

# Frequency of Lower Urinary Tract Injury at Laparoscopic Burch and Paravaginal Repair

Steven Speights, M.D., Robert D. Moore, D.O., and John R. Miklos, M.D

## Abstract

**Study Objective.** To estimate the rate of injury to the lower urinary tract during laparoscopic Burch urethropexy and/or paravaginal repair.

**Design.** Retrospective analysis over 30 consecutive months (Canadian Task Force classification II-2).

**Setting.** Community hospital.

**Patients.** One hundred seventy-one consecutive patients.

**Intervention.** Laparoscopic Burch urethropexy and/or paravaginal repair.

**Measurements and Main Results.** All patients had intraoperative transurethral videocystoscopy performed with intravenous injection of indigo carmine dye to assess potential injury to bladder or ureter. Four women (2.3%, CI -0.71–0.03) had injury to the lower urinary tract. All four injuries were cystotomies, two in women with previous open retropubic urethropexy. No ureteral ligation or intravesical placement of suture was diagnosed.

**Conclusion.** Despite most patients having both Burch urethropexy and paravaginal repair, the lower urinary tract injury rate of 2.3% is much lower than the reported 10% for patients having Burch urethropexy alone performed by laparotomy. Reported benefits of laparoscopy including less blood loss and better visualization may explain this result.

(*J Am Assoc Gynecol Laparosc* 7(4):515–518, 2000)

Burch colposuspension is one of the most frequently performed surgeries for stress urinary incontinence (SUI).<sup>1</sup> A laparoscopic approach to the procedure has become increasingly popular, with numerous articles on laparoscopic incontinence surgery since the first report.<sup>2</sup> Complete laparoscopic reconstruction of the anterior vaginal wall combining Burch urethropexy with paravaginal defect repair has also gained favor with many gynecologists.<sup>3</sup> This technique restores normal lateral vaginal wall support (paravaginal repair) and addresses SUI (Burch urethropexy).

The overall frequency of injury to the lower urinary tract in reconstructive surgery for urinary incontinence and pelvic organ prolapse is often quoted to be about 4%.<sup>4,5</sup> Data focusing on Burch procedures alone showed the frequency of injury to the bladder

or ureter to be approximately 10%.<sup>4,6</sup> Our experience with laparoscopic Burch procedure and/or paravaginal repair is that complications, particularly injury to the lower urinary tract, seldom occur. This study was undertaken to determine the frequency of such injury during these procedures. A second aim was to estimate if any demographic or surgical variable predicted women at greatest risk for injury.

## Materials and Methods

The charts of 171 consecutive women (mean age  $55 \pm 13$  yrs, range 29–79 yrs; mean weight  $78 \pm 15$  kg, range 40–139 kg; mean parity  $2.6 \pm 1.3$ , range 0–7) who underwent laparoscopic Burch and/or paravaginal repair from January 1997 to July 1999 were reviewed for estrogen status, previous surgery, and

From the Division of Urogynecology, Department Obstetrics and Gynecology, Northside Hospital, Atlanta, Georgia (all authors).

Address reprint requests to John R. Miklos, M.D., 3400-C Old Milton Parkway, Alpharetta, GA 30005; fax 770 475 0875.

Accepted for publication June 22, 2000.

Reprinted from THE JOURNAL OF THE AMERICAN ASSOCIATION OF GYNECOLOGIC LAPAROSCOPISTS, November 2000, Vol. 7 No. 4  
© 2000 The American Association of Gynecologic Laparoscopists.  
All rights reserved. ISSN 1074-3804

operative findings at laparoscopy and cystoscopy. All patients had a complete history and physical examination, comprehensive urogynecologic evaluation including quantification of pelvic organ prolapse, and multichannel urodynamic testing. Genuine SUI and urethral hypermobility (Q-Tip > 30 degrees) or anterior vaginal wall relaxation due to a paravaginal defect were established in each patient.

