There is a belief that DV may squeeze infected urine back to bladder and cause UTI. Biofeedback relaxation of pelvic floor muscles did reduce the incidence of febrile UTI in chidren.

A bladder capacity >115% expected bladder capacity (EBC) or a voided volume >100% EBC can be defined as bladder over distention (BOD). BOD frequently results in staccato flow pattern, which implies dysfunctional voiding. Through modification of fluid intake and timed voiding we have reversed some cases of dysfunctional voiding associated with BOD.

Implications to Adult Urologists

DV may be present in adults with refractory LUTS, incontinence, or UTI. Constipation is related to DV and LUTS and UTI. DV can be an extension from childhood or recently acquired in the adulthood. Biofeedback relaxation of pelvic floor reverses DV and improves urinary symptoms. Bladder over distention may be present in adults with urgency +/- urgent incontinence.

Symposium 2 - Female Urinary Incontinence - Management in Complicated Situation

Salvage Therapy for Failed Surgery for Mixed Urinary Incontinence in Females

Chung-Hsi Yeh
Division of Urology, Department of Surgery, Shin Kong Wo Ho Su Memorial Hospital, Taipei, Taiwan; School of Medicine, Fu-Jen Catholic University, Taipei, Taiwan

Mixed urinary incontinence (MUI) is defined as a combination of stress and urge symptoms. Chronically , it has somehow been considered as a single disease entity, encompassing treatment options and etiology.

Selecting an optimal therapy for mixed incontinence is challenging, because a single-treatment modality may be insufficient for alleviating both the stress and urge components.

Lifestyle modification and behavioral therapy should be considered first-line options for all women with MUI. The add-on modality of pelvic floor muscle exercise may have an additional positive effect. It is effective to treat urge part with antimuscarinics; however, the stress component is most likely to persist after medical therapy.

Anti-incontinence surgery may have a positive impact on both the stress and urge parts of MUI; nevertheless, females with MUI probably may have lower cure rate as compared with women suffering from pure stress urinary incontinence. Therefore, what if anti-incontinence surgery failed to treat women with MUI; What should we ponder to decide the next treatment option which is the most appropriate and effective for the patient?

Before the so-called salvage therapy is applied, we should be able to pick up the best candidate for surgery and reduce the probability of failure to much extent as well. Once facing the failed case, to decide which salvage therapy will work depends on the individual's clinical scenario and further study to elucidate the causative factors as completely as possible.

In summary, the optimum management of females with MUI may often need multiple treatment modalities. Although anti-incontinence surgery can resolve both components simultaneously for 50-75% of the patients, its routine implementation should be made with caution and the patient should be highly selected and counseled preoperatively.

Management of Stress Urinary Incontinence and Pelvic Organ Prolapse - Concurrently or Treat Prolapse Only?

Isao Araki
Department of Urology, Shiga University of Medical Science, Otsu, Japan

Advanced pelvic organ prolapse (POP) is associated with stress urinary incontinence (SUI). The rate of POP patients complaining of concomitant SUI has been reported to be 40 to 66%. Furthermore, a certain percentage of SUI is masked preoperatively, since advanced POP may cause urethral kinking and external urethral compression. The reported rate of occult or masked SUI in continence patients ranges from 27 to 68%.

To date, SUI prevention at the time of prolapse repair is still debatable, especially in preoperatively diagnosed occult SUI. It has been reported that preoperative positive stress test with prolapse reduction is associated with a higher risk for postoperative leakage. However, some of patients with positive stress test are still continence after POP surgical repair without continence surgery. Further, when performing concurrent prolapse and continence surgeries, some reports suggest the potential risks of developing the storage and voiding problems and increasing urinary tract injuries.

Using cough stress testing with prolapse reduction, we examined how precisely preoperative evaluation of occult SUI can predict the development of SUI after POP surgery.

