Multichannel Urodynamic Evaluation of Laparoscopic Burch Colposuspension for Genuine Stress Incontinence

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Objective: To evaluate the 2-year outcome of laparoscopic Burch colposuspension in treating genuine stress incontinence, and to evaluate the prevention of subsequent vaginal vault prolapse by prophylactic apical vault repair.

Methods: This is a prospective study of 48 consecutive cases diagnosed with genuine stress incontinence and followed for 2 years or longer (range 30 to 41 months) after correction by laparoscopic Burch colposuspension. All patients had a routine urogynecology evaluation, including preoperative and postoperative multichannel urodynamics. Follow-up testing was done at 6 weeks and 1 and 2 years.

Results: At 6 weeks, 1 year, and 2 years, the cure rate for genuine stress incontinence was 98, 93, and 89%, respectively. There was a significant decrease in urethral hypermobility and an increase in urethral pressure transmission ratios. Thirty-nine (81%) patients voided spontaneously in less than 24 hours. There was no clinically significant pelvic organ prolapse at 2 years.

Conclusion: The 2-year cure rate and multichannel urodynamics findings for laparoscopic Burch repair are similar to those reported for laparotomy. Early results of prophylactic apical vault suspension suggest that the incidence of prolapse observed after routine retropubic urethropexies may be reduced. (Obstet Gynecol 1998;91:55-9. © 1998 by The American College of Obstetricians and Gynecologists.)

Burch colposuspension is considered the gold standard in treating genuine stress incontinence. Randomized studies have shown greater long-term success than anterior colporrhaphy and modified Pereyra techniques with the Burch technique.1,2

In recent years, several investigators have performed laparoscopic bladder suspensions.3-6 Some of these reports did not follow the Tanagho modification7 and, in addition, lacked multichannel urodynamics and long-term data.

The purpose of this study was to perform multichannel urodynamics with the laparoscopic Burch colposuspension, utilizing the Tanagho modification, and to compare these findings with those of earlier laparotomy studies. In addition, prophylactic apical vault reinforcement was included to determine if reported postoperative pelvic organ prolapse following colposuspensions could be decreased.8,9

Materials and Methods

Forty-eight consecutive women with genuine stress incontinence, mean (range) age 57 (39-73) years and mean (range) parity 3 (1-6), underwent laparoscopic Burch repair. All women with detrusor instability (uninhibited detrusor contractions) and intrinsic sphincter dysfunction (low pressure urethra and low valsalva leak point pressure) were excluded. Pelvic prolapse was graded using the Baden scale,10 and only patients with asymptomatic grade I and II defects were included. Twelve women were premenopausal, and 36 were postmenopausal. Twenty-seven women were receiving hormone replacement therapy. Twenty-six had prior total abdominal hysterectomies for routine indications, including four Burch urethropexies and eight needle suspensions for urinary incontinence. Nine patients had prior vaginal hysterectomies and eight anterior vaginal repairs done for uterine prolapse, incontinence, and cystoceles.

Patient evaluation included history and physical examination, urine culture and sensitivity, 24-hour urolog, condition-specific quality-of-life questionnaire, transperineal ultrasound, cough stress test, dynamic urethrocytoscopy, filling cystometrics and urethral pressure profiles at rest and stress, uroflowmetry, and pelvic grading. At 6 weeks and 1 year, a similar

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evaluation was repeated. The criteria for an objective cure was a negative ultrasound, cough stress test, and urodynamic test for genuine stress incontinence. The repeat urologic questionnaire was used for subjective data.

At 2 years, a subjective questionnaire was obtained with ultrasound and cough stress test. Multichannel urodynamics were repeated only if any of these factors was positive.

The perineal ultrasound and cough stress test have been reported. Both tests are done with the bladder filled to maximum cystometric capacity. The subject is supine for ultrasound and standing for the cough stress test.

Multichannel urodynamic studies were measured with a dual microtip pressure transducer (Millar, Houston, TX) turned to the 3 o'clock position in the urethra. Abdominal pressure was approximated with a single microtip transducer in the vagina. The filling rate for cystometry was 60 mL/minute, and urethral profiles were done with a pull rate of 0.5 cm/minute at maximum cystometric capacity. A standard uroflow curve mode was used for uroflow measurements. Post-void residuals were obtained by catheterization and considered normal if they were 20 percent or less of maximum cystometric bladder capacity. The same multichannel recorder (Aquarius UD120, Laborie Medical Technologies, South Burlington, VT) was used for all urodynamic evaluations.

The same surgeon performed 48 laparoscopic Burch urethropexies and apical vault reinforcement procedures, 13 laparoscopic vaginal hysterectomies, 15 paravaginal repairs, and 11 posterior vaginal repairs. The laparoscopic surgical techniques have been described in detail elsewhere. The apical vault repair is a modification of a pelvic culdeplasty, in which interrupted sutures (0 polypropylene) incorporate the left and right uterosacral and cardinal ligaments to the posterior vaginal wall and recto-vaginal septum (Figure 1). The suture is tied behind the vagina, resulting in a uterosacral plication, which closes off the pelvic culdesac. The pubocervical fascia is sutured to the vaginal apex with the last proximal suture line, which closes the endopelvic fascia making up the perirectal ring (Figure 2). The ureters are checked to make sure there has been no kinking.