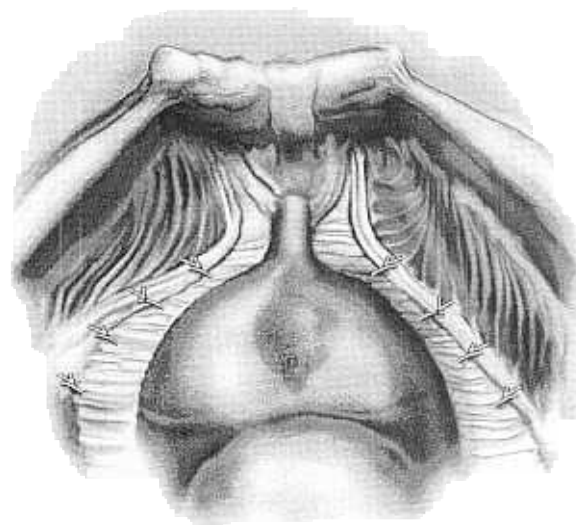
Burch and paravaginal repair was performed in 130 women, Burch procedure alone in 23, and paravaginal repair alone in 18. The senior author (JRM) performed every surgery. Concomitant procedures included laparoscopic uterosacral colpopexy, anterior colporrhaphy, posterior colporrhaphy, and laparoscopic-assisted hysterectomy with or without oophorectomy.

### **Operative Procedure**

Open laparoscopy was used to enter the abdomen through an infraumbilical incision, and remaining ports were placed under direct visualization. The space of Retzius was entered by an intraperitoneal approach by retrograde filling the bladder with at least 300 ml of sterile water using a three-way Foley catheter. Bladder distention helped identify the superior margin of the bladder near the pubic bone. After the bladder margin was identified, the space of Retzius was entered at least 2 cm above this margin using a harmonic scalpel with a 0.5-mm dissecting hook. Once areolar tissue of the space of Retzius was seen, dissection was completed with atraumatic graspers until the pubic bone was identified. The bladder was then allowed to drain and the dissection completed. Endoscopic kitners were used to mobilize periurethral fat and identify pubocervical fascia adjacent to the urethra before suture placement.

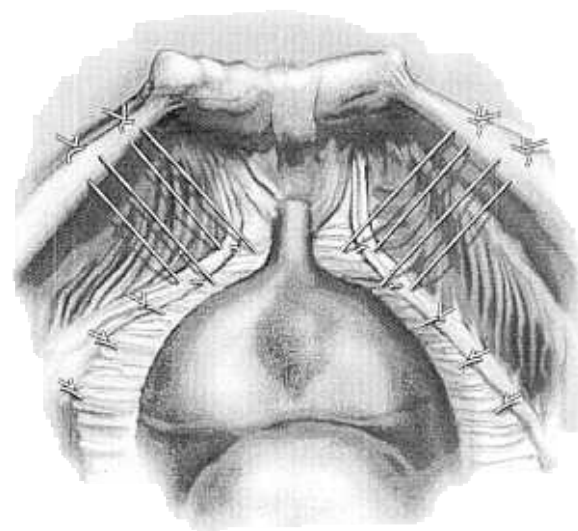
Burch procedures were done by placing a pair of 2-0 Gore-Tex sutures on each side of the middle urethra and bladder neck.<sup>7</sup> Patients without genuine anatomic SUI but anterior vaginal wall prolapse due to paravaginal defects were treated by paravaginal repair alone. This was performed by placing four to five 2-0 Ethibond sutures between the ischial spine and pubic symphysis on each side to reapproximate the entire length of the lateral vaginal wall to the arcus tendineus fascia pelvis (white line; Figure 1). Patients with genuine SUI and anterior vaginal wall prolapse due to paravaginal defects underwent combined Burch urethropexy (four sutures) and paravaginal repair (six sutures; Figure 2).