We reviewed retrospectively the records of all 119 women who underwent surgery for symptomatic POP. The International Consultation on Incontinence Questionnaire Short Form for urinary incontinence (ICIQ-UI) was used for evaluation of urinary incontinence (UI). Women were considered to have UI if they reported symptoms of UI on the ICIQ-UI and required a pad usage during activities of daily living. POP repair was performed with the use of polypropylene mesh (GyneMesh PS™, Ethicon, USA) cut by the surgeon according to the Trans Vaginal Mesh (TVM) technique described previously. Whenever the patients with symptomatic SUI and/or a positive stress test wished for opera-

tive correction or prevention, the trans-obturator mid-urethral sling (TOT) procedure was performed concurrently.

A stress test with prolapse reduction was performed at a bladder volume of 300 mL or maximal bladder capacity, whichever was less, in a 45˚ lithotomy position. During filling cystometry, it was confirmed that involuntary detrusor contraction was not provoked by coughing. Occult SUI was defined as a positive stress test without history of SUI symptoms. Postoperative SUI was determined by symptom assessment and a pad usage 6 months after surgery. SUI symptoms were verified by stress testing.

In our study, 59% of patients diagnosed with occult SUI using stress testing developed symptomatic SUI after POP surgery, if they did not undergo TOT concurrently. In contrast, of 73 patients with a negative stress test, only 5% developed SUI postoperatively. Thus, cough stress test with prolapse reduction may be sufficient for diagnosis of occult SUI. However, some of the patients with a positive stress test (41%) did not develop SUI postoperatively without the TOT procedure. We think that a preventive effect of TVM on SUI is unlikely, since TVM leaves the bladder neck perfectly free. The detection rate of occult SUI with a cough stress test varies by method of prolapse reduction and examiner. It is thus possible that occult SUI is somewhat overdiagnosed and that false positive findings occur on stress testing, as previously suggested.

Occult SUI diagnosed preoperatively may alter the surgical strategy. Thus, a cough stress test with simple filling is essential for diagnosis of occult SUI. Our findings seem to support the usefulness of concurrent performance of anti-SUI surgery with POP repair in patients with symptomatic and occult SUI, however the criterion for a positive stress test needs the refinement (for example, the quantification/grading of test result).

Tricks and Tips to Avoid and Manage Complications in Female Pelvic Floor Surgery

Jong-Hyun Kim
Miz Medi Hospital, Seoul, Korea

Introductions

Pelvic organ prolapsed (POP) is due to attenuation & weakness of pelvic floor muscles, fasciae & ligaments due to delivery, aging & chronic stress. It is classified as anterior (cystocele, cystourethrocele related with stress incontinence), apical (uterine or vault prolapse, enterocele) and posterior compartment (rectocele). This is prevalent problem up to 50% of parous women but only 11% of POP patients were undergone operation to correct stress urinary incontinence (SUI) or POP. Of those who receive surgery, an estimated 13% will require a repeat operation within 5 years and as many as 29% will undergo another surgery for prolapse or a related condition at some point during their life. The need to improve the outcome of traditional SUI or POP has led to increased use of synthetic or biologic graft materials in pelvic floor surgery.

The use of synthetic mesh for inguinal and ventral hernia repair is well supported in the general surgery and is currently considered the 'gold standard' approach. In the field of pelvic floor surgery, the use of synthetic mesh during mid urethral sling operation and sacral colpopexy is well established. Recently there has been an increase in the use of synthetic or biologic mesh to augment transvaginal POP surgery. This has largely been driven by the recent availability and marketing of commercially made 'mesh kits' for transvaginal POP repair. Despite a paucity of consistent data, the use of new synthetic materials including mesh kits is rapidly expanding.

In this chapter, I will summarize the potential benefits and risks associated with vaginal mesh and provide proper approach for avoiding and managing postoperative complications in female pelvic floor surgery.

