1996. APIC guidelines for selection and use of disinfectants. *Am J Infect control* 24(4): 313–342.
- Tenorio AR et al. 2001. Effectiveness of gloves in the prevention of hand carriage of vancomycin-resistant enterococcus species by health care workers after patient care. *Clin Infect Dis* 32(5): 826–829.
- Tietjen L, Bossemeyer D, and McIntosh N. 2003. *Infection Prevention Guideline for Healthcare Facilities with Limited Resources*. Baltimore, MD: Jhpiego.
- World Health Organization (WHO). 2009. *Guidelines on Hand Hygiene in Health Care: A Summary*. Geneva: WHO.

Reflective Practice—Infection Prevention

Date of completion: _____

Date of review from facilitator: _____

1. Do you think it is important to use personal protective equipment? What percentage of the time do you use it? Is it similar or dissimilar to that mentioned from the standards mentioned in Module Three?
2. What are the similarities and dissimilarities that you follow on handwashing practices of those mentioned in Module Three?
3. Have you known anyone in your profession who has had a blood-borne infection? How could it have been prevented?

MODULE FOUR: ASSESSMENT OF WOMEN

Symptoms

Women experiencing prolapse may not be symptomatic and it may be detected incidentally on pelvic examination. Some degree of prolapse is common among parous women, and often asymptomatic. Symptoms of prolapse are notoriously nonspecific except for the sensation of a bulge found in advanced stages of prolapse (Swift 2000). Women usually become symptomatic if the leading edge of the prolapse protrudes beyond the hymen as in some POP-Q stage II and all stage III (Swift 2003). Patients with severe POP often report feeling or seeing a “ball” or protrusion from the vagina. Other prolapse symptoms are often vague and nonspecific.

Any symptoms associated with physical findings of lower stage prolapse require careful evaluation, especially if surgery is being considered. A recent retrospective study of 330 patients reported that women with more advanced prolapse were less likely to have symptoms of stress incontinence and more likely to use manual reduction of the prolapse to void. Therefore, careful consideration of lower urinary tract symptoms is important. Prolapse severity was not associated with bowel or sexual problems in this study (Burrows 2004).

Urinary symptoms predominate in anterior compartment prolapse and symptomatic stress urinary incontinence sometimes coexists but defecatory symptoms predominate in posterior compartment prolapse (Ellerkmann 2001).

Common reported symptoms of POP include (Ellerkmann 2001):

1. Urinary urgency or frequency (86%)
2. Urinary incontinence (73%)
3. Bulge symptoms (63%)
4. Voiding dysfunction (62%)
5. Fecal incontinence (31%), 21% reported by Jackson (1997)

Symptoms of advanced prolapse:

- Voiding difficulty:
 - Urinary hesitancy
 - Intermittent flow
 - Weak or prolonged stream
 - Feeling of incomplete emptying
 - Need to manually reduce the prolapsed organ to initiate or complete urination
- Urinary retention with high post-void residual volumes
- Pain: pelvic discomfort/pain, back and flank pain and dyspareunia
- Defecatory problems:
 - Constipation, diarrhea, tenesmus, fecal incontinence
 - Excessive straining, incomplete rectal emptying
 - Need for perineal or vaginal pressure (called “splinting”) to accomplish defecation

Patients seeking care for prolapse may have one or several of these symptoms involving the lower pelvic floor. Choice of treatment usually depends on severity of the symptoms and the degree of prolapse consistent with the patient's general health and level of activity (Beck 1983).

Patients with mild POP can report feelings of heaviness or pressure that may be present all the time or only after a long day of being on their feet or after heavy physical exercise. Symptoms for one pelvic floor problem should prompt questioning for all other disorders as patients often have more than one pelvic floor problem. Fortunately, mild POP rarely affects sexual function although more severe POP may lead to decreased rates of sexual activity. Common prolapse symptoms include the feeling of something coming down from vagina, further associated with secondary urinary, defecatory, and sexual dysfunction.

This may result from a number of causes, including lack of symptoms, embarrassment, or misperceptions about available treatment options. Although POP is not life-threatening, it can impose a significant burden of social and physical restrictions on activities, impact psychological well-being, and overall quality of life.

Symptoms attributable to uterine prolapse

Vaginal symptoms:

- Sensation of a bulge or protrusion
- Seeing or feeling a bulge
- Pressure
- Heaviness
- Urinary symptoms
- Incontinence, frequency, or urgency
- Weak or prolonged urinary stream
- Feeling of incomplete emptying
- Manual reduction of prolapse needed to start or complete voiding ("digitation")
- Change of position needed to start or complete voiding

Bowel symptoms:

- Incontinence of flatus, or liquid or solid stool
- Feeling of incomplete emptying
- Straining during defecation
- Digital evacuation needed to complete defecation
- Splinting (pushing on or around the vagina or perineum) needed to start or complete defecation

Sexual symptoms:

- Dyspareunia (painful or difficult intercourse)
- Lack of sensation
- Coital incontinence

History

1. Record a patient's obstetric history such as number and spacing of births, complications during childbirth including instrumental deliveries, prolonged labor, precipitate labor, inappropriate management during labor and delivery, big babies etc., and early resumption of heavy work postpartum.
2. Record aggravating factors like smoking, chronic cough, chronic constipation, and treatment history such as insertion of ring pessary or previous surgery.
3. Record medical history such as diabetes, hypertension, chronic respiratory problems, chronic constipation or any other illnesses or surgical procedures.
4. Record personal history such as bladder (incontinence, dribbling) and bowel habits.

Clinical Examination

- Conduct a general and systemic examination (heart, lungs, and abdomen), but record in particular the presence of anemia, obesity, malnutrition, and any other medical problem.
- Conduct a local inspection of the vulva and vagina to identify ulcers, menopausal atrophy, lichen sclerosis, or other lesions with biopsy of any suspicious lesions.

Pelvic Examination

In evaluating patients with POP, it is particularly useful to divide the pelvis into compartments, each of which may exhibit specific defects. The use of a Sims speculum retractor can help to evaluate the apical compartment of the vagina. The anterior and posterior compartments are best examined with the use of a univalve or Sims speculum. The speculum is placed posteriorly to retract the posterior wall downward when examining the anterior compartment and placed anteriorly to retract the anterior wall upward when examining the posterior compartment. A rectovaginal examination may be useful in evaluating the posterior compartment to distinguish a posterior vaginal wall defect from a dissecting apical enterocele or a combination of both.

During the evaluation of each compartment, the patient is encouraged to perform the Valsalva maneuver so the full extent of the prolapse can be ascertained. If the findings determined through this method are inconsistent with the patient's description of her symptoms, it may be helpful to perform a standing straining examination with the bladder empty (Burrows 2004).

Pelvic Muscle Function Assessment

Pelvic muscle function should be assessed during the pelvic examination. Following bimanual examination with the patient in the lithotomy position, the examiner can palpate the puborectalis and pubococcygeus muscles inside the hymen along the pelvic sidewalls at approximately the 4 and 8 o'clock positions. One can ascertain the basal muscle tone and whether there is increased tone with contraction, as well as the strength, duration, and symmetry of contraction (Brinks 1994). A rectovaginal examination should also be performed to assess basal and contraction muscle tone of the anal sphincter complex.

Bladder Function Evaluation

Patients with prolapse exhibit the full range of lower urinary tract symptoms. Despite the fact that some patients may not have significant symptoms, it is important to obtain objective information about bladder and urethral function. With severe POP, the urethral kinking effect of the prolapse may mask a potential urine leakage problem; therefore, basic office bladder testing with prolapse reduction should be performed to mimic bladder and urethral function if the prolapse were treated. At a minimum, the following assessments should be performed: a clean catch or catheterized urine sample to test for infection and a postvoid residual volume should be checked. As many as 30% of women with stage III and IV had residual urine raised up to more than 100 ml (Coates 1997).

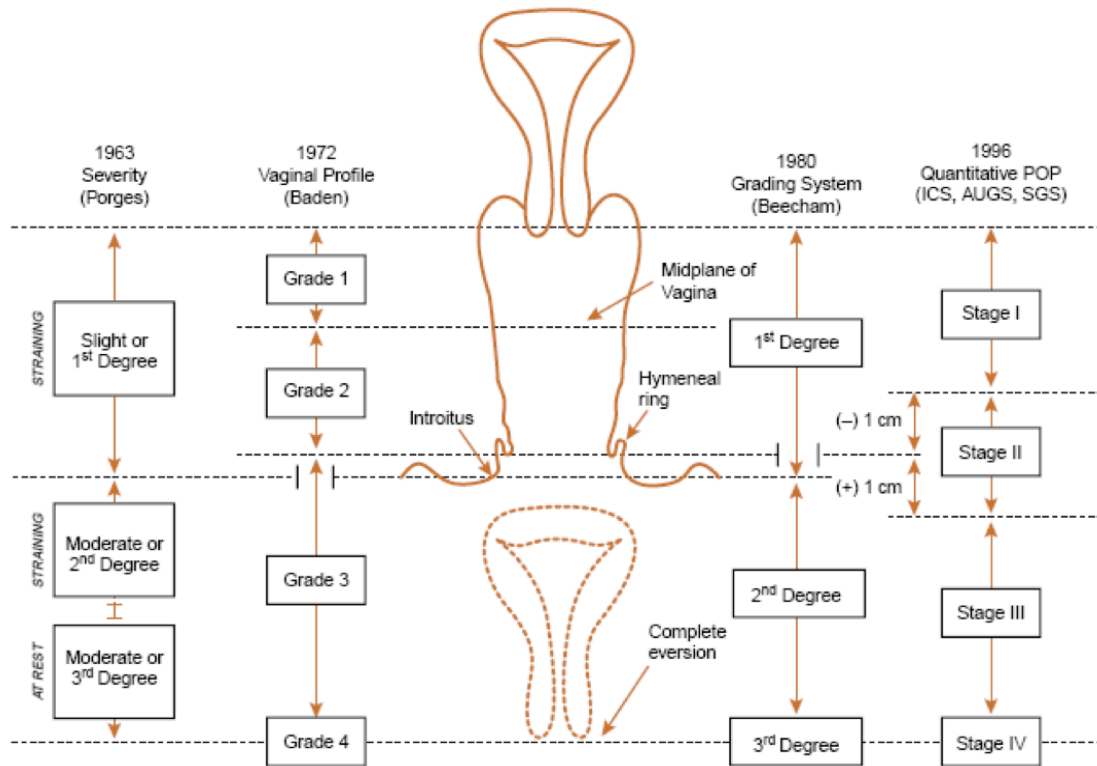
Bowel Function Evaluation

Once a decision is made to perform surgical repair of the posterior compartment based on symptoms, type, and location of defects, an appropriate approach should be determined and the patient should be made aware of the expected outcomes and potential adverse effects such as pain and sexual dysfunction. If the patient has defecatory dysfunction with a rectocele and symptoms of constipation, pain with defecation, fecal or flatal incontinence, or any signs of levator spasm or anal sphincter spasm, appropriate evaluation and conservative management of concurrent conditions could be initiated before repair of the rectocele and continued postoperatively (Walters 1987).

Grading of POP

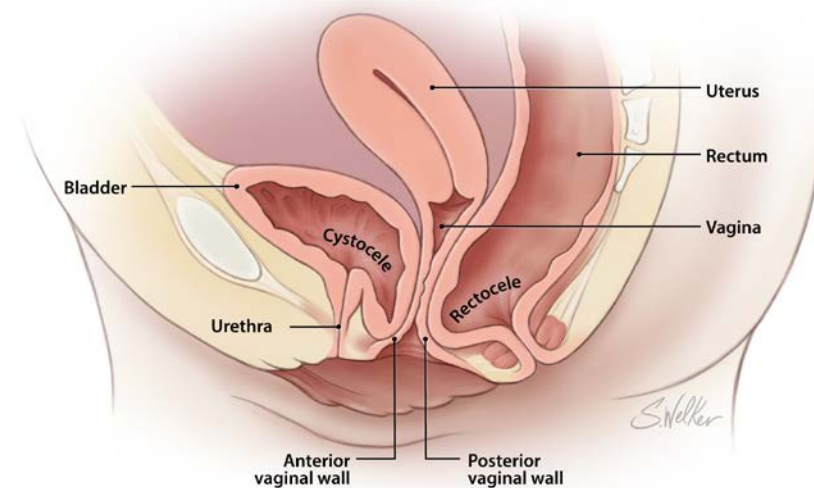
Currently, two systems are popular (there are many systems) to grade or stage prolapse—the traditional Baden-Walker half-way method and the newer, more elaborate and more reliable POP-Q system. Traditional nomenclature includes the terms “cystocele,” “urethrocele,” “rectocele,” or “enterocele” to refer to the various protrusions of the vaginal wall involving the bladder, urethra, rectum, or small bowel, respectively. This traditional terminology has been recently challenged as these terms implicate the organs adjacent to the vagina as bearing a role in the pathophysiology of POP, when indeed they are most often passive victims of damaged compartmental support. The recent National Institutes of Health Terminology Workshop for Researchers in Female Pelvic Floor Disorders advocates describing prolapse within one of three compartments: uterine or apical, anterior, and posterior compartment prolapse (Weber 2001, Visco 2003, Persu 2011).

Figure 4-1: POP Classifications



(Source: Mouritsen L. 2005. Classification and evaluation of prolapse. *Best Pract Res Clin Obstet Gynaecol* 6: 1-17.)

Figure 4-2: Showing Relation of the POP



Standard POP-Q System

In 1996, a special subcommittee of the International Continence Society developed a system to standardize the description of POP through the pelvic organ prolapse quantification system, now commonly known as POP-Q. This is a site-specific system that has proven interobserver and

intraobserver reliability for quantitating, describing, and staging pelvic support, as well as enhancing clinical and academic communication (Bump 1996; Hall 1996).

Simplified POP-Q (S-POP-Q)

The S-POP-Q was introduced to make the POP-Q user-friendly and increase its usage in routine clinical practice (Swift 2006). There is an almost perfect inter-examiner agreement of the S-POP-Q system for the overall stage and each point within the system.

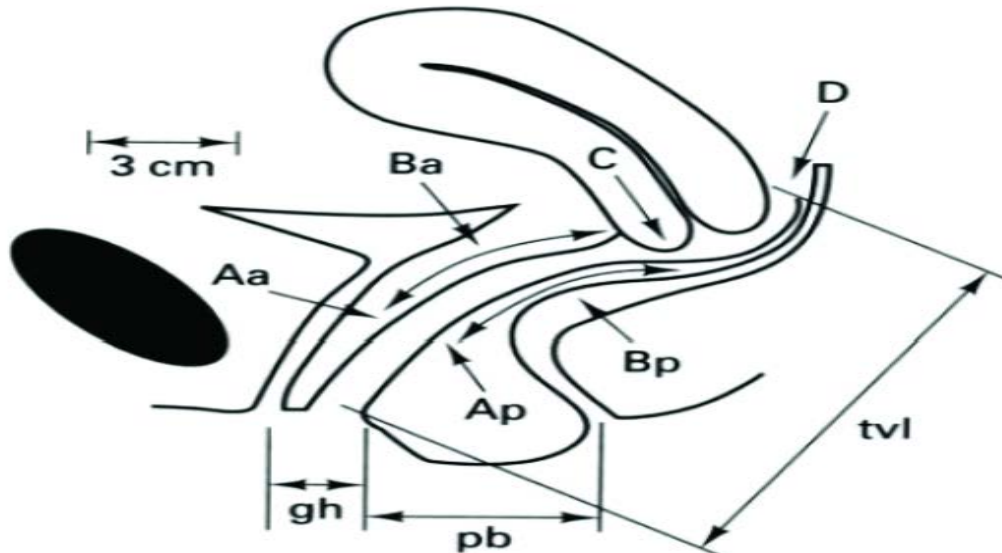
In S-POPQ, **four** areas are examined:

1. Anterior vaginal wall (anterior compartment)
2. Posterior vaginal wall (posterior compartment)
3. Apex or the cervix (central compartment)
4. Posterior fornix

If a subject had undergone hysterectomy in the past, then only **three** areas are recorded:

1. Anterior vaginal wall (anterior compartment)
2. Posterior vaginal wall (posterior compartment)
3. Cuff scar/apex (central compartment)

Figure 4-3: Points and Landmarks for POP-Q



Aa = Point A anterior, **Ap** = point A posterior
Ba = Point B anterior, **Bb** = point B posterior
C = Cervix or vaginal cuff, **D** = posterior fornix (if cervix is present)
gh = genital hiatus, **pb** = perineal body, **tvl** = total vaginal length

Source: Journal of medicine and life vol.4, No. 1, January-March 2011

Descriptions of Points and Landmarks for POP-Q (Figure 4-3):

1. Point Aa: In anterior vaginal wall, a point or fold approximately halfway up the anterior vaginal wall or approximately 3 cm proximal to the urethral meatus or at the convergence of the hymenal remnants is described as point A. The descent of this point (point A) on straining is noted in relation to the hymenal remnants. The lowercase letter 'a' stands for anterior.
2. Point Ap: The point in the posterior vaginal wall approximately halfway up the posterior vaginal wall or 3 cm proximal to the posterior fourchette/hymenal remnants is described as point B. The lowercase letter 'p' stands for posterior.
3. Point Ba: Remaining upper anterior vaginal wall away from point Aa.
4. Point Bp: Remaining upper posterior vaginal wall away from point Ap.
5. Point C: Most distal edge of cervix or vaginal cuff scar. The cervix is evaluated by placing a speculum in the vagina and directly observing its descent during straining or coughing to determine its stage in relation to the hymenal remnants. The vaginal apex or cuff scar is visualized in a similar way in case there is no uterus.
6. Point D: If the subject has a cervix, then the vaginal apex or posterior fornix is described separately from the cervix as point D.

Glossary:

Genital hiatus (gh): Measured from middle of external urethral meatus to posterior midline hymen

Perineal body (pb): Measured from posterior margin of "gh" to middle of anal opening

Total vaginal length (tv): Depth of vagina when point D or C is reduced to normal position

In this training manual, the **four** points are simply recorded as:

Point A (Aa) = Descent of the bulge in anterior compartment

Point P (Ap) = Descent of posterior compartment

Point C = Descent of the cervix, vaginal cuff (point C)

Point D = Descent of posterior fornix

The overall stage will be assigned as the maximum stage of any compartment as per Mitesh 2011.

Staging in S-POP-Q Stage

Stage 1. Pelvic support where the given point remains greater than 1 cm above the hymenal remnants.