After either procedure, video transurethral cystoscopy with a 70-degree cystoscope was performed



© Miklos/Kohli

**FIGURE 1.** Paravaginal repair alone shows four paravaginal sutures bilaterally.



**FIGURE 2.** Burch and paravaginal repair with two Burch and three paravaginal sutures bilaterally.

to inspect the bladder for cystotomy or intravesical suture placement. Each patient was also given indigo carmine 5 ml intravenously to assess ureteral patency. After cystoscopy the vesicoperitoneal reflection was closed and laparoscopic ports were removed. Port

sites larger than 10 mm had fascial edges closed with 2-0 absorbable suture, and all skin edges were closed with 3-0 absorbable suture.

**Data Analysis**

Data were analyzed by Wilcoxon rank sum and Fisher’s exact test where appropriate to determine demographic or surgical risk factors associated with injury to the lower urinary tract.

**Results**

Sixty-one women were premenopausal and 110 were postmenopausal. Eighty percent (88/110) of postmenopausal women were receiving hormone replacement therapy. Sixty percent of patients overall had had at least one prior pelvic surgery, including 17% (29/171) with a history of incontinence surgery including retropubic urethropexy [Marshall-Marchetti-Krantz (MMK) or Burch], needle procedure, or urethropexy with synthetic mesh.

Lower urinary tract injury occurred in four women (2.3%, CI -0.07–0.03; Table 1). All four injuries were cystotomies, with three occurring during Burch procedure and one during paravaginal repair. Two of these women, one undergoing Burch procedure and the other paravaginal repair, had had open retropubic incontinence surgery with MMK and polypropylene mesh urethropexy, respectively. Cystotomies occurred during dissection of the scarred space of Retzius and both were at the dome of the bladder. Two-layer closure with delayed absorbable suture was performed laparoscopically without complication. The other two cystotomies were during Burch procedures and were lateral bladder wall tears during dissection. They, too,

were repaired laparoscopically without sequelae in two-layer closure with delayed absorbable suture. Only one injury was noted before cystoscopy. No ureteral ligation or injury was diagnosed and in no case was there intravesical placement of suture.

We did not identify any demographic or surgical variable that would distinguish patients without injury from those with injury. Furthermore, probability was not significant even when dividing patients by previous retropubic surgery and comparing the frequency of injury. Two (1.4%) of the 142 women without previous retropubic surgery sustained injury as well as two (6.9%) of the 29 with previous surgery. No morbidity resulted from transurethral cystoscopy to assess bladder and ureteral integrity, and no postoperative complications were associated with failure to diagnose injury to the lower urinary tract.

**Discussion**

Our finding that laparoscopic Burch and/or paravaginal colposuspension is associated with 2.3% risk of injury to the lower urinary tract is intriguing. This rate is much lower than the approximately 10% reported by authors describing their experience with open technique.<sup>4,6</sup> Seventy-six percent (130/171) of patients in this study had a combined Burch procedure and paravaginal repair, which consists of five sutures bilaterally, as opposed to two sutures on each side for Burch procedure alone.<sup>3</sup> Theoretically, lower urinary tract injury should be greater in these patients since paravaginal defects are treated. Paravaginal defect repair compared with Burch urethropexy requires more extensive proximal and lateral dissection and more than twice the number of sutures. Despite this, our frequency of injury is almost 4-fold lower compared with open technique.

All injuries were cystotomies and we had no intravesical placement of suture or ureteral compromise. Our low frequency of injury may be due to reported benefits of laparoscopic colposuspension (Burch, MMK, paravaginal repair) including less blood loss and better visualization of the space of Retzius and its anatomy owing to insufflation effects and magnification.<sup>8</sup> Data published to date list complication rates of laparoscopic retropubic colposuspension between zero and 25%.<sup>9-15</sup> These complications include urinary tract infections, voiding dysfunction, hematoma or abscess formation, bowel injury, inferior

**TABLE 1. Patient Demographics and Injury to the Lower Urinary Tract**

	No Injury (n = 167)	Injury (n = 4)
Mean (range) age (yrs) <sup>a</sup>	54 (29–79)	74 (51–74)
Mean weight (kg) <sup>a</sup>	75 (40–139)	79 (53–105)
Mean parity <sup>a</sup>	2 (0–7)	2 (1–2)
Positive estrogen (%) <sup>b</sup>	80	100
No. (%) with previous incontinence surgery <sup>b</sup>	27 (16)	2 (50)

<sup>a</sup>Wilcoxon rank-sum, data presented as median (range).

