Suprapubic Needle Cystoscopy: A New Technique To Detect Iatrogenic Injuries To The Lower Urinary Tract

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Iatrogenic injury to the lower urinary tract, specifically the ureter and bladder, is a potential risk of any pelvic surgery. According to the available literature, the incidence of injury to the ureter ranges from 0.5-2.5% for routine pelvic operations.[1] In actuality, the incidence of ureteral injury during pelvic surgery may even be higher, as many cases are not reported, not detected or are asymptomatic. Injury to the bladder during pelvic surgery most commonly occurs in the form of inadverant laceration or placement of sutures through the bladder wall. Previous pelvic surgery, including Cesearean section, hysterectomy and bladder suspension procedures, and gynecologic conditions such as malignancy, endometriosis and pelvic inflammatory disease increase the risk for bladder trauma.

Urologic procedures for genuine stress urinary incontinence are plagued by possible damage to the lower urinary tract,[2] particularly in the presence of previous retropubic dissection, and in spite of, careful attention to anatomical landmarks and impeccable surgical technique. Injury to the lower urinary tract is reported to occur with 3-6% of Burch colposuspensions,[3,4] 1-7% of needle urethropexies[5,6,7] and 1.6% of Marshall-Marchetti-Krantz procedures.[8]

It is important to identify and correct injuries to the ureter and bladder prior to leaving the operating room. To ensure that no such damage has gone unnoticed, several techniques exist to demonstrate lower urinary tract integrity. Some surgeons administer indigo carmine intravenously and assume that no injury has occurred if no dye is seen in the peritoneal cavity. Others use similar reasoning after instilling methylene blue or sterile milk retrograde into the bladder. Neither of these methods completely guard against unilateral ureteral injury, which can be very difficult to detect. A more invasive measure is to perform open cystostomy to directly inspect the interior of the bladder and observe efflux of indigo carmine through the ureteral orifices. Cystostomy, although a viable option, requires a large opening in the dome of the bladder, prolonged postoperative bladder drainage, and possibly, a higher risk of postoperative bladder problems.

Intraoperative cystoscopy offers an effective, less invasive means by which to visualize the interior of the bladder and can be performed via a transurethral or a suprapubic route, depending on the positioning of the patient.[9] Suprapubic cystoscopy is the preferred route during abdominal procedures, as repositioning of the patient is not necessary and any available endoscope and light source can be utilized including a laparoscope, cystoscope, hysteroscope or fetoscope. Reported here is the new development of a fiber optic cystoscope that minimizes trauma to the bladder wall, but enables full inspection of the bladder through a 15 gauge needle.

Procedures Performed Preceding Needle Cystoscopy (N =20)

Total abdominal hysterectomy	1
Vaginal hysterectomy (with or without salpingo-oophorectomy)	4
Burch retropubic urethropexy	7
Pereyra procedure	1
Suburethral PFTE® sling	2
Paravaginal repair	1
Anterior/Posterior repair	4

* PFTE = polytetrafluoroethylene

Table 1.

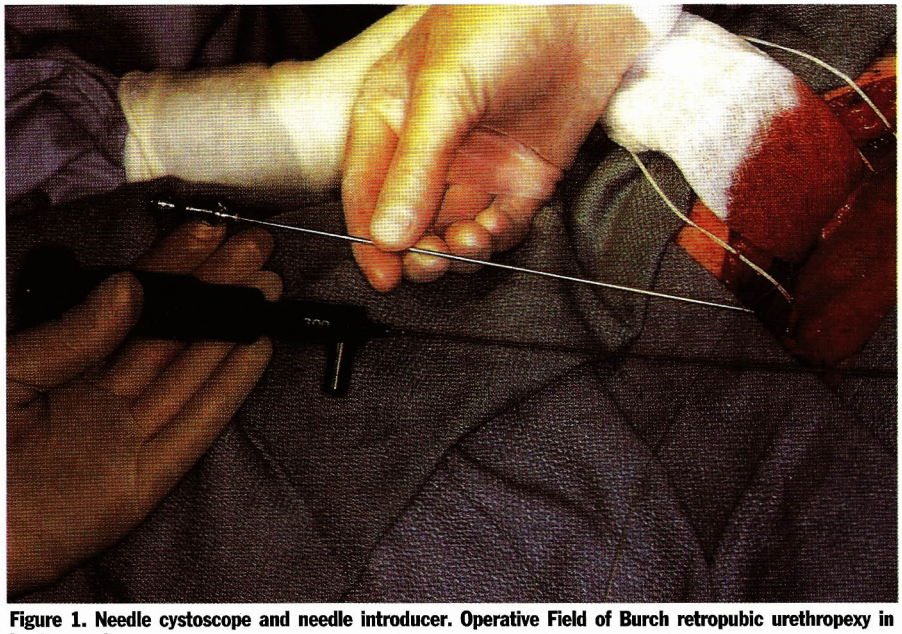

Figure 1. Needle cystoscope and needle introducer. Operative Field of Burch retropubic urethropexy in background.