Stage 2. Pelvic support where the given point descends within an area extending from 1 cm above to 1 cm below the hymeneal remnants.

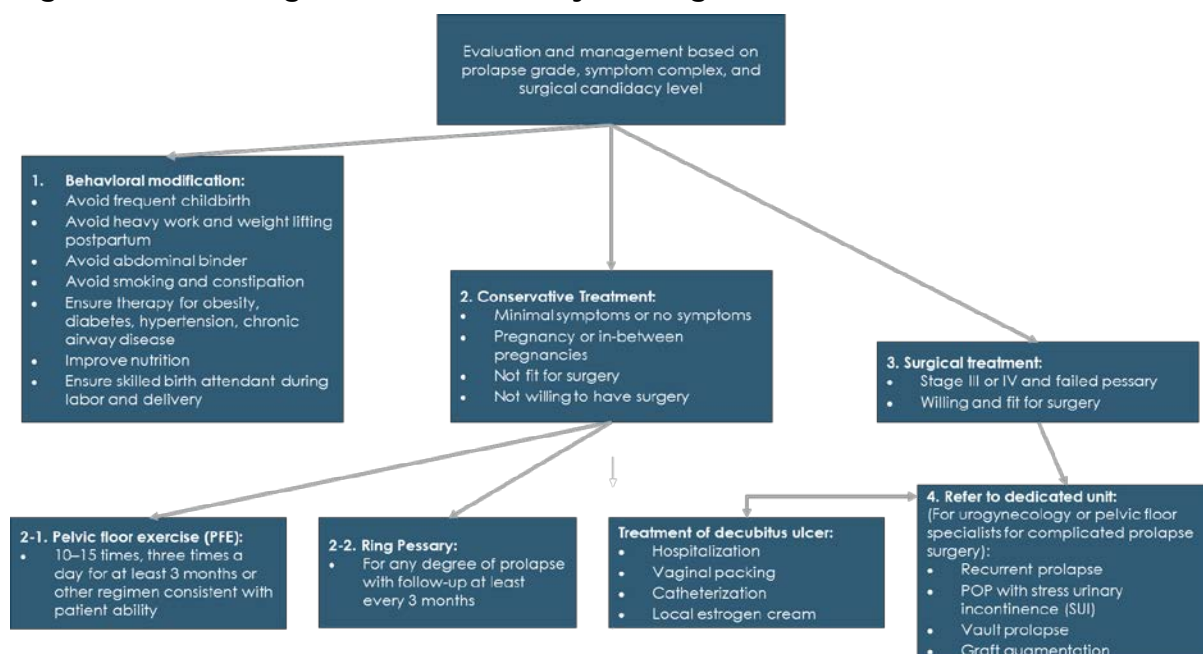
Stage 3. Pelvic support where the given point descends greater than 1 cm past the hymenal remnants, but does not represent complete vaginal vault or uterine eversion.

Stage 4. Complete vaginal vault or uterine eversion. This implies that the vagina and or uterus are maximally prolapsed with essentially the entire extent of the vaginal epithelium everted.

Assessment of degree of prolapse (S-POP-Q) (Please check the appropriate segment)

Stage of Prolapse	Point A (Aa) Approximately 3 cm proximal to the urethral meatus	Point P (Ap) 3 cm proximal to the posterior fourchette	Point C Cervix	Point D Posterior fornix
Stage 1 Point remains greater than 1 cm above the hymenal remnants.				
Stage 2 Point descends within an area extending from 1 cm above to 1 cm below the hymenal remnants.				
Stage 3 Point descends greater than 1 cm past the hymenal remnants, but does not represent complete vaginal vault or uterine eversion.				
Stage 4 Complete vaginal vault or uterine eversion.				

Algorithm for Management of POP for Gynecologists



Adopted from: Family Health Division, Nepal Ministry of Health and Population. 2012. *Clinical Protocol for Management of Pelvic Organ Prolapse*.

In hysterectomy cases, points C and D are usually the same, i.e., cuff scar/vault.

Assessment Plan

Diagnosis: POP-Q stage with or without other problems such as SUI	e.g., POP Q ₃ (A ₃ P ₃ C ₁ D ₂) with SUI (overall stage 3)
Treatment: Education/counseling/PFE/pessary/referral for surgery/others	
Follow-up plan	

Outcome Assessments

Outcome Assessment: Anatomy

There is no consensus on several critical areas of outcomes. There are significant difficulties in creating dichotomous anatomical outcome, and criteria for success and failure, especially in the absence of symptoms. This difficulty is exacerbated in a situation where support loss is evident in an unoperated portion of the vagina and there is no consensus regarding coding of “de novo” POP. Finally, it is likely incorrect to strive for “perfect” support of the vagina (Stage 0) as this is inconsistent with the demographic profile of asymptomatic vaginally parous women (Swift2000).

In addition, the five-level staging system of the current POP-Q (Stages 0-IV) may be insufficient to discriminate among clinically important groups of women with POP, placing virtually all such women into Stage II or III. While the staging may facilitate comparisons, it may not describe sufficient detail as the individual POP-Q measurements provide.

Outcome Assessment: Symptoms

It is well-recognized that symptoms and anatomy do not necessarily correlate in women with POP. Burrows et al. reported that while women with more advanced prolapse are less likely to experience SUI, bothersome sexual or anorectal symptoms do not correlate with prolapse severity (Burrows 2004). The symptom of feeling or seeing a bulge is reliably associated with the anatomic finding of prolapse (Ghetti 2005). FitzGerald et al. reported that women planning sacrocolpopexy with Stage II POP and prior pelvic surgery reported more symptoms and quality of life impact than those with more advanced prolapse (FitzGerald 2007).

Symptoms of urinary incontinence, fecal incontinence, sexual dysfunction, voiding dysfunction, and defecatory dysfunction are common in women with prolapse, but are not well-correlated with anatomic findings (Jelovsek 2006). Nonetheless, most patients expect resolution of pelvic symptoms following surgery.

Urinary symptoms

Urinary Incontinence: There is a risk of de novo stress incontinence following POP repair by any route. This risk is approximately 44% following sacrocolpopexy in stress continent women (Brubrekaer 2006) and can be reduced by concomitant Burch colposuspension. It is not known if other continence procedures are protective in this surgical setting. Estimates for de novo stress incontinence following vaginal repair range between 15% to 80% (Haessler 2005). Improvement of urge incontinence may be a welcome side effect of the surgery, but it is not an indication for surgery per se.

Voiding dysfunction: Voiding function is expected to improve after surgical correction of prolapse. Fitzgerald and co-workers found significant improvement in bladder emptying in patients after surgery for advanced POP (Fitzgerald 2000). Before surgery, the average post-void residual in 35 patients was 226 mL, and this was reduced to less than 100 mL in 89% of the women after surgery for POP.

Sexual function

The effect of POP on sexual function is variable, but repair of POP may improve sexual function. In the Colpopexy and Urinary Reduction Efforts (CARE) trial, more women were sexually active one year after abdominal sacrocolpopexy (171, 76.3%) compared to before surgery (148, 66.1%), and significantly fewer women reported sexual interference from pelvic and vaginal symptoms (Handa 2007). Pauls and colleagues reported no change in sexual function and sexual frequency using the Female Sexual Function Index (FSFI) and other standardized questionnaires in prospectively surveyed women undergoing POP surgery with and without continence procedures (Pauls 2007). In those women, the most bothersome barrier to sexual activity before repair was vaginal bulging; postoperatively, it was vaginal pain. De novo dyspareunia is a complication of many transvaginal prolapse repairs.

Anorectal symptoms

Anorectal symptoms are common in women with POP (Bradley 2006). Fifteen to twenty percent of women with POP or SUI also report fecal incontinence (Jackson 1997). Meschia evaluated 881 women with urinary incontinence or POP, of whom 178 also had anal incontinence. Two-thirds reported constipation, with other common complaints of incomplete evacuation, and splinting in the vaginal or perineal body to effect evacuation (Meschia 2002).

Although such symptoms are common, they do not correlate well with prolapse stage. Bradley (2006) described the prevalence of pre-operative bowel symptoms and colorectal-anal distress inventory symptom scores in 322 women planning sacrocolpopexy. Correlations between symptoms and prolapse were negative and weak, indicating that bowel symptoms do not increase with an increase in the stage of prolapse. Anorectal symptoms are not improved after sacrocolpopexy surgery (Ramanah 2012).

Outcome Evaluation: Quality of Life

The CARE trial reported significant improvements in quality of life following sacrocolpopexy at three months and two years (Brubaker 2006). In that trial, Nygaard et al. reported pre-surgical physical activity levels (Nygaard 2007).

Most participants were physically active pre-operatively, but reported that prolapse substantially interfered with exercise or recreation (27%), household work or yard work (19%), and work outside the home (8%). The interference was not associated with the stage of prolapse.

Key Points

- Common prolapse symptoms include the feeling of something coming down from vagina, further associated with secondary urinary, defecatory, and sexual dysfunction.
- History should include number and spacing of births, complications during childbirth including instrumental deliveries, prolonged labor, inappropriate management during labor and delivery, big babies, etc., and early resumption of heavy work postpartum.
- In evaluating patients with POP, it is particularly useful to divide the pelvis into compartments, each of which may exhibit specific defects. It is mandatory to assess pelvic muscle function and clean catch or catheterized urine sample, and post-void residual volume should be checked.

- In S-POP-Q, four areas are examined—the anterior and posterior vaginal walls, the apex of the cervix and the posterior fornix.
- Symptoms of urinary incontinence, fecal incontinence, sexual dysfunction, voiding dysfunction, and defecatory dysfunction are common in women with prolapse, but are not well-correlated with anatomic findings.

References for Module Four

- Beck RP. 1983. "Pelvic relaxational prolapse." Pp. 677–685 in *Principles and Practice of Clinical Gynecology*, edited by Kase NG and Weingold AB.. New York: John Wiley & Sons.
- Bradley CS, et al. Bowel Symptoms in women planning surgery for pelvic organ prolapse. 2006. *Am J Obstet Gynecol* 195:1814–19.
- Brinks CA, et al. 1994. A digital test for pelvic muscle strength in women with urinary incontinence. *Nurs Res* 43:352–356.
- Brubaker L, et al. 2006. Abdominal sacrocolpopexy with Burch colposuspension to reduce urinary stress incontinence. *N Engl J Med* 354(15):1557–66.
- Bump RC, et al. 1996. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol* 175:10–7.
- Burrows LJ, et al. 2004. Pelvic symptoms in women with pelvic organ prolapse. *Obstet Gynecol* 104:982–988.
- Coates KW, et al. 1997. Uroflowmetry in women with urinary incontinence and pelvic organ prolapse. *Br J Urol* 80:217–221.
- Ellerkmann RM, et al. Correlation of symptoms with location and severity of pelvic organ prolapse. 2001. *Am J Obstet Gynecol* 185:1332–1337.
- FitzGerald MP, et al. 2007. Prolapse severity, symptoms and impact on quality of life among women planning sacrocolpopexy. *Int J Gynaecol Obstet* 98:24–8.
- Fitzgerald MP, Kulkarni N, and Fenner D. 2000. Postoperative resolution of urinary retention in patients with advanced pelvic organ prolapse. *Am J Obstet Gynecol* 183(6):1361–3; discussion 3–4.
- Ghetti C, et al. 2005. Pelvic organ descent and symptoms of pelvic floor disorders. *Am J Obstet Gynecol* 193(1):53–7.
- Haessler AL, et al. 2005. Reevaluating occult incontinence. *Curr Opin Obstet Gynecol* 17(5):535–40.
- Hall AF, et al. 1996. Interobserver and intraobserver reliability of the proposed International Continence Society, Society of Gynecologic Surgeons, and American Urogynecologic Society pelvic organ prolapse classification system. *Am J Obstet Gynecol* 175:1467.
- Handa VL, et al. 2007. Sexual function before and after sacrocolpopexy for pelvic organ prolapse. *Am J Obstet Gynecol* 197(6):629.e1–6.
- Jackson SL, et al. 1997. Fecal incontinence in women with urinary incontinence and pelvic organ prolapse. *Obstet Gynecol* 89: 423–427.
- Jelovsek JE and Barber MD. 2006. Women seeking treatment for advanced pelvic organ prolapse have decreased body image and quality of life. *Am J Obstet Gynecol* 194(5):1455–61.
- Meschia M, et al. 2002. Prevalence of anal incontinence in women with symptoms of urinary incontinence and genital prolapse. *Obstet Gynecol* 100:719–23.
- Mitesh P, et al. 2011. Multicenter inter-examiner agreement trial for the validation of simplified POP-Q system. *Int Urogynecol J* 22:645–650.
- Nygaard I, et al. 2007. Physical activity in women planning sacrocolpopexy. *Int Urogynecol J Pelvic Floor Dysfunct* 18: 33–7.

- Pauls RN, et al. 2007. Sexual function after vaginal surgery for pelvic organ prolapse and urinary incontinence. *Am J Obstet Gynecol* 197(6): 622.e1-7.
- Persu C, et al. 2011. Pelvic Organ Prolapse Quantification System (POP-Q) – A new era in pelvic prolapse staging. *J Med Life* 4(1):75–81.
- Ramanah R, et al. 2012. Anorectal symptoms before and after laparoscopic sacrocolpoperineopexy for pelvic organ prolapse. *Int Urogynecol J* 23(6):779–8.
- Swift SE, Morris S, and McKinnie V. 2006. Validation of a simplified technique for using the POP-Q pelvic organ prolapse quantification system. *Int Urogynecol J* 17(6):615–620.
- Swift SE, Tate SB, and Nicholas J. 2003. Correlation of symptoms with degree of pelvic organ support in a general population of women: what is pelvic organ prolapse? *Am J Obstet Gynecol* 189: 372–377.
- Swift SE. 2000. The distribution of pelvic organ support in a population of female subjects seen for routine gynecologic health care. *Am J Obstet Gynecol* 183: 277–85.
- Visco AG, et al. 2003. Effects of examination technique modifications on pelvic organ prolapse quantification (POP-Q) results. *Int Urogynecol J* 14:136–140.
- Walters MD, and Diaz K. Q-tip test: A study of continent and incontinent women. 1987. *Obstet Gynecol* 70:208.
- Weber AM et al, 2001. The Standardization of Terminology for Researchers in Female Pelvic Floor Disorders, *Int Urogynecol J Pelvic Floor Dysfunct* 12(3).

Exercises

1. Which of the following should be performed when assessing a client with POP?

	Indicated	Not Indicated
Pelvic examination with valsalva maneuver		
Full neurological exam		
24-hour urine collection		
Post-void residual urine		
Stool hematocrit		
Ask about bowel habits		

2. Pelvic muscle function assessment is done in the following position:

- a. Lithotomy
- b. Semiprone
- c. Trendelenburg

3. In which of the following conditions is surgical management indicated?

	Indication	Non Indication
Minimal symptoms or no symptoms		
Frequency of pregnancies or in-between pregnancies		
Not fit for surgery		
Stage III		
Stage IV		
Failed pessary		

Case Studies

Directions

Read and analyze this case study by yourself thoroughly. Consider the steps in clinical decision-making as you answer the questions.

Case Study 1—Non Surgical

Objective: To be able to provide correct non-surgical management of POP

Scenario

Ramkala Gurung, a 57-year-old from Dolakha, is presenting with complaints of difficulty in passing urine. Upon taking her history, here are key results. She resumed household work immediately following all her deliveries. She has been a chronic smoker since her teens and has been treated frequently for chest infections. She describes feeling a mass in her vagina for the last 10 years, which had not bothered her much until the past few months when she developed problems in passing urine.

OB: Gravida 8, Para 5, all home deliveries

Medical: No medical conditions, chronic smoker

History:

Q1. What specific examination will help you to reach a diagnosis?

Physical examination:

Q2. What laboratory tests will you perform?

Laboratory tests:

Q3. Based on the above findings, what will be your diagnosis?

Q4. What would be the appropriate management for the above case?

Case Study 2—Surgical Management

Objective: To be able to provide correct surgical management of POP

Scenario

Harimaya Limbu, who is 48 years old, has been diagnosed to have stage III POP by a doctor at a primary health center at her village and has been referred to Ramechhap District Hospital for further treatment.

What will you do in your initial assessment?

History:

She is 48 years old, is from Ramechhap, and has seven children, all home deliveries, and has had three spontaneous abortions in the past. She resumed household work immediately following all her deliveries, including carrying water and firewood from a distance of about 4 kms. She has been a chronic smoker since her teens and has been frequently treated for chest infections. She describes feeling a mass in her vagina for the last 10 years, which had not bothered her much until the past few years when she has had to reposition the mass for complete evacuation of the bladder. She has not had any problems in passing stool.

Q1. What specific examination will help you to reach a diagnosis?

Physical examination:

Q2. What laboratory tests will you perform?

Laboratory tests:

Q3. Based on the above findings, what will be your diagnosis?

Q4. What would be the appropriate management for the above case?

Case Study 3—Surgical Management

Objective: To be able to provide correct surgical management of POP

Scenario

Seti Maya Rai, who is 42 years old, has been diagnosed by a doctor at a primary health center at her village as having stage III POP with dribbling of urine while coughing and has been referred her to Bharatpur Hospital for further treatment.

What will you do in your initial assessment?

History:

She is a 42-year-old from Mangalpur VDC with four children, all home deliveries, and has had one spontaneous abortion in the past. She resumed household work immediately following all her deliveries, including carrying water and firewood from a distance of about 3 kms. She has been a chronic smoker since her teens. She describes feeling a mass in her vagina for the last 15 years and dribbling of urine on coughing, laughing, and while changing her position, which has been gradually increasing.

Q1. What specific examination will help you to reach a diagnosis?

Physical examination:

Q2. Based on the above findings, what will be your diagnosis?

Q3. What would be further management for the above case?

Checklist for Assessment of Woman with POP

(To be used by the learners and facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Learner: _____

Date: _____

Checklist for Assessment of Woman With POP					
Step/Task	Cases				
• Welcome the woman.					
• Ensure that the equipment and supplies are ready.					
• Explain what is going to be done.					
Take the history					
Take the obstetric history					
Number and spacing of births					
• Complication during childbirth including instrumental deliveries					
• Prolonged labor					
• Manipulation by unskilled birth attendants					
• Big babies					
• Early resumption of heavy work postpartum					
Take a detailed menstrual and contraceptive history					
Take medical history					
• History of diabetes mellitus, hypertension, or chronic respiratory problems					
• Constipation					
• Other surgical or medical illness					
General					
• Ask typical symptoms in women with POP.					
• Ask whether vaginal sensation of bulge or protrusion.					
• See or feel for a bulge or protrusion.					
• Check pressure.					
• Measure heaviness.					