Figure 1. An interrupted suture is passed through the vaginal supporting structures and tied in the midline. Three or more sutures are required to reach the vaginal apex. PCF = pubocervical fascia; RVS = rectal vaginal septum.

Figure 2. After uterosacral plication, the pubocervical fascia (PCF) is sutured to the vaginal apex and rectal-vaginal septum (RVS). The ureters are checked for kinking.

A transperitoneal entry into the space of Retzius is used for the Burch urethropexy and paravaginal repair. The bladder is retracted medially to expose the arcus tendineus fasciae pelvis (arcus white line). Pubocervical fascia attachment to the arcus white line is examined for paravaginal defects from the ischial spine to the pubic bone bilaterally. Polypropylene sutures close any tears before starting the urethropexy (Figure 3). One 0 polydioxanone suture 2 cm lateral to the urethro-vesical junction and one lateral to the midurethra on each side complete the laparoscopic Burch technique following all of the criteria of Tanagho.

All terminology conforms to that proposed by the International Continence Society. Analysis of variance for repeated measures utilizing contrasts was used for statistical analysis (StatView SuperANOVA, Abacus Concepts, Berkeley, CA).

Results

The objective cure rate for genuine stress incontinence at 6 weeks and at 1 and 2 years was 98, 93, and 89%, respectively (Table 1). The objective cure rate is defined as a negative ultrasound and cough stress test, and negative urodynamics. Thirty-nine (81%) patients were
able to void spontaneously less than 24 hours after surgery. The patients had to void at least 200 cc, with a residual of 20% or less of the total bladder capacity on catheterization. Seven patients voided in 72 hours, whereas two others voided on the seventh postoperative day.

Thirty-five patients were discharged in less than 24 hours, and 13 patients with laparoscopic vaginal hysterectomies were discharged in less than 48 hours. All patients were receiving oral pain medication within 6 to 8 hours after surgery. Operative complications included four urinary tract infections, one torn epigastric vessel, one vaginal cuff hematoma, and one inadvertent cystotomy. The cystotomy patient had a prior Stamey needle suspension, and the tear was less than 2 cm in diameter, near the dome of the bladder. The tear was repaired through the laparoscope with two interrupted absorbable sutures.

All 48 patients had a postoperative follow-up examination at six weeks. One patient had a positive cough stress test, mild urethral hypermobility of 2.3 cm (1.8 cm or less = normal), and a pressure transmission ratio at mid-urethra of 84%. She reported significant improvement on the urologic questionnaire and declined further surgery. She underwent biofeedback therapy and became symptom-free after four sessions. Four patients had mild detrusor instability at maximum cystometric capacity but refused medical therapy. Their symptoms resolved spontaneously during the next several months. There was a significant decrease in urethral mobility (Table 1) and an increase in maximum cystometric bladder capacity and pressure transmission ratio at 6 weeks (Table 2). All patients had normal post-void residuals and flow rates (greater than 15 mL/s). There were no differences in functional urethral length or urethral closure pressure, and no vaginal vault prolapse was present.

At 1 year, four patients did not have objective testing. Two of these patients had moved but denied urinary incontinence on their questionnaires. Two patients, still in the study area, refused repeat objective testing because they were asymptomatic, as documented on their questionnaires. Of the remaining 43 subjects, three were found to have genuine stress incontinence on urodynamic testing (93% cure rate). Two of these patients stated they had small amounts of leaking less than once a week. They wore minimal protection only for social events. The third was improved, but did elect to have biofeedback therapy. After biofeedback, she stopped wearing protective pads and reported leaking occurring less than once a month. No subjects had detrusor instability, including the four patients with mild symptoms at 6 weeks. The remaining 40 patients had decreased urethral mobility and increased pressure transmission ratio and maximum cystometric capacity. No changes in functional urethral length, maximal urethral closure pressure, and uroflow rates were found (Tables 1 and 2). On vaginal examination, 1 cystocele and 2 rectoceles were found; all were asymptomatic grade I.

Table 1. Genuine Stress Incontinence, Urethral Hypermobility, and Cough Stress Test at 6 Weeks, 1 Year, and 2 Years After Burch Repair

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<th>Preoperative</th>
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<tr>
<td></td>
<td>(n = 48)</td>
<td>(n = 48)</td>
</tr>
<tr>
<td>GSI*</td>
<td>48 (0%)</td>
<td>1 (98%)</td>
</tr>
<tr>
<td>Urethral mobility (cm)*</td>
<td>3.9</td>
<td>1.0*</td>
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<tr>
<td>Positive CST</td>
<td>48</td>
<td>1</td>
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GSI = genuine stress incontinence; CST = standing cough stress test. * Percentages indicate patients cured of GSI. * Urethral mobility by transperineal ultrasound (> 1.8 cm = hypermobility). * * P < .001.