Materials and Methods

Needle cystoscopy was performed on ten patients undergoing antiincontinence surgery in conjunction with various other gynecologic procedures to ensure integrity of the bladder wall, lack of suture material through the bladder wall, and ureteral patency. Seven patients had a Burch retropubic urethropexy, two patients a suburethral sling and one patient a Pereyra procedure. Concomitant gynecologic procedures included abdominal hysterectomy (1), vaginal hysterectomy with or without adnexectomy (4), anterior/posterior colporrhaphy (4), and paravaginal repair (1), (Table 1).

In all cases, the Optimed Fiber optic Cystoscope (Optimed, Orange CA), a five French diameter instrument was placed through a 15 gauge blunt-end introducer needle with illumination provided by a xenon light source (Figure 1). For the purpose of the investigation, the cystoscope was attached to a video camera for full visualization on a video screen.

Figures 2 - 6 depict the technique used for placement of the needle cystoscope. In open abdominal cases, the bladder was filled retrograde with sterile normal saline through a transurethral Foley catheter. A purse-string suture of #OO Vicryl suture was placed at the dome of the bladder. A 15 gauge thin wall bluntend introducer needle was inserted through the center of the purse-string suture and traction placed on the purse-string suture to prevent drainage of fluid from the bladder. Removal of the sharp stylet of the

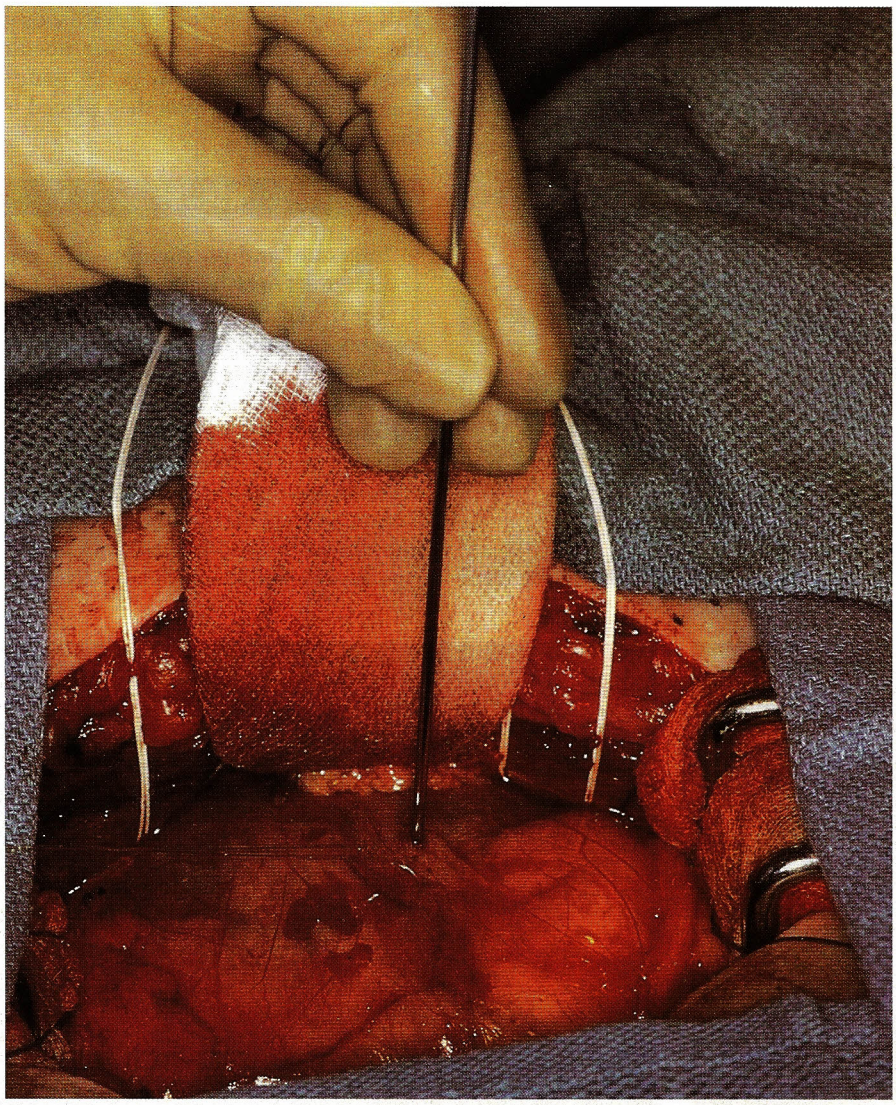

Figure 2. Insertion of needle introducer through purse-string suture in dome of distended bladder.