Checklist for Assessment of Woman With POP					
Step/Task	Cases				
Urinary:					
• Incontinence					
• Frequency					
• Urgency					
• Weak or prolonged urinary stream					
• Hesitancy					
• Feeling of incomplete emptying					
• Manual reduction of prolapse to start or complete voiding					
• Position change to start or complete voiding					
Bowel:					
• Incontinence of flatus, or liquid, or solid stool					
• Feeling of incomplete emptying					
• Straining during defecation					
• Urgency to defecate					
• Digital evacuation to complete defecation					
• Splinting or pushing on or around the vagina or perineum to start or complete defecation					
• Feeling of blockage or obstruction during defecation					
Sexual:					
• Dyspareunia					
Take the past family and personal history:					
• Treatment history such as surgery, insertion of pessary, or other domestic remedies					
• History of smoking					
• History of alcohol intake					
Conduct the physical examination:					
• A thorough and complete physical examination should be done.					
• Vital signs (pulse, respiration rate, blood pressure, temperature) and general nutrition assessment (weight, anemia, signs of other vitamin/mineral deficiencies) should be done. Check for edema, icterus, cyanosis, and clubbing.					
Systemic:					
• Examination of respiratory system					
• Examination of cardio-vascular system					
• Abdominal examination: look for scars, distension, mass, organomegaly					

Checklist for Assessment of Woman With POP					
Step/Task	Cases				
Pelvic Examination:					
<ul style="list-style-type: none"> • Pelvic examination should be done in dorsal or left lateral position. If inconclusive, examine in standing position. Bladder should be full to demonstrate stress incontinence. 					
Inspection of the perineum:					
<ul style="list-style-type: none"> • Note for obvious uterine descent, cystocele, rectocele, enterocele. 					
<ul style="list-style-type: none"> • Look for vaginal/perineal tears/gaping of introitus or any other abnormality. 					
<ul style="list-style-type: none"> • Look for signs of atrophic changes in post-menopausal women. 					
<ul style="list-style-type: none"> • Separate the labia and look for urinary leakage while asking the woman to cough. 					
<ul style="list-style-type: none"> • While the woman coughs, look for presence of bulge of anterior/middle and /or posterior compartment. 					
<ul style="list-style-type: none"> • Note any decubitus ulcer on the prolapsed part including number, size, and character. 					
<ul style="list-style-type: none"> • Cervical hypertrophy/elongation, infection, etc. should also be noted. 					
<ul style="list-style-type: none"> • Note keratinization of vaginal mucosa. 					
Speculum examination:					
<ul style="list-style-type: none"> • When prolapse is not visible outside introitus: Place Sim's speculum in posterior vaginal wall and retract the anterior vaginal wall by retractor. 					
Assessment of degree of prolapse (simplified POP Q):					
<ul style="list-style-type: none"> • Identify in the anterior vaginal wall, a point or fold approximately halfway up the anterior vaginal wall or approximately 3 cm proximal to the urethral meatus/convergence of the hymenal remnants and descent of this point (point A) on straining is noted in relation to the hymenal remnants. 					
<ul style="list-style-type: none"> • Identify the point in the posterior vaginal wall (point B) that is approximately halfway up the posterior vaginal wall or 3 cm proximal to the posterior fourtieth/hymenal remnants. 					
<ul style="list-style-type: none"> • Identify in the cervix (point C) by placing a speculum in the vagina and directly observing its descent during straining or coughing to determine its stage in relation to the hymenal remnants. The vaginal apex or cuff scar is visualized in a similar way. 					
<ul style="list-style-type: none"> • If the subject has a cervix, then identify on the vaginal apex or posterior fornix (point D), which is described separately from the cervix. 					

Checklist for Assessment of Woman With POP					
Step/Task	Cases				
Bimanual examination:					
• Note size, position, and mobility of the uterus.					
• Look for any adnexal masses.					
• Feel for the tone of levator ani muscle. Ask the woman to squeeze the perineal muscle over the examining finger inside the vagina.					
• Record the findings in the patient's medical record.					

Perform Assessment of the Woman:

Qualified Not Qualified

Clinical Skills Evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

MODULE FIVE: NON-SURGICAL MANAGEMENT OF PELVIC ORGAN PROLAPSE

Nonsurgical management of prolapse includes adjunct therapy to address concomitant symptoms, pelvic floor muscle training and pessaries. Ideally, all women should be offered nonsurgical management before surgery. Pessaries may also be used before prolapse surgery to assess whether symptoms will be relieved with surgery (Weber 2005).

Adjunct Therapy

Adjunct therapy often includes advice on lifestyle alterations, weight loss, and a general exercise program as general guidelines for a healthy lifestyle. Presently, there is no evidence to support the pharmacologic use of estrogen to treat or prevent POP (Handa 2004).

Pelvic Floor Muscle Training

Strengthening a patient's pelvic floor muscles will help her actively support her bladder and bowel. Such strengthening improves bladder and bowel control and can reduce or stop leakage of urine and bowel. Like other muscles, the pelvic floor muscles become stronger with a regular exercise program. Pelvic floor muscle training aims to increase the strength of the pelvic muscles, thereby improving support to the pelvic organs. Although there is no direct evidence that pelvic floor muscle training prevents or treats prolapse, it is effective for urinary and fecal incontinence and may be beneficial for prolapse (Mouritsen 2003).

Unfortunately, pelvic floor exercise is underused as a nonsurgical therapy for prolapse, either alone or in combination with pessary use and other adjunct therapies for prolapse (Heit 2003). There is recent evidence from two high-quality, randomized controlled trials that pelvic floor muscle training can reduce the stage and symptoms of POP in some women (Braekken et al 2010; Hagen et al 2014).

For stress incontinence and urge incontinence, pelvic floor physical therapy, also known as Kegel exercises, have decades of data showing reduction and/or cure of incontinence in men and women with urinary and fecal incontinence caused by urgency, sphincter weakness/stress incontinence or mixed stress/urge (Burgio 1986; Burgio 1990; Friedman 2012).

The exercises are tailored to the patient's ability:

- If she can only generate a quick-flicker of muscle activity, don't tell her to "hold it for 10 seconds, relax and repeat 10 times" – she is unable to do that and she will give up.
- Weak patients start with 1 second quick contractions, 10–20 in a row.
- After a week, coach her to hold it for a count of 3, 10 in a row 3–4 times per day.
- After another week, work with her to get up to a 5-second hold—adjust exercise instructions accordingly, and so forth.

Consider using a Kegel Muscle Scoring System to objectively measure what you feel her doing on pelvic exam contraction and to give her a number to monitor her progress (Romanzi 1999; Fitzgerald 2007).

- A patient starting with a score of 1 who progresses to a score of 5 is encouraged.
- In non-fistula patients, continence improvement takes 12–16 weeks of dedicated exercises.

Modified Oxford Pelvic Tone Scoring System (Price 2010; Laycock and Jerwood 2001)

Grading	Muscle Response
0	No contraction
1	A flicker
2	Weak
3	Moderate with some lift
4	Good contraction with lift, against some resistance
5	Normal muscle contraction, strong squeeze and lift

- Grade 0 No discernible muscle contraction.
- Grade 1 A flicker or pulsation is felt under the examiner's finger.
- Grade 2 An increase in tension is detected, without any discernible lift.
- Grade 3 Muscle tension is further enhanced and characterized by lifting of the muscle belly and also elevation of the posterior vaginal wall. A grade 3 and stronger can be observed as an in-drawing of the perineum and anus.
- Grade 4 Increased tension and a good contraction are present, which are capable of elevating the posterior vaginal wall against resistance (digital pressure applied to the posterior vaginal wall).
- Grade 5 Strong resistance can be applied to the elevation of the posterior vaginal wall; the examining finger is squeezed and drawn into the vagina (like a hungry baby sucking a finger).

Patience and determination are part of patient counseling when it comes to expectations of Kegel exercise therapies. One-to-one pelvic floor muscle training for prolapse is effective for improvement of prolapse symptoms. Long-term benefits should be investigated, as should the effects in specific subgroups (Hagen 2014).

Pessaries

Pessaries are widely considered to be a safe and effective management option for women with POP (Wu et al. 1997; Fernando 2006; Atnip 2009; Bai et al. 2005; Sitavarin et al. 2009), including those with advanced POP (Powers et al. 2006). However, women are only suitable for pessary management if they have been examined by an appropriately trained medical practitioner to exclude abdominal or pelvic pathology as a cause of the prolapse. There are groups of women for whom a pessary may be particularly suitable, as indicated below.

Indications for pessary:

Pessary is the first-line management option for women with POP. In particular, pessary prescription is appropriate for women:

- With symptomatic POP
- Who decline surgery
- Who are unfit for or awaiting surgery

- Who have failed surgery
- Who have not completed childbearing
- Who are in their first trimester of pregnancy or postpartum
- Who are of older age and with co-morbidities
- Diagnostics to unmask occult SUI (clinical protocol for management of POP)

Evidence sources: Level III-3 (Bai et al. 2005; Fernando et al. 2006; Wu 1997); Level IV (Sarma et al. 2009); Opinion (Atnip 2009; Bordman et al. 2007; Clemons 2004a)

Contra-indications for pessary:

- Active vaginal infection
- Pelvic inflammatory disease
- Undiagnosed vaginal bleeding
- Decubitus ulcer-site dependent
- Noncompliance with follow-up
- Persistent vaginal erosions

Evidence sources: Level III-3 (Bai et al. 2005; Fernando et al. 2006); Level IV (Sarma et al. 2009); Opinion (Atnip 2009; Bordman et al. 2007; Weber 2005)

Role of Pessary

Pessaries

Nowadays, most pessaries are made of silicone and are ring type pessaries with or without central support (Figure 5-1). The modern pessary may be made of silicone and polyvinyl chloride.

Advantageous properties of silicone (Shah et al. 2006):

- Long half-life
- Resistance to autoclaving and repeated cleaning
- Non-absorbent properties in relation to secretions and odors
- Inert and hypoallergenic

Figure 5-1: Silicone Pessary



Pessaries are widely used devices to reduce prolapse by providing support to the pelvic structures and to relieve pressure on the bladder and bowel. They decrease symptom frequency and severity, delay or avoid surgery, and potentially prevent worsening of prolapse (Weber

2005). There are fewer than 20 different pessary types available (Fernando 2006) including two broad categories: support and space-filling.

Traditionally, use of pessaries has been reserved for patients, who decline surgery, are poor surgical candidates because of medical illness, or who need it for temporary relief such as during pregnancy or for urinary incontinence. However, clinicians should consider pessaries as a treatment option for all women with symptomatic prolapse; in particular, pessaries should always be considered before surgical intervention (Weber 2005). There is no universally accepted standard regarding how frequently patients should be examined after a successful pessary fitting. In general, intervals of 3–6 months are recommended (Braekken 2010; Bo 2004), but such a simple and apparently valuable tool has been poorly evaluated (Hay-Smith 2001). However, effectiveness with improvement of symptoms and patient acceptance of pessary treatment has been reported in various studies (Barber 2009; Braekken 2009, Bo 2006).

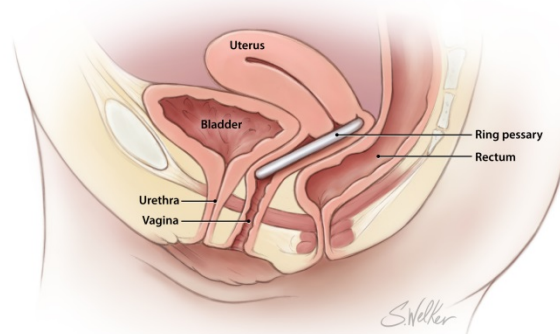
A trial-and-error approach is usually necessary before finding one that is most suitable for an individual patient (Barber 2009). Unsuccessful fitting is associated with (Wilson 2005; Sulak 1993):

- Short vaginal length of <7 cm
- Wide introitus of 4 finger breadths
- Increasing parity
- Previous hysterectomy

How to Use a Pessary

The approximate size of the pessary required is determined by performing a vaginal examination to estimate the appropriate size of the device. Use the length of the middle finger up to the base of the thumb for gross size estimation. Use the middle finger to measure the distance between pubic symphysis and posterior vaginal fornix. This is the correct diameter or pessary size. The goal is to fit the largest pessary that does not cause the patient discomfort, or the smallest pessary that holds the prolapse securely in place during all activities of daily living.

Figure 5-2: Ring Pessary Inserted



Follow-Up after Pessary Treatment

Evidence is lacking on the type of pessary that is chosen, or who should be responsible for cleaning and changing pessaries, and how often this should be performed. Ideally, the physician can teach a patient how to remove and replace the pessary herself. This increases a patient's autonomy, allowing her to use the pessary and clean it when needed. In such a setting, follow-up could be on an annual basis. Patients who are not willing or unable to manage pessary care themselves require more frequent doctor (or nurse practitioner) visits. Pessaries must be cleaned regularly. Sometimes they need to be cleaned by the doctor or nurse. As mentioned previously, many women can be taught how to insert, clean, and remove a pessary.

Post-Pessary Follow-Up (Shulz 2009; Nager 2009):

- There are no clear guidelines for pessary care.
- If possible, instructions on removal and care should be provided.
- Within 2 to 4 weeks, check to see if the client is satisfied or whether another size is needed.
- Advise the client to remove the **silicone pessary** at least every 3 months and **reuse** it after washing it with water or mild soapy water.
- Women who are not able to perform self-care should return for follow-up at **3-month intervals**.
- **Rubber pessary** should be **changed** every 3 months.

Side Effects of Pessaries

- Foul-smelling discharge from the vagina
- Irritation of the lining of the vagina
- Ulcers in the vagina
- Problems with normal sexual intercourse

More serious, but less common complications:

(These generally occur when patients do not attend regular follow-up.)

- Severe vaginal discharge associated with infection, e.g., bacterial vaginosis
- Urological complications associated with more severe prolapse (Arias et al. 2008)
- Cervical incarceration (by a ring pessary)
- Septicemia (Jelovsek 2007)
- Impacted-embedded pessaries, causing vesicovaginal or rectovaginal fistula (Arias et al. 2008; Jelovsek 2007)
- Vaginal or cervical cancer (Arias et al. 2008)

Women are generally instructed to note symptoms and report new problems, such as pain or discomfort, genital bleeding, abnormal vaginal discharge, sexual problems, and problems with elimination of urine or stool (Atnip 2009).

Complications of Pessaries

Local pressure from the pessary can lead to focal devascularisation and cause **erosions**. Reported rates range from 2% to 9%. Erosions may present as **vaginal bleeding**, odor, or **increased discharge**, which is typically brown. A strong odor is usually present upon removal of the pessary. When such strong odor is detected during routine pessary care, careful examination of the vagina should be performed, often facilitated by the use of large swabs to push the cervix and side walls apart. If neglected, erosions can progress to **ulcers** or a **fistula**.

Other causes of vaginal bleeding cannot be excluded in pessary users and endometrial or **ulcer biopsy** may be indicated if they persist. Therapy consists of **pessary removal** for a period of 2 to 4 weeks and **local estrogen** use (tablet or cream).

Key Points

- Non-surgical management of POP is effective and should be considered in cases of symptomatic POP.
- Kegel exercises (PFE) is an underused management option that can prevent and reduce the stage and symptoms of POP.
- The correct use of a pessary can be as effective as surgical treatment in the management of POP.
- Two important relative contraindications for pessary use are non-compliance with follow-up and persistent vaginal erosion.
- Patient counseling and compliance are essential for safe and effective pessary use.

References for Module Five

- Arias BE, Ridgeway B, Barber MD. 2008. Complications of neglected vaginal pessaries: case presentation and literature review. *Int Urogynecol J Pelvic Floor Dysfunct* 19(8):1173–1178. doi: 10.1007/s00192-008-0574-2.
- Atnip SD. 2009. Pessary use and management for pelvic organ prolapse. *Obstet Gynecol Clin North Am* 36(3): 541–63.
- Bai SW, et al. 2005. Survey of the characteristics and satisfaction degree of the patients using a pessary. *Intl Urogynecol J Pelvic Floor Dysfunct* 16(3): 182–186.
- Barber M, et al. 2009. Operations and pelvic muscle training in the management of apical support loss (OPTIMAL) trial: Design and methods. *Contemp Clin Trials*;30(2):178–18.
- Bo K. 2004. Pelvic floor muscle training is effective in the treatment of female stress urinary incontinent, but how does it work? *Int Urogynecol J Pelvic Floor Dysfunct* 15:76–84.
- Bo K. 2006. Can pelvic floor training prevent and treat pelvic organ prolapse? *Acta Obstet Gynecol Scand* 85 (3): 263–8.
- Bordman R, et al. 2007. Step-by-step approach to managing pelvic organ prolapse: Information for physicians. *Can Fam Physician* 53: 485–7.
- Braekken IH, et al. 2009. Pelvic floor function is independently associated with pelvic organ prolapse. *BJOG* 116(13):1706–14.
- Braekken IH, et al. 2010. Can pelvic floor muscle training reverse pelvic organ prolapse and reduce prolapse symptoms? An assessor-blinded, randomized, controlled trial. *Am J Obstet Gynecol* 203(2):1233–7.
- Burgio KL, Robinson JC and Engel BT. 1986. The role of biofeedback in Kegel exercise training for stress urinary incontinence. *Am J Obstet Gynecol* 154(1):58–64.
- Burgio KL. 1990. Behavioral training for stress and urge incontinence in the community. *Gerontology* Suppl 2 27–34.
- Clemons JL, et al. 2004. Patient characteristics that are associated with continued pessary use versus surgery after 1 year. *Am J Obstet Gynecol* 191(1): 159–64.
- Fernando RJ, Thakar R, Sultan AH, Shah SM, Jones PW. Effect of vaginal pessaries on symptoms associated with pelvic organ prolapse. *Obstet Gynecol*. 2006;108(1):93–99
- FitzGerald MP, et al. 2007. Pelvic-floor strength in women with incontinence as assessed by the brink scale. *Phys Ther* 87(10):1316–24.
- Friedman B, *Conservative treatment for stress urinary incontinence; simple, reasonable and safe*, Can Urol Assoc J, 2012 Feb;6(1):61–63
- Hagen S, et al. 2014. Individualised pelvic floor muscle training in women with pelvic organ prolapse (POPPY): A multicentre randomised controlled trial. *Lancet* 383(9919):796–806.
- Handa VL, et al. 2004. Progression and remission of pelvic organ prolapse: A longitudinal study of menopausal women. *Am J Obstet Gynecol* 190(1):27–32.
- Hay-Smith EJ, et al. 2001. Pelvic floor muscle training for urinary incontinence in women. *Cochrane Database Syst Rev* (1):CD001407.