Benefits and Risks of Vaginal Mesh Use

The use of mesh or graft to correct SUI or augment vaginal prolapse surgery is associated with both potential benefits and risks. The pelvic surgeon must carefully consider the balance of these benefits and risks when deciding the use of mesh for transvaginal surgery. The aim of using mesh in pelvic reconstructive surgery is to get the result which is safe, more effective and durable. It seems to be reasonable to use mesh tape in anti-incontinence surgery when benefits and risks are evaluated. The longest follow-up result of tension-free vaginal tape (11 years) shows objective cure 90%, subjective cure 77% and its complication rate has not been high compared to its effectiveness. However there are some controversies to use mesh or graft to improve the success in prolpase surgery. In 2008, the Society of Gynecologic Surgery (SGS) and in 2010, the Cochrane Collaboration completed a systematic review and concluded that the use of mesh at the time of anterior vaginal wall repair may reduce the risk of recurrent cystocele but the use of non absorbable synthetic mesh may be associated with significant adverse effect, and there was insufficient evidence to make recommendations for posterior and apical repair.

Potential complications related to graft and mesh include voiding problems (obstructive and irritative symptoms, de novo SUI), mesh erosion or extrusion, infection, chronic pain, dyspareunia, fistula.

In October 2008, the Food and Drug Administration (FDA) issued a public health notification and made recommendations regarding the serious complications associated with transvaginal placement of surgical mesh for the repair of POP and SUI in which they describe receiving 1,000 reports of complications over 3 years. This counseling includes informing patients about the following: (1) obtain specialized training for each mesh placement technique, (2) implantation of surgical mesh is permanent, (3) some complications associated with the implanted mesh may require additional surgery that may or may not correct the complication, and (4) there is the potential for serious complications that may affect quality of life, including pain during sexual intercourse, scarring, and narrowing of the vaginal wall. This illustrates the balance of benefits and risks that the surgeon and patient must keep in mind before deciding the use of vaginal mesh or graft for the

treatment of pelvic organ prolapse.

Complications of Female Pelvic Floor Surgery

Voiding problems

The incidence of voiding difficulty after mid urethral sling operation was 2.8-8% and the mechanism is excessive sling tension and/or migration of tape to proximal portion. The clinical manifestation is obstructive and/or irritative urinay symptoms and there is clear temporal relationship of symptoms and operation. On physical examination, fixed and hypersuspended urethral mobility was found.

De novo SUI appears in women who had anterior repair with mesh augmentation. The incidence was reported by 7-23%. This is more common in mesh augmented repair compared to traditional method. Hiltunen et al reported de novo stress urinary incontinence in 23% of patients who had mesh repair compared with 10% in patients who underwent traditional anterior repair. Hung et al reported de novo stress urinary incontinence in 16.7% of women after anterior repair reinforced with mesh.

Mesh erosion

Mesh erosion rate of mid urethral sling operation using macroporous monofilament polypropylene tape is 0.7-1.8% but the incidence is higher in POP surgery. Erosion of mesh after transvaginal prolapse surgery varies widely from 2 to 25%, 3 to 24 months after placement with synthetic mesh. Multifilament mesh has a higher rate of erosion and complications than wide pore monofilament mesh. The causes of mesh erosion are inadequate vaginal tissue coverage, poor tissue vascularity, infection, and mesh contraction or folding. Clinical symptoms are vaginal discharge, bleeding, chronic pain, dyspareunia and partner's pain during intercourse but it can be asymptomatic in some patients.

Mesh-related infection

Vaginal surgery is a 'clean-contaminated surgery' since the vagina is naturally colonized by bacteria and is located close to the anus. Bacterial contamination may occur during vaginal prepping or vaginal closure. The reported frequency of infection after the use of polypropylene mesh for POP is 0-8%. It should be emphasized that clinically evident infection is frequently associated with erosion while asymptomatic infection may be the cause of an additional proportion of cases with erosion. Clinical symptoms include non-specific pelvic pain, persistent vaginal discharge or bleeding, dypareunia, and urinary or faecal incontinence. Clinical examination can reveal vaginal induration, vaginal granulation tissue, draining sinus tracts, and mesh erosion. A mesh-related infection can sometimes manifest as a pelvic abscess in the retropubic space, pararectal abscess, ischio-rectal abscess, vesicovaginal fistula, recto-vaginal fistula, abdominal fistula, sigmoid bowel-vaginal fistula, entero-cutaneous or enteroperineal fistulas, and osteomyelitis.