Table 2. Multichannel Urodynamics Before and After Burch Colposuspension and Apical Vault Repair

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<tr>
<td></td>
<td>(n = 48)</td>
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</tr>
<tr>
<td>FUL (mm)</td>
<td>24.8</td>
<td>25.3</td>
</tr>
<tr>
<td>MUCP (cm H₂O)</td>
<td>45.4</td>
<td>49.1</td>
</tr>
<tr>
<td>PTR</td>
<td>79.4</td>
<td>90.7*</td>
</tr>
<tr>
<td>MCC (cc)</td>
<td>411</td>
<td>478*</td>
</tr>
</tbody>
</table>

FUL = functional urethral length; MUCP = maximal urethral closure pressure; PTR = pressure transmission ratio at mid-urethra, MCC = maximal cystometric bladder capacity. * * P = .004. * * P = .003.
At 2 years, three more patients had moved from the area, and only one was reached by mail. She had no symptoms of leaking or prolapse identified on her questionnaire. Of the remaining 37 subjects, four had urethral hypermobility and/or leaking on cough stress test. Multichannel urodynamics confirmed genuine stress incontinence in these patients. Two patients with genuine stress incontinence had repeat surgery, but two believed that their symptoms were mild and refused further treatment. One of the patients with genuine stress incontinence had a grade I cystocele. In the remaining group, single vault defects, including one cystocele, three rectoceles, and two apical vault eversion, were found. The cystoceles, vault eversion, and two rectoceles were asymptomatic grade I. One rectocele was asymptomatic grade II. Two of the four patients had a combination of asymptomatic grade I rectocele and vault eversion. There were no enteroceles.

Thirty-one patients have reached their 3-year follow-up examinations at the time of this report. No further genuine stress incontinence has been detected objectively or been reported by the patients. One grade II apical vault prolapse has been found in this group.

Discussion

The objective cure of genuine stress incontinence was 98, 93, and 89% at 6 weeks and at 1 and 2 years after laparoscopic Burch colposuspension, respectively. Subjectively, the results were even better, but in assessing the value of new surgical techniques, attention must be given to objective data. The objective cure rate compares favorably with long-term follow-up reported in laparotomy series. Only two patients have requested further surgery. The other objective failures reported subjective improvement. Of these, two elected to have biofeedback treatment with good success, and four refused further testing because they believed their symptoms were mild.

Preoperative and postoperative multichannel urodynamics were reported in this laparoscopic Burch series. The findings are similar to the data found with laparotomy. In the continent patients, there was significant improvement in the pressure transmission ratios. This finding demonstrates that the recreation of a vaginal hammock under the bladder neck and proximal urethra, which aids in urethral closure, is possible with the laparoscopic Burch repair. The high fixation of the urethro-vesical junction was seen clearly on ultrasound. These cure rates and multichannel urodynamic results mirror findings reported with several laparotomy studies. In our experience, the paravaginal repair corrects lateral cystoceles and is not a primary continence procedure, which is in agreement with others. Laparoscopic Burch repair appears to cause some de novo detrusor instability. At 6 weeks, four patients (8%) were found to have mild detrusor instability that did not require medication. Detrusor contractions could be elicited only with vigorous heel jounces at maximum cystometric capacity, and even then, were of short duration and low amplitude. The symptoms resolved spontaneously within a few months, and at 1 year, the cystometric studies were normal, similar to earlier laparoscopic studies. The incidence of de novo detrusor instability after laparotomy Burch colposuspension ranges from 2–20%. Suggested causes include disruption of autonomic innervation of the bladder and urinary obstruction by urethral kinking due to overcorrection of the colposuspension. Slight overcorrection was probably the cause of detrusor instability, but it must be mild because there are no signs of obstruction on uroflow studies. Also, most reports come from tertiary referral centers where many patients have had multiple incontinence procedures, making possible autonomic nerve damage secondary to scarring more common. Most patients in this study had no prior surgery, and no patient had more than one.

Several series of laparotomy Burch colposuspensions suggest that normal voiding requires 3 or more days. Early voiding has been found in several laparoscopic series. Wall et al have suggested that posterior colporrhaphy can cause transient urinary retention by inhibiting detrusor contraction, secondary to pain in the levator ani. In this study, only patients who had posterior vaginal repairs had delayed voiding. The inability to relax the pelvic floor after a posterior repair appears real with this type of repair in contrast to other reports.

Several investigators have reported an 8–27% incidence of symptomatic pelvic organ prolapse after suprapubic urethropexies. The 27% reported by Wiskind et al comprised grade II or greater symptomatic defects. DeLancey has described how weakening of the levator ani muscle can cause disruption of the paracolpium and parametrium and lead to pelvic prolapse. Also, vaginal dissection can cause pudendal nerve damage and result in vault prolapse. We did the vault repair prophylactically to try to prevent future posterior defects secondary to increased pressure from anterior pelvic compartment elevation. The apical vault repair was designed to reestablish the endopelvic fascia making up the pericervical ring and to strengthen the paracolpium. On follow-up, a few asymptomatic grade I vaginal defects and one asymptomatic grade II rectocele have been found. This rate of pelvic prolapse is well below the rate reported by others. It is too
early to demonstrate the importance of prophylactic pelvic support, but the early data are encouraging.

References


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