- Heit M, et al. 2003. Predicting treatment choice for patients with pelvic organ prolapsed. *Obstet Gynecol* 101:1279–84.
- Jelovsek JE, Maher C, Barber MD. 2007. *Pelvic organ prolapsed. Lancet* 369(9566):1027-1038.
- Laycock J and Jerwood D. 2001. Pelvic floor muscle assessment: The PERFECT Scheme. *Physiotherapy* 12: 631–642.
- Mouritsen L and Larsen JP. 2003. Symptoms, bother and POPQ in women referred with pelvic organ prolapse. *Intl Urogynecol J Pelvic Floor Dysfunct* 14(2):122–7.
- Nager CW, et al. 2009. Incontinence pessaries: size, POPQ measures, and successful fitting. *Int Urogynecol J Pelvic Floor Dysfunct* 20(9):1023–8.
- Powers K, Lazarou G, Wang A, et al. *Pessary use in advanced pelvic organ prolapse. Int Urogynecol J Pelvic Floor Dysfunct.* 2006;17:160–164
- Price N, Dawood R and Jackson SR. 2010. Pelvic floor exercise for urinary incontinence: A systematic literature review. *Maturitas* 67(4):309–15.
- Romanzi LJ, Polaneczky M and Glazer HI. 1999. Simple test of pelvic muscle contraction during pelvic examination: correlation to surface electromyography. *Neurourol Urodyn* 18(6):603–12.
- Sarma S, Ying T, Moore KH. Long-term vaginal ring pessary use: Discontinuation rates and adverse events. *BJOG: An International Journal of Obstetrics and Gynaecology.* 2009; 116(13): 1715–1721.
- Schulz JA and Kwon E. 2009. “Pelvic Organ Prolapse: Pessary Treatment.” Pp. 271–7 in. *Pelvic Floor Reeducation: Principles and Practice, edited by Baessler K, Schussler B, Burgio KL, Moore KH, Norton PA, and Stanton SL.* London UK: Springer-Verlag London Limited.
- ShahSM, Sultan AH and Thakar R. 2006. The history and evolution of pessaries for pelvic organ prolapse. *Int Urogynecol J Pelvic Floor Dysfunct* 17(2): 170–175.
- Sitavarin S, et al. 2009. The characteristics and satisfaction of the patients using vaginal pessaries. *J Med Assoc Thai* 92(6): 744–747.
- Sulak PJ, Kuel TJ and Shull BJ. 1993. Vaginal pessaries and their use in pelvic relaxation. *J Reprod Med* 38:919–23.
- Weber AM and Ritcher HE. 2005. Pelvic organ prolapse. *Obstet and Gynecol* 106(3)615–34.
- Wilson PD, Berghmans B, Hagen S, Hay-Smith J. 2005. *Adult conservative management third international consultation on incontinence.* www.menopausemgmt.com.
- Wu V, et al. 1997. Simplified Protocol for pessary use. *Obstet Gynecol* 90: 990–4.

Exercises

1. Insertion of a ring pessary is appropriate management for POP in the following situation:

Case	Yes	No
1. 35-year-old patient with Down's Syndrome who was brought to you by her elderly mother from a remote village		
2. 82-year-old female with severe arthritis of the hip		
3. 24-year-old female who desires another pregnancy		
4. Patient with offensive vaginal discharge		
5. 60-year-old female with decubitus ulcer in cervix who would like surgical management		
6. 30-year-old female, gravida 4 at 10 weeks gestation		

For each situation (a–f), list the advantages and disadvantages of pessary, and any other possible management option.

2. What are the possible side effects of having a vaginal ring pessary?

Examples	True	False
1. Slight vaginal discharge		
2. Back pain		
3. Vaginal irritation		
4. Frothy blood-stained vaginal discharge		

Checklist for Pessary Insertion

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

- 1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
- 2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
- 3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Pessary Insertion				
Step/Task	Cases			
1. To assist in the selection of the pessary style and size, the service provider estimates the vaginal dimensions:				
– Determines vaginal length: palpates the posterior fornix (or vaginal vault in the absence of the cervix) with the index or middle finger and estimate the distance to the pubic symphysis.				
– Visually compares the mental image of the vaginal vault size and shape with the actual pessaries, trying the pessary that most closely represents the visual image (Atnip 2009).				
2. Washes the pessary in soap and water /or betadine to remove any corn starch used for packaging.				
3. Applies water-based lubricant to the leading edge of the pessary, or to the introitus, to make insertion easier, but avoids lubricant on the gloved hand holding the pessary.				
4. Separates the labia and inserts the pessary at the introitus, and, with gentle pressure, slides it up the posterior vaginal wall. Eases the pessary right up into position in the upper part of the vagina and behind the pubic symphysis (Atnip 2009). The ring pessary should be turned one quarter turn in either direction following placement to ensure the foldable edge is not placed in front of the introitus, thus potentially limiting spontaneous expulsion.				
5. Once the pessary has been fitted, the patient should ambulate in the clinic and perform activities such as squatting and performing the Valsalva maneuver to ensure that it will not fall out. It is necessary to ensure that patients are able to void and that they are given appropriate education.				
To test for correct fit for pessary				
1. Asks the woman to cough and perform the Valsalva maneuver in dorsal lithotomy or bent knee lying position. A correctly sized pessary may descend in the vagina; however, it should recede on relaxation.				

Checklist for Pessary Insertion				
Step/Task	Cases			
1. Asks the woman to stand up and walk around. There should be no discomfort and it should not be expelled with coughing, performing the Valsalva maneuver, bending, or squatting.				
2. A larger size or different type should be tried if it is nearly or completely expelled.				
3. A smaller size or different type should be tried in the event of discomfort in the vagina or low abdominal pain.				
4. A vague sensation of discomfort or irritation may be due to irritation from the actual fitting procedure. Clinical judgment will determine whether removal and refit is necessary.				
Things to check during follow-up:				
1. At the follow-up visit, asks about symptoms of vaginal bleeding, discharge, or odor that might indicate infection or erosion. Check for defecation or voiding difficulty and any abdominal discomfort. Asks about coital problems.				
2. Check the pessary for position and fit, then remove it, and wash with soap and water.				
3. A speculum examination should look for evidence of abrasions or erosions caused by the pessary.				
4. If abrasions or erosions are found, the pessary should be removed and local estrogens applied until healed. Salt baths or antibiotics may be indicated. Pessary management with a different size or type can be resumed.				
5. If no abrasions or erosion are found and the pessary is intact and flexing normally, it can be washed under running water with soap, dried, and reinserted.				
6. Modern pessaries are generally made of silicone, which makes them non-allergenic and able to be autoclaved.				
7. Mild discharge and odor can be treated with vaginal acidifiers.				
8. If vaginal estrogen is contraindicated, a water-based gel may be used.				

Perform pessary insertion:

Qualified Unqualified

Clinical skills evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Pelvic Floor Exercise

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence, or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary) but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Pelvic Floor Exercise				
Step/Task	Cases			
1. Asks the woman to empty her bladder.				
2. Coaches the patient to perform this exercise properly during internal vaginal examination by asking the patient to tighten the pelvic floor muscles, squeezing around the examining fingers, holding the contraction for 5–10 seconds each, relaxing in between contractions.				
3. If the patient cannot hold for 5 seconds, or cannot contract at all, adjustment of PFE performance in daily life and therapeutic expectations is modified accordingly.				
4. For women able to sustain a contraction for 5–10 times during each session. Once the patient knows how to tighten these muscles, they can do these any time while standing quietly, sitting, or lying down.				
5. For women barely able to contract the muscles, instruct her to do "quick flick" contractions in sets of 5–20 repetitions 3–5 times per day, setting the number of repetitions to match the patient's abilities.				
6. Documents patient "Kegel capacity" at each visit. Considers use of a PFE scoring system to monitor and document pelvic floor function with this semi-objective assessment tool.				
7. Advises patient to conduct pelvic floor contractions during activities of daily living as well, particularly before coughing, sneezing, heavy lifts, and during sessions for prolonged standing.				

Perform pelvic floor exercise:

- Qualified Not Qualified

Clinical skills evaluation:

- Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

MODULE SIX: SURGICAL MANAGEMENT FOR POP

Introduction

The success of POP surgery depends on the preparation for surgery, surgical technique, and post-operation wound healing; each has a significant impact on the final outcome. The principles of surgery are based on proven techniques that help to optimize the healing environment.

Basic necessities of surgery:

1. Respect for tissues
2. Time motion and flow of operation and forward planning
3. Knowledge and handling of instruments
4. Suturing and knotting skills
5. Technical use of assistants
6. Relation with patient and surgical team

Pre-Operative Care

Preparing a patient for anesthesia requires an understanding of the patient's pre-operative status, the nature of the surgery, and the anesthetic techniques required for surgery, as well as the risks that a particular patient may face during this time. Patients often have comorbidities that require careful assessment and co-ordination. Preparation for surgery may take weeks to achieve, and could therefore potentially cause delay and cancellation of surgery if not done adequately.

Pre-operative anesthetic assessment services decrease cancellations on the day of surgery, improve the patient's experience of their hospital admission, and may reduce complication rates and mortality. The pre-operative visit may relieve anxiety and answer questions about both the anesthetic and surgical processes (NHS 2009).

Pre-Operative Services Should Include (AAGBI Safety Guideline 2010)

- Ensure that every patient is fully informed about their proposed procedure and the interventions that will need to be undertaken.
- Estimate the level of risk for every patient.
- Ensure that every patient understands her own individual risk so that she can make an informed decision about whether to proceed with surgery.
- Identify co-existing medical illnesses and optimally prepare patients while taking into account the urgency of the operation.
- Identify patients with a high risk of complications in the peri-operative period and define the appropriate post-operative level of care

It is important to plan and identify problems based on:

- History
- Physical examination

- Differential diagnosis
- Investigations
- Treatment
- Observation of the effects of treatment
- Re-evaluation of the situation, the diagnosis, and the treatment

- A full medical history includes the following:
 - Patient identification: name, sex, address, and date of birth
 - Presenting complaint
 - History of the present symptoms/illness
 - Past medical history, especially previous surgery and any complications, including:
 - Allergies
 - Medications, including non-prescription and locally obtained drugs
 - Use of tobacco and alcohol
 - Chronic constipation and cough
 - Family history
 - Social history
 - Activities at home

General Examination

- A general and systemic examination should identify:
 1. Pallor, icterus, cyanosis, edema
 2. local skin infection/excoriation
 3. Respiratory system—abnormal breath sounds
 4. Cardiovascular system—heart murmur. Patients should be hemodynamically stable and their vital signs normal before starting anesthesia.
 5. Gastrointestinal system— abdominal masses, previous scars
 6. Musculoskeletal system—skeletal malformations such as kyphoscoliosis

Pre-operative investigations should include the following:

- Blood tests:
 - CBC , blood group, and Rh typing
 - Blood sugar
 - Renal function test
 - Serology: HIV (provision of HIV counseling and testing), HBsAg
- Urinalysis and urine culture

- Imaging:
- Chest X-ray
 - Ultrasound of kidney, ureter and bladder, and adnexal mass. Look for stones and obstruction if indicated.
- ECG (all women over the age of 40)

Informed consent and counseling

Informed consent is the process of communication between a patient and physician that results in the patient's authorization or agreement to undergo a specific medical intervention. For both ethical and legal reasons, patients must be given enough information to be fully informed before deciding to undergo a major treatment, and this informed consent must be documented in writing.

The surgeon must discuss with the patient and her guardian the following points:

- Full diagnosis
- Nature and purpose of the treatment or procedure
- Risks and benefits of the treatment or procedure
- Alternative treatment options with their risks/benefits
- Risks and benefits of not undergoing treatment/procedure
- Risks during the post-operative period
- Risks due to anesthesia
- Follow-up and post-discharge care

It is important that a patient has the opportunity to ask questions and it is the surgeon's duty to make sure that the patient has understood all information given to her. The patient's privacy and confidentiality must be respected and the woman should be able to give written consent in a supportive environment. Confidentiality and informed consent are key expressions of a good patient-surgeon relationship.

Standards of Peri-Operative Care

It is important that the service provider bears professional responsibility and provides essential information for the delivery of safe peri-operative patient care and a safe work environment.

Pre-Operative Counseling

Pre-operative counseling is done by the surgeon(s).

The following points should be included during counseling for the woman and relatives.

- Options:
 - Conservative treatment (pessary) is always an alternative to surgery.

- If future pregnancy is planned, every effort must be made to properly fit a pessary and encourage the woman to use a pessary until childbearing is complete.
- Hysterectomy entails removal of uterus, resulting in permanent cessation of menstruation and infertility.
- Hysterectomy does not improve durability or overall success of prolapse surgery.
- Further pregnancy:
 - Any pregnancy after prolapse surgery is strongly discouraged.
 - When the uterus is retained, cesarean is advised for all pregnancies subsequent to prolapse surgery to minimize the possibility of recurrence and further pelvic trauma.
- Recurrence:
 - Even without subsequent pregnancy, prolapse recurrence is always possible.
 - Prolapse recurrence is not always as severe as the initial prolapse severity, and, if occurs, may never be symptomatic.
 - For recurrent, severe, and symptomatic prolapse, repeat operation is possible.
 - It is not possible to guarantee that the prolapse will never recur, no matter what prolapse technique is employed.
 - Because of the potential for recurrence, women undergoing prolapse surgery must be prepared to reduce lifestyle habits that increase this risk (smoking, heavy lifting, constipation, pregnancy, obesity, pulmonary disease).
 - Weight lifting and other strenuous activities must be restricted.
- Risks: All surgeries, including prolapse surgery, carry inherent risks, including:
 - Immediate risks:
 - Bleeding that requires blood transfusion
 - Injury to bladder, ureters, rectum, and intestines
 - Conversion to laparotomy to manage intra-operative complications
 - Anesthetic risks
 - Death due to unforeseen, rare complications of surgery or anesthesia
 - Later risks:
 - Positional and surgical neuropathies (brachial, peroneal, sciatic, pudendal, sacral nerve root, femoral)
 - Infection
 - Chronic dyspareunia

Quality of Life

Following surgery among women with POP, studies have shown that all domains of quality of life (QOL) progressively improved after three months had passed. Depressive symptoms also improved remarkably after surgery. Improved mental health status post-operatively could have positively affected post-operative QOL (Dhital 2013). In appropriately selected elderly women, both obliterative and reconstructive vaginal surgery for advanced POP significantly improved health-related QOL (Barber 2000), (Fitzgerald 2001). The CARE trial also reported significant improvements in QOL following sacrocolpopexy at three months and two years. In that trial, Nygaard et al. reported pre-surgical physical activity levels (Nygaard 2004).

A study conducted by UNFPA demonstrated that surgical interventions positively impact to contribute to the improvement of the health-related QOL of women who suffer from uterine prolapse. This study showed that QOL among women with advanced POP may progressively improve after surgery. The improved QOL scores observed in participants encompassed physical, psychological, social relationships, and environment domains. Before the surgery, women with POP had poorer QOL as compared to women without the condition (Dhital 2013).

Counseling of Women Scheduled for Surgery

- Before surgery:
 - The surgeon will be available to counsel the woman and re-examine her immediately before the surgery.
 - The patient should not eat or drink anything for 6 hours before the surgery to reduce anesthesia complications. If she does not follow this advice, the surgery will be canceled.
 - The patient must shower the night before surgery, or, if not possible, she must bathe the genital area thoroughly.
 - The lower bowel should be cleaned by a pre-operative enema the evening before and morning of surgery if bowel is not evacuated completely.
- During surgery:
 - The patient will have a urinary catheter and an intravenous line during surgery that will stay in for a few days.
 - The anesthesia is spinal. Explain that this numbs the body from the waist down. She will be awake and will be able to talk.
 - The surgery usually takes around 1 hour.
- After surgery:
 - The patient may or may not be able to drink or eat right away, depending on the operation performed and the advice of the surgeon. If the diet is restricted, it is usually for 6–12 hours.
 - The doctor checks the patient daily. The patient should inform nurses immediately in case of difficulty with or painful urination, vaginal bleeding, fever, nausea/vomiting, constipation, or foul discharge.
 - Post-op hospital stay is usually 3–5 days

- There will be no visible scars when surgery is done vaginally.
- At discharge, the patient:
 - Must wash herself daily with clean water, paying special attention to the vulva.
 - Should report to the hospital immediately for bleeding, fever, foul vaginal discharge, urinary retention, severe constipation, or severe lower abdominal pain.
 - Avoid intercourse for at least 6 weeks after surgery.
 - Avoid weight lifting for at least 6 weeks and heavy weight lifting forever.

Preparation for Surgery

- Anemia or any medical condition such as diabetes, hypertension, etc. must be corrected.
- Bacterial vaginosis, sexually transmitted disease, urinary infection, atrophic vaginitis and decubitus ulcer should be treated before surgery.
- Ring pessary if in situ should be removed before surgery.
- The patient should be kept on an empty stomach for 6 hours before the operation.
- Mild sedative drugs should be given the night before surgery to reduce anxiety.
- The lower bowel should be cleaned by pre-operative enema the evening before and morning of surgery if bowel is not evacuated completely.
- Deep vein thrombosis prophylaxis should be considered if indicated.
- Prophylactic antibiotics like first and second generation cephalosporins (e.g., cefazolin) 2 gm iv should be given within 60 minutes before the incision, to be repeated if operating time more than 3 hours or if blood loss is more than 1,500 ml (CDC 2014 Draft Guidelines for Prevention of SSI), Trimming or clipping of hair (if require) to be done just before operative procedure in the operation theatre. Shaving should not be done.

Intra-Operative Care: (WHO Guidelines of Patient Safety, 2009)

Before induction of anesthesia:

- Patient identity, site of surgery, procedure, and consent should be confirmed.
- Anesthesia machine and medication should be checked.
- Any history of allergy should be notified.
- Difficult airway and aspiration risk should be noted.
- Two IV access lines should be ready if blood loss is expected to be > 500ml.