Chronic pain & dyspareunia

Persistent pain after 3 months is suspicious for nerve capture or injury. Vaginal examinations can provide substantial information. In cases of obturator neuralgia, palpating the obturator foramen can provoke the electric pain. In cases of pudendal neuralgia, the pain is provoked by palpating the ischial spine.

Mesh shrinkage caused by excessive fibrin reaction is a recently identified complication. It may lead to excessive stiffness of the vaginal wall and cause secondary pain and dyspareunia. Dyspareunia rate of up to 38% has been reported with vaginally introduced mesh for POP repair. Women may develop de novo dyspareunia without mesh erosion. Regardless of the presence of mesh erosion, chronic pain and de novo dyspareunia related with mesh implantation were the indication for removal of mesh.

Risk Factors of Mesh Erosion and Contraindications of Mesh Use

Patients with significant urogenital atrophy who have thin vaginal walls may be at risk for mesh erosion or exposure after mesh placement. Age, concomitant hysterectomy, smoking, active sexuality, chronic steroid use, pelvic radiation, uncontrolled diabetes mellitus, or other causes of a compromised immune system may be also other risk factors to affect wound healing and these conditions are relative contraindications to vaginal mesh placement.

In addition to a history of chronic pain, current and future sexual activity is another factor to consider when choosing a transvaginal mesh procedure. Mesh does not have the same elasticity as the vaginal wall and therefore may alter the functionality of the vagina. So some surgeons do not place permanent synthetic mesh in sexually active women because of reported de novo dyspareunia and/or altered sexual function.

Perioperative Principles to Avoid Complications

1. The bladder should be drained with a transurethral catheter.
2. A well-estrogenized vaginal wall is preferred before surgery (intravaginal estrogen cream daily (0.5 to 1.0 g/d) for 2 to 3 wk preoperatively).
3. A vaginal pessary should be removed 1 to 2 weeks before surgery to limit vaginal epithelium irritation.
4. The procedure should be initiated after antibiotic prophylaxis with a first or second generation cephalosporin 1 hour before surgery.
5. Avoid making inverted "T-shaped" incisions from a concurrent hysterectomy and colporrhaphy.
6. Exposure of the correct vesicovaginal and rectovaginal planes are performed with hydrodissection of 20 to 80 mL 0.5% lidocaine with 1:200,000 epinephrine, dilute pitressin (20 units in 60 to 100 mL of saline), or normal saline.
7. Mesh should be placed underneath the vaginal muscularis. It is vital that the surgeon perform a full-thickness dissection deep into the vesicovaginal and rectovaginal spaces to avoid erosion of the mesh postoperatively.
8. The mesh should be placed loosely. Loosely place the prosthesis because mesh can contract by up to 20-25% after placement compromising vaginal length and caliber.
9. The mesh is placed flat and minimal tension and it will improve fibroblast growth and minimize complications of pain or erosion.
10. The vaginal epithelium should not be trimmed. Trimming the vaginal epithelium can lead to discomfort and may also contract.
11. The colpotomy incision is closed using a non-locking continuous absorbable suture.
12. Cystoscopy, digital rectal examination and, if necessary, proto-

scopy should be performed routinely after mesh placement to identify potential visceral injury.

13. Macroporous monofilament, low weighted polypropylene mesh should be chosen.

Management of Mesh Complications

Voiding difficulty

The incidence of voiding difficulty after mid urethral sling operation is 2.8-8%. This is relatively lower compared to other anti-incontinence surgeries such as colposuspension or pubovaginal sling operation. To solve this problem, non surgical or surgical treatment modalities can be used. Non surgical management include waiting with clean intermittent catheterization, medication (obstructive-diazepam, baclofen, alpha blocker, irritative- anticholinergics), physical therapy for pelvic floor control, urethral dilation and downward traction. Surgical management is tape incision or release and formal urethrolysis. In most cases, obstruction can be effectively treated with tape manipulation with incision or release. The success rate of tape incision or release was 81-100% in obstructive symptom, 57-88% in irritative symptom and recurred SUI appeared 0-40%. Under rare circumstances, when simple tape incision does not sufficiently alleviate the obstructive symptom, complete transvaginal urethrolysis with lateral dissection and perforation of endopelvic fascia is required to achieve satisfactory vesicourethral mobility.