introducer needle sheath allowed insertion of the needle cystoscope, already attached to the camera and light source. In all cases, the lateral walls of the bladder were closely inspected for rents or suture material, and the ureteral orifices identified. Intravenous indigo carmine was administered and egress of dye from the ureteral orifices observed. A 14 Fr suprapubic catheter was inserted through a stab incision superior to the skin incision and guided to the puncture site of the needle cystoscope. The cystoscope and introducer needle sheath were then removed, with prompt insertion of the suprapubic catheter through the pursestring suture, which was tied. The bladder was allowed to drain and the transurethral Foley removed after confirmation of free-flow of urine through the suprapubic catheter.

In cases involving a combined abdominal and vaginal anti-incontinence procedure (sling or Pereyra), suprapubic needle cystoscopy was performed utilizing a percutaneous approach. The bladder was filled in a retrograde fashion with sterile normal saline. The 15 gauge introducer needle was inserted superior to the skin incision and directed toward the dome of the bladder The sharp stylet was then removed, with insertion of the needle cystoscope through the introducer needle sheath, already attached to the camera and light source. Cystoscopy was performed as described above.

Figures 3, 4. Placement of needle cystoscope through needle introducer sheath.

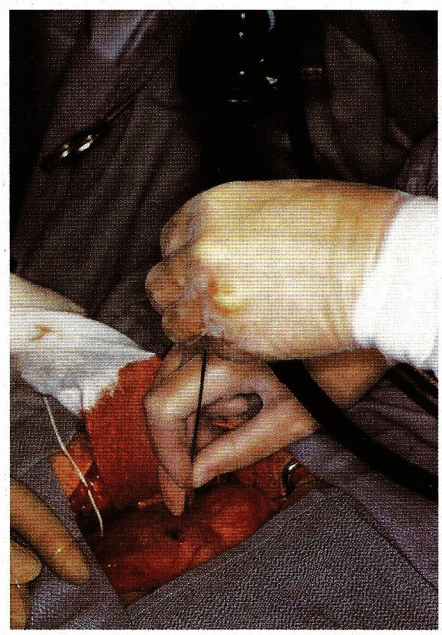

Figure 3.

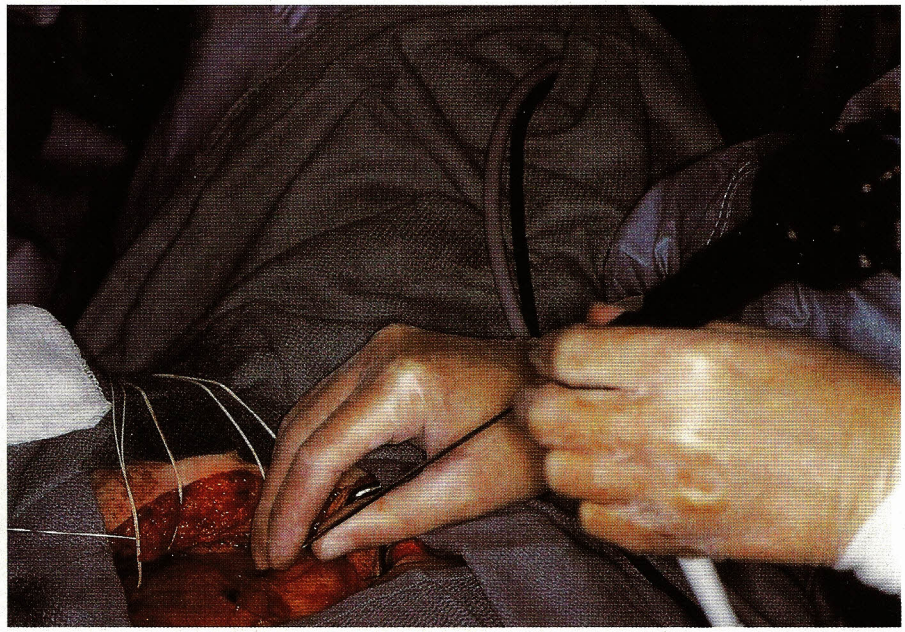

Figure 4.