Before incision:

- All team members (surgeons, anesthetist, and nurse) should introduce themselves.
- Patient name, procedure, and site of incision to be reviewed.
- Antibiotics prophylaxis should be confirmed.
- Anticipated critical events should be discussed (any critical steps, time duration, anticipated blood loss).

- Patient's specific concerns should be discussed.

Before patient leaves operating room:

- The name of the procedure should be confirmed.
- Completion of the surgical checklist should be done.
- Specific concern for recovery and post-op management should be advised.

Post-Operative Instructions after Prolapse Surgery

The most critical period for a patient post operatively is the first 48 hours after surgery when the patient must be under close observation by adequately skilled nursing staff. Proper monitoring during this period reduces the risk of complications and helps in quick recovery.

Anesthesia for POP Surgery

Pre-Operative Preparation

Patient positioning and anesthesia

The lithotomy position with the head tilted down (Trendelenburg position) reduces vital capacity by 18–20%, but is not very well tolerated by cardiac or obese patients. The lithotomy position is also one of the causes of backaches in the post-operative period. Special precautions and care are necessary when positioning. Many patients will have hip and/or knee arthritis, and may have had surgery on these joints. Special leg slings may be preferable to leg stirrups if leg joints articulate poorly. Care must be taken to avoid common peroneal nerve compression in leg stirrups. Special precautions taken during repositioning to supine as after prolonged leg elevation excessive blood pooling to lower limbs may cause transient compromise in cardiac output and even cardiac arrest in occasional cases. Sudden repositioning of limbs after surgery may alter circulatory blood volume abruptly.

Premedication:

- Anxiolytic the night before (e.g., lorazepam 1 mg oral)
- Antiemetic (e.g., metoclopramide 10 mg) to reduce peri-operative nausea and vomiting
- H₂ receptor blocker(inj ranitidine 50 mg iv) to reduce volume and pH of gastric contents
- DVT prophylaxis to be given if necessary (low molecular weight heparin)

There are different anesthetic techniques used for the procedures, namely:

- General anesthesia: under controlled ventilation with muscle relaxant or spontaneous ventilation with the laryngeal mask airway
- Total intravenous anesthesia
- Regional anesthesia: spinal, epidural, combined spinal-epidural, caudal-epidural, spinal-saddle block, etc.
- Local anesthesia for very selected procedures

Spinal anesthesia is the choice of anesthetic techniques for most gynecological surgeries, including prolapse surgery, and epidural anesthesia is preferred for prolonged surgeries. Epidural

anesthesia is the better option for post-operative pain management, especially if opioid analgesics are not preferred. Combined spinal epidural anesthesia is another option for the same. Different types of anesthesia can be used in combination. For example, a regional anesthetic can be used with a general anesthetic to relieve pain after surgery. A sedative is also sometimes used with a regional anesthetic to help a woman to relax and feel calm during surgery as well as be pain free (Miller 2010).

Major advantage of regional anesthesia is its safety and lack of serious complications. Moreover, it also provides a hypotensive technique to reduce intra-operative blood loss.

Types of Anesthesia (Miller 2010)

- Regional anesthetic—a local anesthetic given to a defined region of the body, usually served by a large nerve bundle (such as the arm), giving numbness or pain relief for deeper surgeries where more extensive numbness is needed.
- Epidural anesthetic—a type of regional anesthetic usually used to numb the lower half of the body and good for pain relief, for example, during labor and childbirth.
- Spinal anesthetic—a type of regional anesthetic used to give total numbness lasting about three hours to the lower parts of the body so that surgery can be safely carried out in this area.
- Sedation—medication that makes a patient feel sleepy and relaxes her both physically and mentally. It is sometimes used to keep the woman calm during minor, painful, or unpleasant procedures.

Intra-Operative Monitoring

- Routine non-invasive cardiac monitoring including non-invasive blood pressure, pulse oximetry, and ECG should be done.
- Intravenous access with suitable intravenous fluid should be ensured.
- The surgeon usually infiltrates the operative field with a vasoconstrictor adrenaline in a concentration of 1:200 000 solution to reduce bleeding. Cardio vascular monitoring is mandatory when adrenaline solution infiltration given.
- The patient must be kept warm all the time with warm blankets or warm air blanket.

Basic Surgical Techniques for POP Surgery

Dissection Technique

Infiltration of the prolapse with saline, or a mixture of saline and lignocaine and 1–2% with adrenaline or without adrenaline, promotes both hydro dissection and hemostasis. The incision line is planned and marked to facilitate the separation.

Selecting Dissection Scissors

The choice of dissecting scissors relates to the integrity of the tissue in the Ally's clamps:

- Fibrosis dissection: A sharp, dissecting scissor, Reynolds or Padgett Stevens Tenotomy scissors or curved Mayo scissors
- Normal non-fibrotic dissection: fine, blunt-tipped dissecting scissors or a fine Metzenbaum scissors

Sutures

Choice of suture material

- Polyglycolic (Dexon) suture has the durability and non-reactivity preferred by most surgeons. Usually number 1 is used.
- Delayed absorbable polyglactin (Vicryl) suture is commonly used in vaginal mucosal closure, vesicovaginal and rectovaginal fascial work, perineoplasty and anal sphincteroplasty.
- Permanent sutures (polypropylene) are used in some procedures like sacrospinous fixation.
- Chromic catgut has been used in past. This is not recommended any more.

The half-life tensile strength

Braided polyglactin 910 (Vicryl)	2 weeks
Polyglycolic acid (Dexon)	2 weeks
Monofilament polyglyconate (Maxon)	3 weeks
Monofilament polydioxanone (PDS)	4-6 weeks

Needles

Surgical needles are classified in three categories:

1. Round body needles: These are also called "Taper" needles, come in sizes ranging from large, sturdy sizes to fine, delicate, highly-malleable configurations. The type of needle used is based on constructive goals and the tissue densities involved. Round-bodied needles are used in soft/fragile tissue, for example, on uterine muscle, ovaries, or tubes.
2. Cutting needles: These are used on the skin, and for securing structures like drains.
3. Trocar needles: They have a sharp tip but a round body, and are used to penetrate tough tissues such as the cervix. Needles are attached to the suture commercially or have eyes to pass the suture through (free needles). Swaged needles are preferable, but every center must have free needles available as an alternative.

Types of Surgery

The primary aim of surgery is to relieve or improve prolapse symptoms and associated urinary and bowel symptoms. Approaches include vaginal, abdominal, and laparoscopic routes or a combination of routes based on the type and severity of prolapse, the surgeon's training and experience, the patient's preference, and the expected or desired surgical outcome (Weber 2005).

Surgery usually involves a combination of repairs addressing the anterior vagina, vaginal apex, posterior vagina, and perineum. However, there is no universal acceptance on the following points (Weber 1997):

1. Approach: vaginal, abdominal, or combined approach
2. To perform a hysterectomy or not
3. Use of artificial mesh grafts and urethral slings for the concomitant stress urinary incontinence

Procedures for prolapse can be broadly categorized into three groups:

1. Restorative, which uses the patient's endogenous support structures
2. Compensatory, which attempts to replace deficient support with some type of graft, including synthetic, allogenic, xenogeneic, or autologous materials
3. Obliterate, which closes the vagina (Weber 2005)

Brief review of surgical Procedures for Prolapse

Anterior Compartment Defect

Introduction

The surgical repair of the cystocele has a number of variations, and techniques differ extensively among surgeons. The technique is also often called anterior colporrhaphy. It should be noted that the recurrence rates for this operation have been quoted to be in excess of 30% and therefore adequate pre-operative counseling is necessary prior to embarking on the surgery.

Pre-operative considerations

Any women presenting with a cystocele may have other pelvic floor pathology and it is essential to adequately assess her for stress incontinence. The patient must always be examined properly to ensure that she does not have uterine or vault prolapse that also requires attention at the time the anterior compartment prolapse is being addressed. The surgical technique for apical (uterine and vault) prolapse and posterior compartments prolapse are addressed in separate chapters. It is very unusual to have an isolated cystocele without prolapse in any other compartment.

Operative technique

The gynecologist will use the traditional native tissue repair technique for repair of the anterior compartment defect.

Anterior colporrhaphy

1. Preparation:
 - Catheterize the bladder with a Foley catheter before commencing the operation. This reduces the risk of injury to the bladder. The catheter may be left in-situ to keep the bladder empty.
 - Place a retractor in the vagina and ask the assistant to pull it posteriorly as you identify the prolapse as it extends from the urethra toward the vault or cervix.

2. Putting in clamps:

- Starting at the part of the prolapse that is closest to the urethra, place an Allis clamp in the midline avoiding the urethrovesical junction.
- Place the Allis clamps in the anterior vaginal wall about 2–3 cm apart over the extent of the prolapse.
- It is useful to place a vulsellum on the anterior lip if cervix is present.
- If there is no cervix, place a Vicryl 0 suture at the vault on either side so that you can identify the apex or cuff while performing the repair. This step is very useful to retain your orientation.

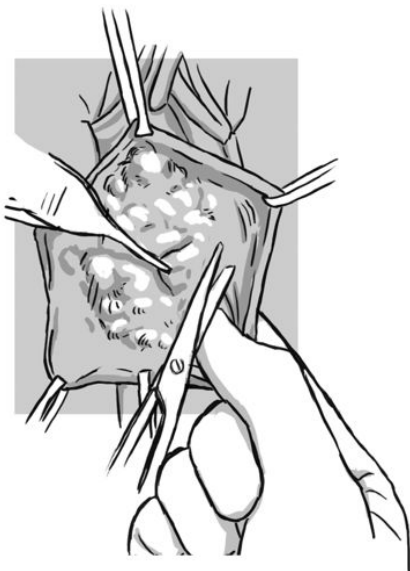
3. Incision:

- Inject the infiltration solution along the course of the prolapse.
- Make an incision over the prolapse extending from one Allis to another.
- Once you have a continuous incision, place an Allis at the top and bottom corners of your incision.
- Place Allis clamps on the edges of the incision line so as to expose the underlying tissue.

4. Dissection:

- Ask assistant to retract firmly on the side. Commence dissection and to spread the Allis clamps for you on that side creating tension in the vaginal mucosal edge. This facilitates the dissection.
- With your assistant providing firm traction away from the incision line, grasp the tissue underlying the vaginal mucosa (we will call it bladder fascia) and gently dissect it away from the mucosa with the Metzenbaum or Stille's scissors. The point of the scissors should be curved toward the mucosa (Figure 6-1).

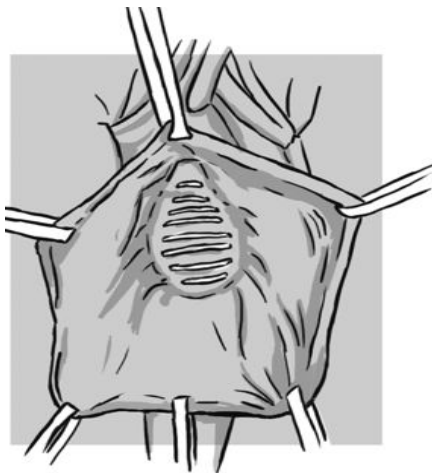
Figure 6-1. Dissection Showing Correct Scissor Use



Source: Jeffery S. 2010. *Procedures in Obstetrics and Gynaecology*. Creative Commons Attribution License, 232–249

- Dissection using the scissors (sharp dissection) is often considered to be safer than the alternate technique that employs blunt dissection with swab and/or finger. The initial aim of the dissection is to dissect the underlying bladder fascia off the vaginal mucosa.
5. Assessing the extent of dissection:
- If you place your forefinger into your dissection, you will feel the inferior ramus of the pubis and, cephalad to that, the soft tissue lateral to your dissection is the medial part of the levator muscle, which is covered by the levator fascia.
 - Going even more cephalad, lateral to your dissection, you will eventually get to the so-called “white line,” which is the insertion of the levator on the pelvic side wall and stretches from the pubic bone to the ischial spine.
 - You will notice once you have completed the dissection that the bladder and its overlying fascia are now free of the lateral attachments to the mucosa and levator muscle.
6. Closure:
- The bladder fascial plication:
 - Place a number of sutures from side to side so as to reduce the anterior compartment prolapse.
 - Start at the top of the bladder wall and place five or six Vicryl 3/0 sutures from side to side. These can be either continuous or interrupted (Figure 6-2).

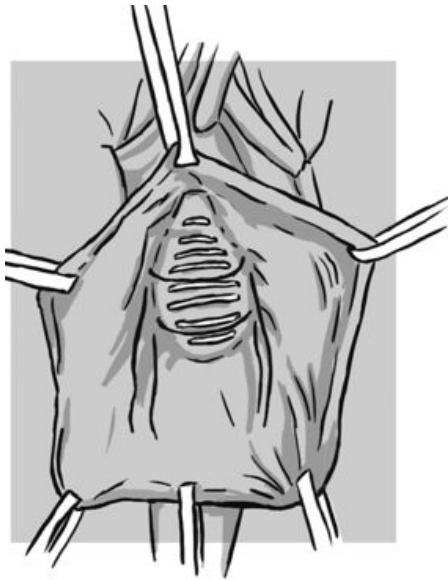
Figure 6-2. Example of Sutures



Source: Stephen Jeffery Procedures in Obstetrics and Gynaecology, Creative Commons Attribution License 2010, 232–249

- The levator fascia closure:
 - Using a retractor, ask your assistant to hold the bladder away from the pelvic side wall, thereby exposing the medial aspect of the levator muscle and its fascia.
 - Apply PDS 0 or PDS 2/0 sutures on the medial aspect of the levator fascia and muscle that is repeated on the other side with the same suture, which is cut and the ends left long and clamped for tying at a later stage.
 - Additional two or three sutures are placed in the same manner (Figure 6-3).

Figure 6-3. Example of Additional Sutures



Source: Stephen Jeffery Procedures in Obstetrics and Gynaecology, Creative Commons Attributive License 2010, 232-249

- The PDS sutures are now tied individually, thereby creating an extra layer of support.
- Vagina mucosal closure:
 - The excess vaginal mucosa should be trimmed if necessary at this point.
 - The incision is closed with a locking Vicryl 2/0 suture.

Anterior vaginal wall prolapse can be divided into central and lateral defects. Paravaginal repair of antero-lateral vaginal prolapse is done by reattaching the antero-lateral vaginal sulcus to the obturator internus muscle and fascia at the level of the arcus tendineus fascia pelvis (“white line”). It can be performed via transvaginal or retropubic (abdominal or laparoscopic) access (Kenneth 2006). The long-term effectiveness of paravaginal repair is unknown. Furthermore, performance of the vaginal paravaginal repair requires specific expertise (Weber 2005).

Posterior Compartment Defect Repair

Posterior repair or posterior colporrhaphy is the standard approach to correcting posterior compartment prolapse. It is essential that the surgeon is satisfied with the indication of surgery before embarking on a posterior repair.

Operative Technique

The gynecologist will use the traditional native tissue repair technique for repair of the posterior compartment defect.

Posterior colporrhaphy

1. Posterior Dissection:

- Start by making a triangular incision in the lower part of the posterior vagina and then extend this incision upwards toward the cervix or vault. The base of the triangle is at the introitus. This may not be necessary if the introitus is really tight or if the rectocele is relatively high up in the vagina. Some surgeons do not include this triangular step, but simply commence the operation by making a midline incision from the introitus.
- Putting on clamps:
 - Place two Allis forceps approximately 2–3 cm on either side of the midline on the posterior vaginal introitus.
 - Place a third Allis about 3 cm into the vagina in the midline—this will create a triangular area of vaginal mucosa that you will dissect off as you commence your dissection.
 - Place additional Allis clamps in the midline above the apex of the triangle toward the vault or cervix.
- Infiltration:
 - Inject your infiltration and make sure to get enough fluid into the perineal area to facilitate the dissection. Inform the anesthetist when you inject.
- Lateral dissection:
 - Ask your assistant to pull on the lower Allis clamps laterally and hold the apical Allis clamp with your own non-dominant hand.
 - Using the scalpel, dissect the mucosa off the triangular area you have created.
 - Once you have dissected the triangular piece of mucosa off the vagina, place two or more Allis clamps on the vaginal skin edges.
 - With a tissue forceps on the one hand and a Metzenbaum scissors in the other, dissect the peri-rectal tissue off the vaginal mucosa. This is most easily done by asking your assistant to pull on the vaginal mucosa edge with the Allis and retracting the peri-rectal tissue with a tissue forceps in your other hand and cutting with the scissors pointing toward the vaginal mucosa edge. Dissect the skin off the underlying rectal tissue in this way.
 - Once the mucosa edges on the vaginal triangle are separated from the underlying peri-rectal tissues, using a swab, push the peri-rectal tissues away and hereby advance your dissection away from the rectum.
- Apical dissection:
 - You are now ready to extend your dissection up the posterior vaginal wall.
 - Remove the Allis at the apex of the triangular incision and place it about 1 cm away from the apex on the right side.
 - Place another Allis on the left side about 1 cm away from the apex.

- Ask your assistant to pull and spread both of these Allis clamps and, using a scissors in the one hand and a tissue forceps in the other hand, dissect the underlying rectal fascia off the mucosa by undermining and spreading with your scissors.
- Aim toward the apex as you dissect the mucosa off the underlying fascia.
- Do not go too far up in the vagina with your dissection since that may create a vaginal constriction ring.
- A finger should now be placed in the vagina between the dissected mucosa edge and the peri-rectal tissues. Push toward the side wall and advance the dissection with this finger.

2. Fascial Plication:

This technique is associated with good results and should be one of the procedures of choice.

- Start at the apex and place a midline Vicryl 3/0 suture into the peri-rectal fascia.
- Take another bite on the lateral side of the fascia below the bite in the midline and then take a bite from the opposite side.
- Go progressively downwards with interrupted suture and hereby reduce the prolapse by suturing across the midline until you get to the bottom part where you should tie a knot.

3. Vaginal Closure:

- Vagina should be closed with 2-0 polyglactin suture ensuring that only the excess stretched vagina is excised.

Traditional posterior colporrhaphy involves separation of the vaginal epithelium from the underlying fibromuscular connective tissue (which includes the rectovaginal septum, in between the vaginal muscularis and the rectovaginal adventitia), followed by midline plication with interrupted stitches, excision of excess epithelium, and closure (Cindiff 2004). Dyspareunia after posterior repair has been blamed on levator ani plication causing narrowing of the vagina and is not recommended for sexually active women (Maher 2004).