The timing of tape incision or urethrolysis has been commonly recommended at minimum 3 months after operation but the reports advocating earlier operation is growing. During sling revision, concomitant mid urethral sling operation has not been recommended.

In summary, both obstructive & irritative symptoms due to urethral obstruction after mid urethral sling operation are well controlled by simple tape incision or urethrolysis and the incidence of recurred SUI after sling revision is acceptable.

Mesh erosion with or without infection

Mesh or graft erosion is one of the most common postoperative complication and not always combined with infection and pain. The simple exposition can be differentiated from infection or foreign-body rejection by simple pulling on the mesh. In the former, tissue ingrowth is strong and the mesh is attached and in the latter, the mesh is loose without tissue attachment on a part or the whole surface. If the mesh is loose, it must be totally removed or, at least, trimmed as far as possible, up to a part with strong tissue ingrowth.

Treatment options consist of use with antibiotics and estrogen cream, partial simple excision and removal of the maximum amount of mesh or graft. If the patient is asymptomatic, not sexually active, and the erosion is small (<1 cm) we initially advocate the use of vaginal estrogen. We will typically use 1 g of vaginal estrogen at night for 2 weeks and then 3 times weekly. If the erosion persists until 3 months after estrogen use we proceed to partial simple excision. Partial simple excision is mostly done in case of a limited vaginal exposure with mild symptoms. The exposure site is circumcised and the edges of the vaginal epithelium are mobilized approximately 1 cm around the exposure. The extruded part of the mesh is then removed and the edges of the vaginal epithelium trimmed and reapproximated.

In cases where partial mesh excision has failed, when the exposure area is large, when infection, foreign body rejection, abscess, fistula, or chronic pain is present and when mesh erosion involving bladder or rectum is found, removal of the majority of the mesh is considered. If the mesh was originally placed from a completely transvaginal approach, then it may be possible to remove the mesh in its entirety. If trocars were used to place the mesh, as is the case with many commercially available mesh kits, it is often not possible to remove the arms of the mesh because they pass through the ischiorectal fossa and/or obturator space. In these cases, we advocate removal of as much of the mesh as possible through a vaginal approach while leaving the mesh arms in place.

The possibility of recurrence of POP after excision of mesh was more common with complete or maximal excision than with partial excision. If it is possible, partial excision should be preferred in most cases of mesh exposure with relatively mild symptoms.

Symposium 3 - Translational Researches on Lower Urinary Tract

New Aspects in Immunological Mechanisms of Bladder Pain Syndrome/ Interstitial Cystitis

Tomohiro Ueda
Department of Urology, Kyoto City Hospital, Kyoto University, Kyoto, Japan

Objectives: Upon completion of this session, attendees will be presented with: up-to-date information regarding investigational approaches, mechanistic concepts and therapeutic options about the immunological mechanisms of bladder pain syndrome/interstitial cystitis (BPS/IC).

Overall Presentation: BPS/IC is a chronically progressive syndrome affecting the urinary bladder and is associated with symptoms of urgency, frequency and pain. This lecture will cover the current knowledge regarding peripheral targets and mechanisms underlying BPS/IC as well as therapeutic strategies. I will present evidence supporting a possible involvement of immune reactivity and the mechanisms that may be involved in triggering symptoms in patients diagnosed with BPS/IC. Urothelial cells have been demonstrated to release an array of signaling factors in response to mechanical and chemical stimuli. The targets for these signaling factors are thought to include afferent nerve terminals and lamina propria interstitial cells, suggesting that the urothelium may be involved in regulating bladder activity and sensory function. As no one pathological process has been identified in every patient with BPS/IC, a better understanding of possible mechanisms will increase opportunities for the development of new therapeutics targets for the treatment of this disorder.