<sup>b</sup>Fisher’s exact test.

epigastric vessel injury, and detrusor instability, in addition to injury to the lower urinary tract. Many of these studies, however, are limited by small numbers of patients. Reviewing more recent publications of laparoscopic colposuspension for specific injury to the bladder or ureter reveals an injury rate most commonly around 3%.<sup>13-15</sup> One group, however, had an 11% (11/113) frequency of injury to the lower urinary tract, but 9 of the 11 injuries (10 cystotomies, 1 intravesical suture) were in women with previous incontinence surgery.<sup>12</sup> The overall injury rate in one of the largest reported series (178 patients) was consistent with our findings.<sup>16</sup> Six patients (3.4%) had injury to the lower urinary tract (3 intravesical placement of sutures, 3 ureteral ligations).

We believe that laparoscopy performed by experienced surgeons may reduce lower urinary tract injury during anterior vaginal wall reconstruction. We advocate intraoperative surveillance with cystoscopy to be sure no injury to the bladder or ureter has occurred.

#### References

1. Bergman A, Elia G: Three surgical procedures for genuine stress incontinence: Five-year follow-up of a prospective randomized study. *Am J Obstet Gynecol* 173:66-71, 1995
2. Vancaillie TG, Schuessler W: Laparoscopic bladder-neck suspension. *J Laparoendosc Surg* 1:169-173, 1991
3. Miklos JR, Kohli N: "Paravaginal plus" Burch procedure. *J Pelvic Surg* 4:297-302, 1998
4. Harris RL, Cundiff GW, Theofrastous JP, et al: The value of intraoperative cystoscopy in urogynecologic and reconstructive pelvic surgery. *Am J Obstet Gynecol* 177:1367-1369, 1997
5. Pettit PD, Petrou SP: The value of cystoscopy in major vaginal surgery. *Obstet Gynecol* 84:318-320, 1994
6. Stevenson KR, Cholhan HJ, Hartmann DM, et al: Lower urinary tract injury during the Burch procedure: Is there a role for routine cystoscopy? *Am J Obstet Gynecol* 181:35-38, 1999
7. Tanagho EA: Colpourethropexy: The way we do it. *J Urol* 116:751-753, 1976
8. Paraiào MFR, Falcone T, Walters MD: Laparoscopic surgery for genuine stress incontinence. *Int Urogynecol J* 10:237-247, 1999
9. Langebrekke A, Dahlstrom B, Eraker R, et al: The laparoscopic Burch procedure: A preliminary report. *Acta Obstet Gynecol Scand* 74:153-155, 1995
10. Radomski SB, Herschorn S: Laparoscopic Burch bladder neck suspension: Early results. *J Urol* 155:515-518, 1996
11. Flax S: The gasless laparoscopic Burch bladder neck suspension: Early experience. *J Urol* 156:1105-1107, 1996
12. Cooper MJ, Cario G, Lam A, et al: A review of results in a series of 113 laparoscopic colposuspensions. *Aust N Z J Obstet Gynaecol* 36:44-48, 1996
13. Papasakelariou C, Papasakelariou B: Laparoscopic bladder neck suspension. *J Am Assoc Gynecol Laparosc* 4:185-189, 1997
14. Ross JW: Multichannel urodynamic evaluation of laparoscopic Burch colposuspension for genuine stress incontinence. *Obstet Gynecol* 91:55-59, 1998
15. Saidi MH, Sadler RK, Saidi JA: Extraperitoneal laparoscopic colposuspension for genuine urinary stress incontinence. *J Am Assoc Gynecol Laparosc* 5:247-252, 1998
16. Dwyer PL, Carey MP, Rosamilia A: Suture injury to the urinary tract in urethral suspension procedures for stress incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 10:15-21, 1999