The traditional posterior colporrhaphy with levator ani plication is largely superseded by fascial repairs with similar anatomic success rates, but favorable functional outcome. Moreover, the midline fascial plication may offer a superior anatomic and functional outcome compared to the discrete site-specific fascial repair (Shull 2000).

Apical Defect

Vaginal Apical Repair

Apical vaginal prolapse includes uterine prolapse with or without enterocele and vaginal vault prolapse, typically with enterocele. Traditionally the standard treatment for symptomatic uterine prolapse is hysterectomy with procedure(s) to suspend the vaginal apex, address enterocele if indicated, and repair of coexisting anterior and posterior vaginal prolapse. It is particularly important to emphasize that when hysterectomy is performed for prolapse, hysterectomy alone (or hysterectomy with colporrhaphy) is inadequate; a specific vaginal vault suspension procedure must be performed in addition to hysterectomy (Weber 2005).

Special Conditions

Fothergill's Repair

The Manchester-Fothergill operation, first performed by Duncan of Manchester in 1885, consists of cystocele and rectocele repairs, if necessary, and amputation of the cervix and suture of the cervical ligaments in front of the cervix to draw the cervix up into the vagina. Shorter operation time and less operative morbidity make this procedure ideal for the elderly patient with no other uterine disease who wishes to preserve coital function (i.e.; avoid colpocleisis) and warrants uterine preservation. The procedure is also recommended for younger women who don't have success with pessary treatment and who prefer to avoid hysterectomy for completion of childbearing. Cervical amputation is to be carried out only in women with frank cervical hypertrophy.

Fothergill repair is uterine preservation surgery for apical prolapse and involves shortening and tightening of cardinal's or uterosacral ligaments with or without partial amputation of the cervix.

Vaginal Hysterectomy with McCall's Culdoplasty

Preparation:

- Catheterize the bladder and ensure that it is empty. The catheter may be left in situ for continuous drainage.
- Perform a bimanual vaginal examination to assess the uterine size and exclude any adnexal masses.
- Place a volsellum on the anterior lip of the cervix and another on the posterior lip.
- Inject the infiltration solution into the peri-cervical tissues going around the full circumference—remember to inform the anesthetist.

Incision and putting in clamps:

- Circumferential incision: If there is no anterior prolapse, a simple circular incision will be adequate 2–3 mm above the level of cervico-vaginal junction. The incision can be made with a knife.
- Inverted V incision: It extends from the 12 o'clock position to some length onto the anterior vaginal wall, especially if there is significant anterior compartment prolapse that needs repairing following the vaginal hysterectomy.
- Once the incision has been made, place an Allis forceps on the 12 o'clock upper edge of the incision and ask an assistant to retract upwards.
- Place the volsellum in the cervix side (lower edge) of the anterior part of the incision.

Anterior dissection:

- Hold a Metzenbaum or scissors in your dominant hand and retract the bladder tissue away from the cervix and dissect that plane with the curve of the scissor pointing toward the cervix.

- Dissect onto the cervix while looking for the peritoneal reflection of the bladder onto the uterus.
- The peritoneal reflection between the uterus and the bladder is a clear shiny membrane; once this is clearly seen, a bold incision into this layer will take you into the vesico-uterine pouch.
- Once you have made the incision and are sure you are in the peritoneal cavity, place the end of the retractor (Wertheims or Landon or equivalent) inside the peritoneum and ask your assistant to retract anteriorly.

Posterior dissection:

- Place two Allis clamps on the lower edge of the posterior part of the circumferential incision
- Ask your assistant to retract firmly downwards on these Allis clamps.
- Ask the assistant to pull firmly upwards on the lower volsellum
- With the scissors in the dominant hand again and the tissue forceps in the other, retract the peri-rectal tissue down and dissect in an attempt to access the pouch of Douglas (POD).
- Once the POD is identified and opened, it can be extended laterally by opening the tips of a pair of scissors or using two index fingers and extending it laterally.
- Once you are in this pouch, place a Sims speculum into it and ask your assistant to provide gentle downward retraction.

- If you have not been able to access the anterior peritoneal cavity as yet, place a finger posteriorly into the POD and curl it over the fundus if possible. You will then be able to see where a safe incision can be made that is clear of the bladder.
- If you are still not “in” in the front (anteriorly) or back (posteriorly) or both, defer this for a later step and proceed with the uterosacral ligament ligation. You will need to be more vigilant for bladder and rectal injury.

- Release uterosacral and cardinal ligament:
 - Ask for a hysterectomy clamp. Open the jaws widely and insert or hook the lower blade firmly under the uterosacral ligament and then rotate the instrument up in your hand and get a good bite of the anterior part of the ligament at right angles to the cervix.
- Take the volsella that are on the cervix in your hand opposite to the side you are ligating. Ask your assistant to stabilize the clamp and using a curved Mayo scissor, or a scalpel, cut the ligament.
- Using a Vicryl 0 suture, take a bite at the tip of the clamp and then another bite out of the “heel” and then tie the suture while your assistant takes the clamp from you and release it when you are satisfied that the suture is secure.
- Keep the end of the uterosacral stitch long. This will be used to support the vaginal vault at a later stage in the operation. Clamp this to the drape with an artery forceps.
- Proceed with the uterosacral ligament on the opposite side and ligate it similarly.

- It may be worth attempting to access the anterior peritoneal cavity at this stage if this has not yet been achieved. Descent of the uterus and cervix may make this possible now that the uterosacrals have been cut.
- If the woman has a long cervix, then additional lateral pedicles need to be taken in a similar way.

- In a similar manner, transverse cervical ligaments are identified, transfixed, and ligated on both sides and kept tagged.
- Uterine artery ligation: Using a Heaney, clamp at right angles to the uterine corpus. Ligate and tie uterine artery with Vicryl no 1.
- Clamp the infundibulopelvic ligaments: Place two Heaney clamps on the pedicle and cut the uterus on both sides. It's better to take two ties of the pedicle as there is risk of knot slippage due to large pedicle.
 - Inspect all the pedicles carefully for any bleeding.

Next step would be to proceed with modified McCall culdoplasty.

McCall's Culdoplasty

Originally described by McCall in 1957 (McCall 1957), uterosacral ligament suspension can be used prophylactically at hysterectomy or therapeutically for vaginal apical suspension.

Procedure:

- Lift the suture of the right uterosacral ligament pedicle. Place two artery forceps on the posterior vaginal vault edge about 1 cm from midline on either side.

Pull two artery forceps that are attached to vault and place a PDS 0 suture in vagina from exterior to interior at about the 4 o'clock positions. Include some peritoneum in this bite.

- Ask the assistant to retract the vaginal wall posteriorly so that stumps of uterosacral ligament are seen clearly.
- Any enterocele, if present, is dealt with at this stage by dissecting the sac, completely obliterating it, and excising the redundant part,

- Take a good bite in left uterosacral ligament.
- Now, take a bite of inner aspect of posterior vaginal vault in the midline (out-in) including peritoneum and vaginal tissue in the bite. This closes the cul de sac.
- Using the same suture, take another bite of uterosacral ligament from opposite side and come out of vaginal mucosa through the 8 o'clock position.
- Proceed with vaginal vault closure with interlocking Vicryl 0 suture.
- The culdoplasty suture should be tied after the closure of vault.

Colpocleisis:

These procedures are offered to women:

- With stage II-IV POP seeking a relatively non-invasive surgical procedure with cure rates as high as 100%
- Who no longer wish to preserve coital function per vaginum

Procedure

- Rectangles of vaginal epithelium are excised from the dorsal and ventral surfaces of the prolapsed vagina.
- The vagina is inverted and closed with the two raw surfaces in direct contact and reinforced with sutured vaginal mucosa edges.
- A small amount of vaginal mucosa is usually preserved on each side of the vagina, speeding the excision and allowing drainage of any secretions.
- The enterocele need not be addressed and the uterus can be left in situ unless there is separate pathology.
- In total colpectomy, all vaginal mucosa is removed.

Postoperative advice

1. Take plenty of fluids
2. Be mobile
3. Avoid constipation
4. Avoid overfilling of the bladder

Advice at discharge

- Ensure adequate rest at home for 6 weeks.
- Avoid aggravating factors (cough, heavyweight lifting, chronic constipation).
- Avoid constipation and straining (Valsalva) during bowel movements by drinking plenty of water and eating a balanced, healthy diet with whole grains and fresh vegetables. If constipation exists, it needs to be assessed to determine the type of constipation, and then be properly treated.
- Practice PFM strengthening (“Kegels”): This strengthening involves exercising the PFM by contracting them for short or long periods of time—usually from 2 to 4 seconds to train the “fast-twitch” muscle fibers, and 5 to 30 seconds to train the “slow-twitch” muscle fibers. If the woman still feels weak, this exercise helps to strengthen it. Develop more muscle tone.
- Abstain from sexual intercourse for 6 weeks is mandatory.
- Eat nutritious food for at least six weeks.
- Return immediately to the health facility if any vaginal bleeding, urinary or bowel problem, or any other symptoms are noted.
- Be aware of warning signs to look for such as vaginal bleeding(heavy), fever, severe abdominal or perineal pain, fainting attacks, leaking of urine or incontinence, profuse offensive discharge, retention of urine

Efficacy of specific procedures

A total of 85% of women who have had a vaginal hysterectomy for uterine prolapse are cured permanently. About 15% of women develop a further prolapse of the vaginal vault months or years after their first surgery. These figures may vary depending on the severity of the original prolapse. The *Cochrane* review on the surgical management of prolapse by Maher et al.

summarizes these studies and concludes that these trials provide level 1 evidence that the overall outcome (including QOL) is similar between abdominal and vaginal approaches, but that sacrospinous-based vaginal procedures have a higher anterior and apical anatomical recurrence rate and higher rates of dyspareunia than sacrocolpopexy-based abdominal repairs. This is somewhat offset by the higher short-term morbidity of open abdominal sacrocolpopexy (Maher 2004).

Key Points

- Proper pre-operative preparation and informed consent should be provided before surgery.
- Ensuring proper surgery safety checklist as per WHO guidelines is required.
- Vaginal wall should be infiltrated with normal saline/or adrenalin.
- Vaginal skin is dissected through sharp dissection up to the “white line” for anterior repair.
- Bladder fascial plication is done through use of delayed absorbable sutures.
- For posterior repair, separate posterior vaginal wall incision is given with separation of vaginal mucosa from rectovaginal septum and plication of fascia is done.
- For vaginal hysterectomy, after opening of anterior and posterior peritoneum clamping all pedicles and ligaments are ligated through delayed absorbable suture.
- Meticulous hemostasis is maintained throughout surgery
- For McCall’s culdoplasty, take a good bite in uterosacral ligament followed by inner posterior vaginal vault in the midline including the peritoneum and vaginal tissue. Repair enterocele if needed.
- In Fothergill’s repair, amputate the cervix and suture cervical ligament in front of the cervix.
- In colpocleisis rectangles of vaginal epithelium are excised from the dorsal and ventral surfaces of the prolapsed vagina so the vagina will be inverted and raw surface are sutured.

Counseling

- Counseling plays a critical role for all women suffering from POP.
- Conservative treatment (pessary) is always an alternative treatment for young women if a future pregnancy is planned.
- Avoid strenuous activities for six weeks after POP surgery.
- Heavy weight lifting is avoided forever.
- Adequate rest and no intercourse for 6 weeks.
- Explain about warning signs.
- Follow up 6 weeks, 3 months, 6 months, and 1 year.

References for Module Six

- The Association of Anaesthetists of Great Britain & Ireland. 2010. *AAGBI Safety Guideline*.
- Barber MD, et al. 2000. Bilateral uterosacral ligament vaginal vault suspension with site specific endopelvic fascia defect repair for treatment of pelvic organ prolapse. *Am J Obstet Gynecol* 183:1402.
- Cindiff CW and Fenner D. 2004. Evaluation and treatment of women with rectocele: Focus on associated defecatory and sexual dysfunction. *Obstet Gynecol* 104:1403–21.
- Dhital R, Keiko O, Poudel K et al. 2013. Improved quality of life after surgery for pelvic organ prolapsed in Nepalese women. *BMC Women's Health* 13:22.
- Duncan WA. Two cases of vaginal extirpation of the uterus. *BMJ* 1885; 1:283.
- Fitzgerald MP, Kenton K, Shott S, Brubarker L. 2001. Responsiveness of quality of life measurements to change after reconstructive pelvic surgery. *Am J Obstet Gynecol* Jul; 185(1):20–4.
- Kenneth P, George L, Andrea W, Julie I, Gitiben S, Wilma G et al. 2006. Pessary use in advanced pelvic organ prolapse. *Int Urogynecol J* 17(3):160–164.
- Maher CF, et al. 2004. Abdominal sacral colpopexy or vaginal sacrospinous colpopexy for vaginal vault prolapse: A prospective randomized study. *Am J Obstet Gynecol* 190(1):20–6.
- McCall ML. 1957. Posterior culdoplasty; surgical correction of enterocele during vaginal hysterectomy; a preliminary report. *Obstet Gynecol* 10:595–602.
- Miller RD. 2010. *Miller's Anesthesia*, 7th edition. Elsevier Health Sciences.
- NHS Institute for Innovation and Improvement. Quality and Service Improvement Tools. http://www.nodelaysachiever.nhs.uk/ServiceImprovement/Tools/IT130_PreOpAssessment.htm (accessed 01/10/09).
- Nygaard IE, et al. 2004. Abdominal sacrocolpopexy: A comprehensive review. *Obstet Gynecol* 104:805–23.
- Shull BL, et al. 2000. A transvaginal approach to repair of apical and other associated sites of pelvic organ prolapse with uterosacral ligaments. *Am J Obstet Gynecol* 183:1365–73.
- Weber AM and Ritcher HE. 2005. Pelvic organ prolapse. *Obstet and Gynecol* 106(3):615–34.
- Weber AM, et al. 1997. Anterior vaginal wall prolapse: review of anatomy and techniques of surgical repair. *Obstet Gynecol* 89:311–8.

Checklist for Pre-Operative Counseling for Women with POP

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Pre-Operative Counseling for Women With POP				
Steps/Task	Cases			
• The provider welcomes the woman.				
• The provider explains what is going to be done.				
Pre-operative counseling				
• Counsels the woman that conservative treatment (pessary) is always an alternative to surgery.				
• Explains that hysterectomy entails removal of uterus, resulting in permanent cessation of menstruation and infertility.				
• Clarifies that hysterectomy does not improve durability or overall success of prolapse surgery and for recurrent, severe, and symptomatic prolapse, repeat operation is possible.				
• Explains that pregnancy should be strongly discouraged after POP surgery where uterus is retained, if planned subsequent delivery should be by Caesarean section to minimize the possibility of recurrence.				
• Explains to the woman that if future pregnancy is planned, every effort must be made to properly fit a pessary and encourages the woman to use a pessary until childbearing is complete.				
• Explains that because of the potential for recurrence, women undergoing prolapse surgery must be prepared to reduce lifestyle habits that increase this risk: <ul style="list-style-type: none"> – Smoking – Heavy lifting – Constipation – Pregnancy – Obesity – Pulmonary disease 				
• Makes clear that all surgery, including prolapse surgery, carries inherent risks: <ul style="list-style-type: none"> – Infection – Hemorrhage – Chronic dyspareunia – Damage to bladder rectum, intestines, ureters – Anesthetic risks – Positional and surgical neuropathies 				
• Explains that weight lifting and other strenuous activities must be prohibited.				

Perform Pre-operative Counseling to Women with POP

Qualified Not Qualified

Clinical Skills Evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Counseling Women Scheduled for Surgery

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Counseling Women Scheduled for Surgery				
Steps/Task	Cases			
• The provider welcomes the woman.				
• The provider explains what is going to be done.				
Counseling of women scheduled for surgery				
• Explains that she will be unable to eat or drink anything for 6 hours before the surgery to reduce anesthesia complications.				
• Explains that she must shower the night before operation, and, if not possible, she must wash the genital area thoroughly.				
• Explains that enema will be given the night before and in the morning of the operation if evacuation is incomplete.				
• Explains that she will have a urinary catheter and an IV line during operation that will stay in after operation for a few days.				
• Explains the mode of anesthesia				
• Explains that the surgery usually takes 1-2 hours.				
• Explains that after the surgery, she may or may not be able to drink or eat right away (6-12 hours).				
• Clarifies that there will be no visible scars when surgery is done vaginally.				
• Explains that post-op hospital stay is typically 5 days.				
• Explains that the doctor will check her daily and to inform health care staff immediately if any problems arise: <ul style="list-style-type: none"> - Difficulty with or painful urination - Vaginal bleeding - Fever - Nausea/vomiting - Constipation - Foul-smelling discharge 				
• Explains that after surgery she must avoid weight lifting.				
• Explains that intercourse is not allowed for at least 6 weeks after surgery.				
• Explains that once she goes home, she must report to the hospital immediately for: <ul style="list-style-type: none"> - Vaginal bleeding - Fever - Foul vaginal discharge - Urinary retention - Severe constipation 				
• Severe lower abdominal pain				

Checklist for Counseling Women Scheduled for Surgery				
Steps/Task	Cases			
<ul style="list-style-type: none"> Explains that once she goes home, she must report to the hospital immediately for: <ul style="list-style-type: none"> Vaginal bleeding Fever Foul vaginal discharge Urinary retention Severe constipation Severe lower abdominal pain 				
Advice at discharge—following surgery, women are advised the following:				
<ul style="list-style-type: none"> Explains that the woman needs to take adequate rest at home for 6 weeks. 				
<ul style="list-style-type: none"> Explains to avoid constipation and straining (Valsalva) during bowel movements, and drink plenty of water. If constipation exists, it needs to be assessed and properly treated. 				
<ul style="list-style-type: none"> Clarifies to avoid aggravating factors (cough, heavyweight lifting, chronic constipation). 				
<ul style="list-style-type: none"> Explains about PFM training. 				
<ul style="list-style-type: none"> Explains to the woman that abstinence from sexual intercourse for 6 weeks is mandatory. 				
<ul style="list-style-type: none"> Tells the woman to eat nutritious food at least for 6 weeks following surgery. 				
<ul style="list-style-type: none"> Tells the woman to come to the health facility immediately if any vaginal bleeding, urinary or any other problems arise. 				
<ul style="list-style-type: none"> Explains the warning signs: <ul style="list-style-type: none"> Vaginal bleeding (heavy) Fever Severe abdominal or perineal pain Fainting attacks Leaking of urine or incontinence Profuse offensive discharge Retention of urine 				
Follow up				
<ul style="list-style-type: none"> Asks the women who had surgery about her bladder and bowel habits. 				
<ul style="list-style-type: none"> Asks the woman about her behavior modification: <ul style="list-style-type: none"> Cough Heavy weight lifting Chronic constipation 				
<ul style="list-style-type: none"> Looks for vaginal Vault prolapse and, if identified, refers to higher center for repair. 				
<ul style="list-style-type: none"> Looks for any foul-smelling discharge or bloody discharge. 				
<ul style="list-style-type: none"> Asks about retention or incontinence of urine, if present, treats and if necessary refers to a urologist. 				
<ul style="list-style-type: none"> Discourages pregnancy and offers appropriate contraceptives. 				
<ul style="list-style-type: none"> Advises the woman to come for next follow-up visit after 3 months, 6 months, and 1 year. 				