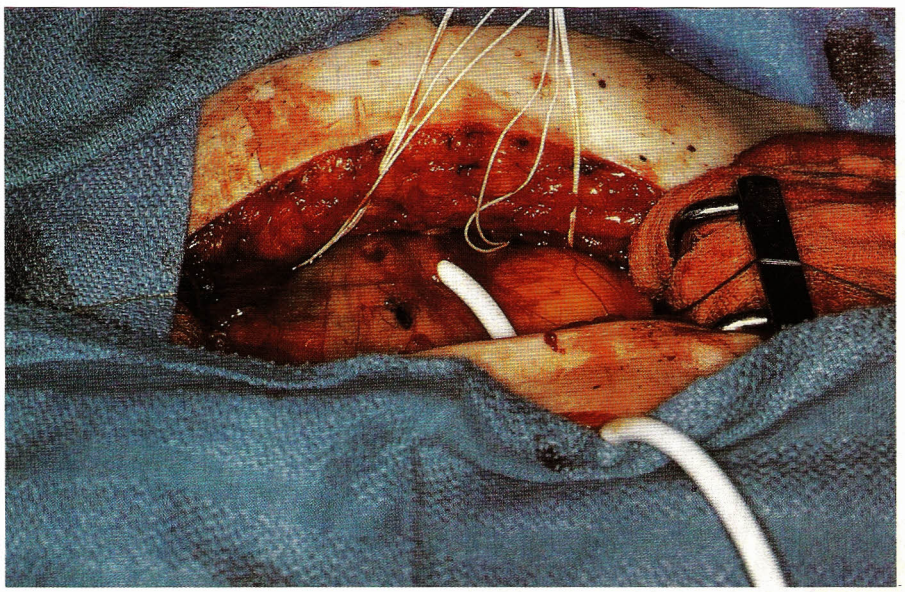

Figure 5. Suprapubic catheter placed through needle cystoscopy site.

Following completion of cystoscopy, the cystoscope and introducer needle sheath were removed. A 14 gauge suprapubic catheter was then placed in the usual fashion.

RESULTS

Egress of indigo carmine dye was visualized from both right and left ureteral orifices in all ten cases. On inspection of the bladder walls, one of the seven patients having had a Burch procedure was found to have two sutures through the left lateral bladder wall. These sutures were removed and replaced through the paravaginal fascia. Repeat suprapubic cystoscopy revealed integrity of the bladder wall with no foreign bodies visible and bilaterally func-

Figure 6. Urethrovesical junction, with transurethral Foley catheter.

Figure 7. Urethrovesical junction, with transurethral Foley catheter.

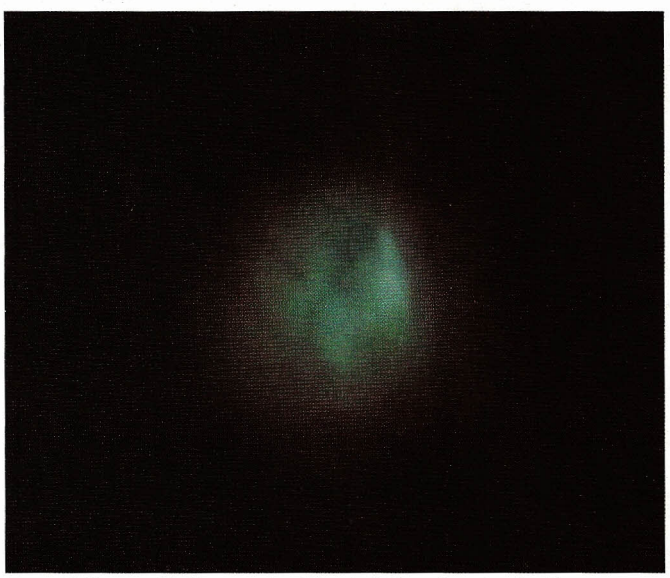

Figure 8. Egress of indigo carmine (blue dye) through ureteral orifice.

Figure 9. Egress of indigo carmine (blue dye) through ureteral orifice.

tioning ureters. In all other cases, there was no evidence of suture or other damage to the bladder walls.

DISCUSSION

In gynecologic surgery, suspicion of lower urinary tract injury mandates intraoperative evaluation. Intraoperative assessment of the integrity of the bladder and ureters is equally vital to successful surgical outcome of female urologic procedures aimed at correcting genuine stress incontinence or its recurrence. Only clear visualization of the interior of the bladder can definitively eliminate the risk of unrecognized injury to the bladder wall and unilateral or bilateral ureteral compromise. The advent of improved fiber optic systems makes intraoperative cystoscopy through a 15 gauge needle a viable, minimally invasive option for evaluation of ureteral and bladder integrity. This equipment and technique can be easily modified for use during both abdominal and laparoscopic gynecologic procedures, whenever lower urinary tract injury is possible. STI

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