Perform Counseling of Women Scheduled for Surgery:

Qualified Not Qualified

Clinical Skills Evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Anterior Compartment Defect Repair

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Anterior Compartment Defect Repair					
Step/Task	Cases				
Surgical steps for anterior compartment defect repair:					
1. Positions the patient, cleans, and drapes.					
2. Performs examination under anesthesia and confirms findings and staging of prolapse.					
3. Inserts indwelling Foley's catheter.					
4. Ensures identification of urethrovesical junction and proper placing of instruments at different points in anterior compartment and cervix/vault.					
5. Injects the infiltration solution (normal saline/or with adrenaline).					
6. Makes incision in anterior of vaginal wall.					
7. Performs dissection and separation of vaginal wall from pubocervical fascia.					
8. Sutures pubocervical fascia/ligaments of both sides of midline.					
9. Removes vaginal mucosa.					
10. Closes vaginal mucosa.					
11. Records the findings in the patient's medical record.					

Perform Anterior Compartment:

- Qualified Not Qualified

Clinical Skills Evaluation:

- Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Vaginal Hysterectomy

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Vaginal Hysterectomy				
Steps/Tasks	Cases			
1. Positions the patient, cleans, and drapes.				
2. Conducts examination under anesthesia and confirms pre-operative findings.				
3. Inserts indwelling Foley's catheter.				
4. Identifies anatomical landmarks and placing of instruments.				
5. Injects infiltration solution (normal saline with/or adrenaline).				
6. Makes incision of the vaginal wall.				
7. Separates bladder from the uterus and opening of anterior cul de sac.				
8. Opens posterior peritoneum.				
9. Performs cutting and ligating of the uterosacral and cardinal ligaments.				
10. Ligates the uterine vessels.				
11. Performs clamping, cutting, and ligation of the upper part of the uterus from adenexal structure.				
12. Performs reconstructive suspension of the vault to uterosacral ligaments.				
13. Closes the vagina.				
14. Conducts concomitant repair of anterior and posterior compartment defect if needed.				
15. Records the findings in the patient's medical record.				

Perform Vaginal Hysterectomy:

Qualified Not Qualified

Clinical Skills Evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Colpoclesis

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

- 1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
- 2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
- 3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Colpoclesis					
Step/Task	Cases				
1. Positions the patient, cleans, and drapes.					
2. Conducts examination under anesthesia and reassessment of POP stage.					
3. Inserts indwelling Foley's catheter.					
4. Injects infiltration solution.					
5. Marks the incision lines on the vaginal wall.					
6. Performs dissection and separation of vaginal skin from the underlying fascia.					
7. Trims excess vaginal skin.					
8. Conducts levatoroplasty if needed.					
9. Closes vaginal skin.					
10. Records the findings in the patient's medical record.					

Perform Colpoclesis:

- Qualified Not Qualified

Clinical Skills Evaluation:

- Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Fothergill's

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Manchester Repair					
Steps/Tasks	Cases				
1. Positions the patient, cleans, and drapes.					
2. Conducts examination and confirmation of findings.					
3. Inserts indwelling Foley's catheter.					
4. Identifies Fothergill's points and places instruments in different anatomical landmarks of vagina.					
5. Injects infiltration solution.					
6. Makes incision of the vaginal wall.					
7. Performs dissection of the bladder wall and exposure of Mackenrodt's uterosacral complex.					
8. Creates posterior vaginal flap (no need to open POD).					
9. Performs shortening of the Mackenrodt's uterosacral complex.					
10. Performs amputation of the cervix					
11. Plicates Mackenrodt's ligaments in front of cervix					
12. Suture of posterior vaginal flap over or to the posterior surface of the amputated cervical stump					
13. Fothergill's suture for anterior lip of cervix or to the anterior surface of the amputated cervical stump					
14. Performs anterior and posterior compartment defect repairs as needed					
15. Closure of vaginal skin					
16. Record the findings in the patient's medical record					

Perform Infiltration:

Qualified Not Qualified

Clinical Skills Evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

Checklist for Posterior Compartment Defect Repair with Perineorrhaphy (When Indicated)

(To be used by the Learners and Facilitators)

Rate the performance of each step or task observed using the following rating scale:

1. **Needs Improvement:** Step or task not performed correctly or out of sequence or is omitted.
2. **Competently Performed:** Step or task performed correctly in the proper sequence (if necessary), but participant does not progress from step to step efficiently.
3. **Proficiently Performed:** Step or task efficiently and precisely performed in the proper sequence (if necessary).

Participant's Name: _____ Date: _____

Checklist for Posterior Compartment Defect Repair					
Surgical Step Check List for Posterior Compartment Defect Repair	Cases				
1. Positions the patient, cleans, and drapes.					
2. Conducts examination under anesthesia and confirmation of findings.					
3. Identifies apex of the posterior vaginal wall, and properly places instruments in different anatomical landmarks in posterior vaginal wall and confirms the anatomical defect.					
4. Injects infiltration solution (normal saline/or with adrenaline).					
5. Performs incision of the vaginal wall.					
6. Performs dissection and separates vaginal skin from the underlying rectovaginal fascia.					
7. Makes midline approximation of rectovaginal fascia.					
8. Performs rectal examination to rule out any rectal injury.					
9. Removes excess vaginal skin (keeps the trimming minimal).					
10. Closes vaginal skin.					
11. Records the findings in the patient's medical record.					

Perform Checklist for Posterior Compartment Defect Repair:

Qualified Not Qualified

Clinical Skills Evaluation:

Satisfactory Unsatisfactory

Facilitator's signature: _____ Date: _____

MODULE SEVEN: POST-SURGICAL FOLLOW-UP AND MANAGEMENT

Diagnosis and Management of Early Complications

Although pelvic organ prolapse (POP) surgery is generally considered safe, several possible complications are associated with the procedure. These complications can result in mild-to-severe morbidity and even (although rare) mortality (Rice 2006; Chelmow 2007). Incidence of procedure-related mortality is 2 in 10,000 (Rice 2006; Chelmow 2007).

Hemorrhage

The most serious postoperative complication of hysterectomy is hemorrhage, which occurs in 1% to 3% of patients (Maresh 2002). It may be primary, reactionary, and secondary.

- Primary hemorrhage may occur immediately following surgery. Isolated large vessel hemorrhage requires identification, isolation, clamping, and double ligation. Widespread oozing is usually venous and may be managed with hot mops or swabs pressure or vaginal packing for 24 hours post-surgery.
- Reactionary hemorrhage occurs on the day of operation due to vasodilatation occurring as the hypotensive effect of anesthesia fades away and blood pressure returns back to normal.
- Secondary hemorrhage usually occurs 7 to 10 days post-surgery from an infection eroding a blood vessel or from infected granulation tissue.

If post-operative vaginal bleeding develops and is determined to occur below the vaginal cuff, minimal bleeding can be stopped by simple packing. The patient may require transfer to the theatre for securing the bleeding vessels or drainage of hematoma. If the hemorrhage is above the vaginal cuff, the patient may need to be stabilized with IV fluids and blood transfusion. If significant intraperitoneal bleeding is suspected, exploratory laparotomy is recommended

Bladder Injuries

- Bladder injuries can occur in up to 2% of POP surgery (Maresh 2002).
- Cause:
 - In vaginal hysterectomy, the bladder can be perforated during entry into the anterior cul-de-sac (Rice 2006).
- Detection:
 - Immediate recognition of bladder injury is crucial and confirmed by a methylene blue test.
 - Delayed recognition of bladder injury may result in the development of an iatrogenic fistula, requiring consultation with a fistula surgeon. Although most of these complications are corrected during the procedure, postoperative incontinence due to bladder injury during surgery is commonly reported (Van Der 2002; Brown et al. 2000).
- Management:
 - A bladder injury is repaired in two layers using 2-0 or 3-0 delayed absorbable sutures.
 - Continuous catheterization is required for 7 to 10 days.

Ureteric Injuries

- Ureteric injury is not very common in prolapse surgery.
- Causes:
 - Uterosacral ligament suspension carries a risk of ureteral kinking and obstruction.
 - Excessive use of electrocautery adjacent to the ureter during surgery.
- Management:
 - Cystoscopy should be performed to evaluate if ureteric injury is suspected.
 - Repair is more likely to be successful if performed intraoperatively at the time of injury (Shovall 2008; Dandade 2007).
- Referral:
 - Delayed recognition usually involves acute onset of flank pain in the involved ureter(s), with readily identifiable hydronephrosis on a renal sonography.
 - Such cases should be referred to a urologist.

Bowel Injury

- The risk of bowel injury is rare (0.5%) and depends on the type and method of the POP surgery (Mathevet 2001).
- The bowel can be injured during opening of the POD, hysterectomy, enterocele repair, and posterior compartment surgery.
- Immediate recognition and repair of bowel injury usually results in good outcome:
 - It is safer to insert the finger in the rectum to guide the placement of the sutures to approximate the fascia.
 - Rectum examination is mandatory following any repair of posterior compartment.
 - Though uncommon, injury to the rectum or to the ascending or descending colon can occur and such cases must be referred to a colorectal surgeon (Stovall 2008).

Retention of Urine

- Retention of urine following vaginal surgery can happen any time after removal of the catheter (usually with a week).
- The main causes are urinary tract infection (UTI), reflex spasm, hematoma, previous voiding problems and post-repair of SUI with vaginal hysterectomy.
- Recatheterization is required until normal detrusor activity returns and treatment of the cause along with antibiotics is needed (*TeLinde's Operative Gynecology*, 8th edition).

Vault Hematoma/Abscess

- Vault hematoma can occur following vaginal surgery.
- The presentation will be pelvic pain, retention of urine, rectal pressure, and, if infected, fever with chills.
- Management of this condition is drainage of the hematoma/abscess, if required, and use of appropriate antibiotics.

Infection (Cuff Cellulitis)

- Infection of the vaginal vault may occur at the surgical margins during the hospital stay or even after discharge.
- The presentation will be pelvic pain, abnormal vaginal discharge, or fever.
- Complete blood counts, urine culture and sensitivity, high vaginal wall swab culture and sensitivity, and an ultrasound are advised.

Other Complications

While the aforementioned complications are more common, the following complications, although rare, also can occur:

- Atelectasis, fallopian tube prolapse, thromboembolic manifestation, myocardial infarction, stroke and renal failure (Stovall 2008).

Late Complications

- Symptoms of early menopausal (Falcone 2008; Wright 1996)
- Psychological effects: depression, anxiety, decreased libido, or social disruption due to the lengthy post-procedural recovery
- Urinary symptoms:
 - Recurrent UTI
 - Stress incontinence
 - Urge incontinence
 - Iatrogenic fistula (urinary and fecal)
 - Voiding dysfunction/urinary retention
- Bowel symptoms: fecal incontinence, defecatory dysfunction
- Pelvic symptoms: recurrence of POP, dyspareunia, chronic pelvic pain

Follow-Up

- District-level or central hospitals
- 6 weeks → 3 months → 6 months → 1 year
- Look for infection, discharge, bleeding, aggravating factors, recurrence

- Behavioral modification for all aggravating factors
- Review urinary and bowel habits, retention, incontinence
- Encourage appropriate contraceptives
- Look for vault prolapse and refer for repair

Key Points

- Hemorrhage is the most common complication during and after hysterectomy, and identification and management are crucial.
- Bladder injury is common while repairing the anterior compartment, which requires immediate repair and catheterization for 7 to 10 days.
- Ureteric injury is uncommon and may occur during utero-sacral ligament suspension.
- Bowel injury may occur while opening the POD.
- Late complications after vaginal hysterectomy and pelvic floor repair are vault infection, voiding dysfunction, vault prolapse.
- Proper selection of cases for surgery, use of appropriate surgical technique, pre-operative and post-operative counseling are essential in preventing complications of POP surgery.

References for Module Seven

- Brown JS, et al. 2000. Hysterectomy and urinary incontinence: a systematic review. *Lancet* 356:535–539.
- Chelmow D, Aronson MP, and Wosu U. 2007. “Intraoperative and postoperative complications of gynecologic surgery.” In: *Current Diagnosis & Treatment: Obstetrics & Gynecology*, 10th edition, edited by DeCherney AH, Nathan L, Goodwin TM, and Laufer N. New York, NY: McGraw-Hill Medical.
- Dandade D, Malinak LR, and Wheeler JM. 2007. “Therapeutic gynecologic procedures.” In: *Current Diagnosis & Treatment: Obstetrics & Gynecology*, 10th edition, edited by DeCherney AH, Nathan L, Goodwin TM, and Laufer N. New York, NY: McGraw-Hill Medical; 2007.
- Falcone T, Cogan-Levy SL. 2008. Overview of hysterectomy. Up to date Online 16.2.
- Maresh MJ, et al. 2002. The VALUE national hysterectomy study: description of the patients and their surgery. *BJOG* 109:302–312.
- Mathevet P, et al. 2001. Operative injuries during vaginal hysterectomy. *Eur J Obstet Gynecol Reprod Biol* 97(1):71–5.
- Rice CN and Howard CH. Complications of hysterectomy. 2006. *US Pharmacist* 31(9):HS-16-HS-24.
- Shovall TG and Mann WJ. Abdominal hysterectomy. Up to date Online 16.2. Accessed June 22, 2008.
- Van der Vaart CH, et al. 2002. The contribution of hysterectomy to the occurrence of urges and stress urinary incontinence symptoms. *BJOG* 109:149–154.
- Wright JB, Gannon MJ, Greenberg M. 1996. Psychological aspects of heavy periods: does endometrial ablation provide the answer? *Br J Hosp Med* ;55:289-294

Case Studies

Objectives:

1. To identify post-operative complications of intra-peritoneal hemorrhage
2. To be able to manage hemorrhagic shock
3. To be able to perform exploratory laparotomy, identify bleeding source and correct it

Case I

Mrs. A, who is 65 years old, underwent vaginal hysterectomy for POP. Eight hours following surgery she was found to be pale. Her pulse was 120/min and blood pressure was 80/40 mm of Hg. She had abdominal distension. Her vaginal pack was fully soaked with blood. Her urine output in the last 8 hours was 100 ml.

Q1. What is your provisional diagnosis?

Q2. What immediate management would you do for this patient?

Q3. What investigations would you do to come to your diagnosis?

Q4. What is your definitive management?

Case II

Objectives:

1. To be able to diagnose vaginal vault infection
2. To be able to manage vaginal vault infection

Mrs. B, 50 years old, underwent vaginal hysterectomy and pelvic floor repair two weeks ago. Her intra-operative and immediate post-operative period had been uneventful. She has now come to the gynecological outpatient department with complaints of foul-smelling vaginal discharge and mild lower abdominal pain.

Q1. What specific examination would you do?

Q2. What tests would you send for?

Q3. What is your clinical diagnosis?

Q4. How would you manage this case?

Case III

Objectives:

1. To be able to diagnose vaginal vault prolapse

Mrs. C, a 50-year-old farmer, underwent vaginal hysterectomy and pelvic floor repair 6 months ago. She resumed her work 2 weeks after surgery. She started feeling something coming out of her vagina, which was more prominent while lifting heavy weight. With this complaint, she presented to the gynecological outpatient department. On examination, the apex of the vault was 3 cm below the hymenal remnant.

Q1. What is your diagnosis?

Q2. What is the management for this condition?

Q3. What precautions should be taken to prevent this condition?

MODULE EIGHT: ORGANIZATION AND MANAGEMENT FOR HIGH-QUALITY SERVICES

Dimensions of Quality

Every initiative taken to improve quality and outcomes in health systems has as its starting point an understanding of what is meant by “quality.” Without this understanding, it would be impossible to design the necessary interventions and measures used to improve results.

There are many definitions of quality used in relation to health care and health systems, and in other spheres of activity. There is also a language of quality, with its own frequently used terms.

The focus of this is on health systems as a whole, and on the quality of the outcomes they produce. For this reason, this working definition needs to take a whole-system perspective, and reflects a concern for the outcomes achieved for both the individual service user and whole community.

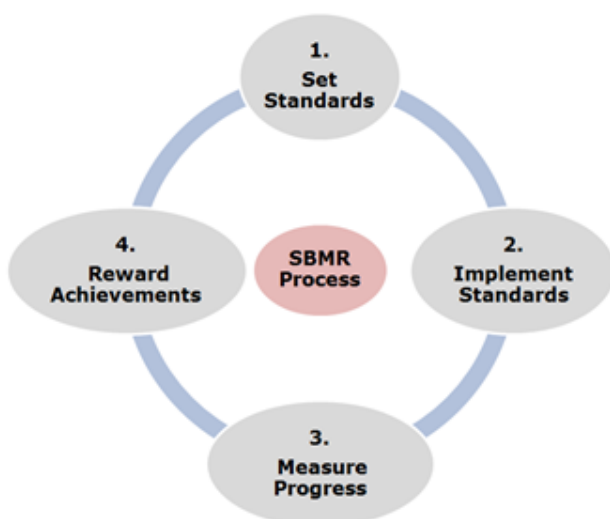
The health care is expected to be:

1. Effective
2. Efficient
3. Accessible
4. Acceptable
5. Safe

Elements of Quality of Care

Consistent use of the necessary tools and implementation of a quality improvement process will achieve and maintain the highest level of performance. These tools are a part of an overall process called the Standards-Based Management and Recognition (SBM-R) approach, which aims to improve and maintain quality at the service delivery site. As shown in Figure 1, standards are essential to the SBM-R process (explicitly in Steps 1 and 2).

Figure 8–1: SBM-R in the Performance Improvement Process



The Four Steps of SBM-R

SBM-R is a practical management approach for improving the performance and quality of health services. It consists of systematic, consistent, and effective utilization of operational performance standards as the basis for the organization and functioning of these services, and the rewarding of

compliance with standards through recognition mechanisms. SBM-R follows four basic steps (see Figure 8-1):

1. Setting standards of performance in an operational way;
2. Implementing standards through a streamlined and systematic methodology;
3. Measuring progress to guide the improvement process to achieving these standards; and
4. Recognizing the achievement of the standards.

Roles and Responsibilities in Quality Improvement

While it is important to recognize the differences in roles and responsibilities, it is equally important to recognize the connections between them. Examples include the following:

- Decision-makers cannot hope to develop and implement new strategies for quality without properly engaging health care providers, communities, and service users.
- Health care providers need to operate within an appropriate policy environment for quality and with a proper understanding of the needs and expectations of those they serve to deliver the best results.
- Communities and service users need to influence policy related to quality and the way in which health services are provided to them, if they are to improve their own health outcomes.

These critical relationships are summarized below:

Figure 8-2: Roles and Responsibilities in Quality Improvement



Follow-Up and Referral Steps

Women with POP will be diagnosed and screened as follows:

- Women are made aware of the problem and symptoms through the provision of health education materials.
- In areas where there is a high incidence of POP, the District Health Office (DHO)/District Public Health Office (DPHO) will conduct screening camps to identify women who need services.
- At the screening camps, the following will be discussed: advice on Kegel exercises, instructions on insertion of a silicone pessary, and the need to come in for a 3-month follow-up.
- Those requiring surgery will be referred (see Annex 2).

- Those who are referred will be entered in the Health Management and Information System (HMIS) 32.
- Screening camps are arranged during which women may seek services from the expert team.
- According to the geographical layout and density of population, the DHO/DPHO will plan for screening camps conducted by skilled personnel.
- The screening will take place at a health post or primary health care center (PHCC).
- Accordingly, the District Health Office/District Public Health Office, in coordination with relevant stakeholders, will refer women for surgery to the listed sites. Those women who are fit for surgery will be advised to fill out a referral form (Annex 2).
- Women who will undergo surgery have to be on the list. It is mandatory for the women to stay at the health facility for up to five days following surgery and to return for follow-up after 6 weeks.
- The health facility providing POP services should be registered with the Department of Health Services (DOHS) and Family Health Division (FHD).
- The women are advised to report any problems regarding surgery, exercise, and follow-up. The women will not be responsible for any costs for transportation, food, and lodging for a family member, and the charges for surgery, complications, and medicine will be borne by the public authority.
- Listed private hospitals can also give the services mentioned above.

Importance of Reporting

It is important to understand the importance of reporting to determine the prevalence of POP. Reporting will identify the total number of women who have undergone surgery in the private and public sector, which will help for budgeting for the next fiscal year.

Management of Commodities

Below is a list of necessary supplies for the physical facilities, equipment, and instruments (medical/surgical).

Physical facilities:

1. Operating table with provision of lithotomy position
2. Mattress
3. Board to record instruments
4. Rotating chairs for surgeons
5. IV stands
6. Instruments trolley
7. Stretcher for transfer of patients
8. Rack for medicine/Instruments
9. Light and emergency light with batteries, extra bulbs, and multi-plug
10. Clean water

Equipment:

1. Sterilizer for instruments (autoclave and boiler)
2. Wall clock
3. Torch with extra batteries and bulb
4. Ambu bag and mask
5. Laryngoscope set
6. Anesthesia machine
7. Breathing hose and connectors
8. Bain circuit
9. Nebulizer machine
10. Suction machine with suction catheters
11. ECG monitor
12. Pulse oximeter
13. Oxygen: cylinder, flow meter, nasal cannula, wrench
14. Airways
15. Cautery machine with hand piece and tips

Instruments:

1. Cheatle forceps
2. Jar for cheatle forceps
3. Stethoscope and blood pressure instrument
4. Body thermometer
5. Magill's intubating forceps
6. Scissors to cut bandages
7. Spinal set with spinal needle (25g), sponge holder, bowl, eye towels, epidural needle and catheter
8. Dressing drum
9. Tray
10. Metal catheter
11. Laparotomy set (extra instruments needed: Doyen's retractor, lap packs, drain)
12. Table: instruments required per case of prolapse surgery

Table 8-1: Instruments Required per Case of Prolapse Surgery

S. N	Item	Quantity
1	Sponge-holding forceps	2
2	Towel clips	6
3	Allis forceps	4
4	Hemostatic artery forceps	
	• Hemostatic artery forceps—6"	6
	• Hemostatic artery forceps—straight	2
	• Curved mosquito—6"	6
5	Kocher's forceps—6"	
	• Straight	2
	• Curved	2
6	Dissecting forceps—6"	
	• Toothed—2	
	• Non toothed—2	
	Cautery forceps -1	1
7	Needle holder	
	• 6"	1
	• 7"	1
8	Vulsellum	1
9	Sim's speculum	1
10	Hegar's dilators	1 set
11	Uterine sound	1
12	Uterine curette	1
13	Knife handle	
	• No. 3	1
	• No. 4	1
14	Surgical blades (no. 10)	2
15	Scissors	
	• Mayo's	2
	• Suture cutting	1
16	Other items	
	• Lateral vaginal wall retractor	2
	• Stainless steel tray (medium)	1
	• Kidney tray	1
	• Bowl (small)	2

For **three** surgeries performed simultaneously in camp, set up at least **nine** sets of instruments to ensure that the procedure goes smoothly and also for the sterilization of instruments.

Supplies (surgical):

1. Soap and detergent powder
2. Surgical scrub solution (Betadine)
3. Towel
4. Container for sharps disposal
5. Receptacle for soiled linens
6. Bucket for soiled pads and swabs
7. ECG leads
8. Gloves: Sterile or HLD surgical gloves and utility gloves
9. Leucoplasts
10. Saw (ampoule Cutter)
11. Spirit
12. Long plastic aprons
13. Foley catheters (no. 14, 16) and urobags
14. Disposable syringes (3, 5, and 10 cc) and needles
15. Surgical blades (no. 10)
16. IV cannula (16 and 18) and IV sets
17. Antiseptic solution: Betadine
18. Suture materials: (Vicryl 1, 1-0, Catgut 1, 1-0, 2-0)
19. Loose needles (round body and cutting)
20. Swabs: cotton, gauze, pieces, ribbon gauze, and tetra swabs
21. 0.5% chlorine solution (Virex)
22. Cidex
23. Mackintosh sheet
24. Gown for patient
25. Face mask , caps , OT gowns, OT dress and slippers
26. Sterile towels, OT draw sheet, leggings, perineal sheets, and drapes
27. Bandages: 3" and 4"
28. Bed sheets, Blanket for the patient
29. Kettle

Supplies (Medical):Anesthetic Medicines

1. Inj. Sodium thiopentone (STP)
2. Inj. Sensorcaine heavy
3. Inj. Succinyl choline
4. Inj. Termin (Mephentermine)
5. Inj. Midazolam
6. Inj. Xylocard
7. Inj. Xylocaine 2% solution and jelly
8. Inj. Pavulon (Pancuronium)
9. Inj. Neostigmine
10. Inj. Atropine
11. Inj. Adrenaline
12. Inj. Ketamine

IV Fluids

1. Inj. Ringer lactate
2. Inj. normal saline
3. Inj. Dextrose-saline
4. Inj. Hemacel
5. Distilled water for injection

Antibiotics

1. Inj. Ceftriaxone/tabs
2. Inj. Ciprofloxacin (200 mg) and tab (500 mg)
3. inj. Metronidazole (500 mg) and tab (400 mg)

Analgesic/Antipyretic

1. Inj./tab Buscopan (Hyoscine butylbromide)
2. Inj. Diclofenac/ tab
3. Inj. Pethidine
4. Inj. Phenergan (Promethazine)
5. Inj. Paracetamol /tab (500)
6. Inj. Fortwin (Pentazocin)

7. Tab. Ibuprofen

Emergency Drugs

1. Inj. Adrenaline
2. Inj. Hydrocortisone (100mg)
3. Inj. Avil (Pheniramine maleate)
4. Inj. Dopamine
5. Inj. Sodium bicarbonate
6. Inj. Calcium gluconate
7. Inj. Transamin (Tranexanic acid)

Antiemetic

1. Tab/Inj. Perinorn (Metodopramide)

Diuretics

1. Tab/Inj. Frusemide (Furosemide)

Antacids

1. Tab/Inj. Ranitidine

Sedatives

1. Tab/Inj. Diazepam

Miscellaneous

1. Oral rehydration solution (ORS)
2. Thrombophob ointment

Stationeries

1. Register
2. Admission forms, OT chart, consent form, I/O chart, drug cardex, continuation sheet, Rx forms
3. Stamp pad
4. Pencil, sharpener, eraser, marker, pen
5. Adhesive tape, paper clip, stapler, and pins
6. Polythene bags (subjected to rules)

Team of human resources for prolapse surgery

1. Specialist gynecologist
2. Anesthesiologist/anaesthetic assistant
3. Medical officer
4. Nurses for pre-/post-operative care and operation theater
5. Lab technician
6. Blood transfusion technician
7. Field coordinator (for camp)
8. Helpers
9. Volunteers

References for Module Eight

Bengoa R, et al. 2006. Quality of Care: A Process for Making Strategic Choices in Health Systems. Geneva: World Health Organization Press.

National service guideline for management of UV prolapse. 2007. Phect Nepal.

Necochea E and Bossemeyer D. 2007. Standards-Based Management and Recognition. Second reprint. A Field Guide. A Practical Approach for Improving the Performance and Quality of Health Services. Baltimore, MD: Jhpiego.

Revised UP guidelines, third revision. 2013. Family Health Division.

Appendix A: Patient Selection Criteria

1. Anterior compartment repair:
 - Stage 3 or above anterior compartment prolapse
2. Posterior compartment prolapse:
 - Stage 3 or above posterior compartment prolapse
3. Vaginal hysterectomy with pelvic floor repair with McCall culdoplasty:
 - Stage 3 or more apical prolapse with indication of removal of uterus (e.g., (Abnormal Uterine Bleeding (AUB))
 - Stage 3 or more apical prolapse with patient's desire for removal of uterus
4. Fothergill's repair:
 - Apical prolapse more than stage 3 with cervical elongation with patient's desire to preserve uterus
5. Colpocleisis:
 - Stage 3 or more prolapse with no desire of sexual function

Appendix B: Instruments for Surgery

A. Anterior Repair

- Infiltration—local anesthetic
- Allis tissue clamps
- Foley's Catheter with urobag
- Knife (scalpel: preferably #11 blade, but a #15 is also suitable)
- Sharp Metzenbaum or Stille scissors
- Gillies forceps
- Side wall retractors, Landon retractors are preferable, but a Sim's speculum or a Wertheim's retractor will also be effective
- PDS# 0 on a round body *2 or 3
- Vicryl 2-0 on a round body

B. Posterior Compartment

- Infiltration—local anesthetic
- Tissue clamps
- Allis forceps are used since they tend to grasp the vaginal tissues firmly without causing trauma. Some surgeons use Kochers forceps or Littlewood forceps. Make sure you have at least 6–8 of these tissue clamps.
- Knife (scalpel—# 11 or #15 blade)

- Sharp Metzenbaum or Stille scissors
- Gillies forceps
- Side wall retractors, Landon retractors, but a Sim's speculum or a Wertheim's retractor will also work
- Vicryl 2/0 * 1
- Vicryl 1

C. Hysterectomy

- Catheter with urobag
- 8-10 of Allis tissue clamps.
- Knife (scalpel-#15)
- Sharp Metzenbaum or Stille scissors
- Gillies forceps
- Side wall retractors, Landon retractors, but a Sim's speculum or a Wertheim's retractor will also work
- Heaneys or Maingot clamps * 2
- Vicryl 1*4
- Vicryl 2/0
- Loose mayo needle
- Vulsella*2

Appendix C: Requirements as Per the Guideline

- Operating table with provision of lithotomy position
- Mattress
- Instruments record board
- Rotating chairs for surgeons
- IV stands
- Instrument trolley
- Stretcher for transfer of patients
- Rack for medicine/instruments
- OT light and emergency light with batteries, extra bulbs, multi-plug
- Clean water supply

Equipment

- Instruments—sterilizer (autoclave and boiler)
- Wall clock
- Torch with extra batteries and bulb
- Ambu bag and mask
- Laryngoscope set
- Anesthesia machine
- Breathing hose and connectors
- Bain circuit
- Nebulizer machine
- Suction machine with suction catheters
- ECG monitor
- Pulse oximeter
- Oxygen: cylinder, flow meter, nasal cannula, wrench
- Airways
- Cautery machine: with hand piece and tips

Instruments

- Cheatle forceps
- Jar for Cheatle forceps.
- Stethoscope and blood pressure instrument
- Body thermometer
- Magill intubation forceps
- Bandage-cutting scissor
- Sponge holder
- Bowl
- Kidney tray
- Spinal set with spinal needle(25 g), sponge holder, bowl, eye towels, epidural needle, and catheter
- Dressing drum
- Towel clips
- Tray
- Metal catheter
- Dilatation and curettage set (Sim's speculum, Vulsellum, uterine sound, Hegar dilators, curette)
- Lateral vaginal wall retractors (right angle)
- Allis forceps
- Knife holder and surgical blade no.10
- Artery forceps: (Long curved and straight, small curved and straight , mosquito curved and straight)
- Forceps (tooth and non-tooth)
- Cautery forceps
- Needle holders
- Mayo's scissors
- Suture-cutting scissors
- Kocher's clamps: straight and curved

- Laparotomy set (extra instruments needed. Doyen's retractor, lap packs, drain)
- Table: instruments required per case of prolapse surgery

Table: Instrument Required Per Case of Prolapse Surgery

- Sponge-holding forceps-2
- Towel clips-6
- Allis forceps -4
- Hemostatic artery forceps
 - 6"-6
 - Straight -2
 - Curved mosquito 6"-6
- Kocher's forceps-6"
 - Straight -2
 - Curved-2
- Dissecting forceps-6"
 - Toothed -2
 - Non toothed-2
- Cautery forceps—1
- Needle holder:
 - 6"-1
 - 7"-1
- Vulsellum-1
- Sim's speculum -1
- Knife handle:
 - No. 3 -1
 - No. 4 -1
- Surgical blades (no. 10)-2
- Scissors:
 - Mayo's -2
 - Suture cutting -1
- Lateral vaginal wall retractor -2
- Stainless steel tray medium-1

- Kidney tray -1
- Small bowl-2

For three operations to be performed simultaneously in camp, set up at least nine sets of instruments to ensure that the procedures go smoothly and in the time needed, and also allow time for sterilization of instruments.

Supplies (Surgical)

- Soap and detergent powder
- Surgical scrub solution (Betadine)
- Towel
- Container for sharps disposal
- Receptacle for soiled linens
- Bucket for soiled pads and swabs
- ECG leads
- Gloves: Sterile of high-level disinfected surgical gloves and utility gloves
- Leukoplasts
- Saw (ampoule cutter)
- Spirit
- Long plastic aprons
- Foley's catheters (no. 14, 16) and urobags
- Disposable syringes (3, 5 and 10 cc) and needles
- Surgical blades (no. 10)
- IV cannula (16 and 18) and IV sets
- Antiseptic solution: Betadine
- Suture materials : (Vicryl 1, 1.0, catgut 1,1.0.2-0)
- Loose needles (round body and cutting)
- Swabs: cotton, gauze, pieces, ribbon gauze, and tetra swabs
- 0.5% chlorine solution (Virex)

- Cidex
- Mackintosh sheet
- Gown for patient
- Face mask , caps , OT gowns ,OT dress and slippers
- Sterile towels, OT draw sheet, leggings, perineal sheets, and drapes
- Bandage 3" and 4"
- Bed sheets and blanket for the patients
- Kettle

Suppliers (Medical)

Anesthetic medications:

- Inj. Sodium thiopentone (Stp)
- Inj. Sensorcaine heavy
- Inj. Succinylcholine
- Inj. Mephenteramine
- Inj. Midazolam
- Inj. Xylocard
- Inj. Xylocaine 2% solution and jelly
- Inj. Pancuronium
- Inj. Neostigmine
- Inj. Atropine
- Inj. Adrenaline
- Inj. Ketamine

IV Fluids:

- Inj. Ringer lactate
- Inj. Normal saline
- Inj. Dextrose-saline
- Inj. Haemaccel
- Distilled water for injection

Antibiotics:

- Inj. Ceftriaxone/tabs

- Inj. Ciprofloxacin (200 mg) and tab (500 mg)
- Inj. Metronidazole (500 mg) and tab (400 mg)

Analgesics/Antipyretic:

- Inj. /tab Buscopan (Hyoscine butylbromide)
- Inj. Diclofenac/tab
- Inj. Pethidine
- Inj. Promethazine
- Inj. Paracetamol/tab (500)
- Inj. Fortwin (Pentazocin)
- Ibuprofen tab

Emergency Drugs:

- Inj. Adrenaline
- Inj. Hydrocortisone (100)
- Inj. Avil (Pheniramine maleate)
- Inj. Dopamine
- Inj. Sodium bicarbonate
- Inj. Calcium gluconate
- Inj. Transamin (Tranexamic acid)

Antiemetics:

- Tab/Inj. Perinorn (Metoclopramide)

Diuretics:

- Tab/Inj. Furosenide

Antacids:

- Inj. Ranitidine/tab

Sedative:

- Inj. Diazepam/tab

Miscellaneous:

- Oral rehydration solution (ORS)
- Thrombophob ointment

Stationeries

- Register
- Admission forms, OT chart, consent form, I/O chart, drug cardex, continuation sheet, Rx forms
- Stamp pad
- Pencil, sharpener, eraser, marker, pen
- Adhesive tape, paper clip, stapler, and pins
- Polythene bags

Team of Human Resources for Prolapse Surgery

- Specialist gynecologist
- Anesthesiologist/ anesthetic assistant
- Medical officer
- Nurses for pre-op./operation theatre ,post of care
- Lab technician
- Blood transfusion technician
- Field coordinator (for camp)
- Helpers
- Volunteers

