ELSEVIER

LAPAROSCOPIC PARAVAGINAL REPAIR PLUS BURCH COLPOSUSPENSION: REVIEW AND DESCRIPTIVE TECHNIQUE

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ABSTRACT

The objective of this article was to review the available literature on laparoscopic Burch urethropexy cure rates and describe the authors' laparoscopic technique and experience with Burch urethropexy and paravaginal repair. A MEDLINE search (1991 to 1999) was performed for articles describing the laparoscopic Burch urethropexy using suture to elevate and stabilize the paraurethral tissue. Also a retrospective chart review of the authors' 171 consecutive patients between January 1997 and December 1999 was done. The laparoscopic Burch urethropexy and paravaginal repair is described using an open laparoscopic technique with 3 accessory ports for access. A transperitoneal approach is taken to gain access to the space of Retzius. The anterior vaginal wall and its paravaginal defects, if present, are identified. Nonabsorbable sutures are placed in a conventional fashion. The paravaginal repair is used for support of the anterior vaginal wall proximal to the urethral vesical junction and the Burch urethropexy distal to the vesical neck. An average of 6 sutures are used for the paravaginal repair and 4 sutures for the Burch urethropexy. Cystoscopy is performed to ensure no breech of lower urinary tract integrity. In all, 20 articles describing a laparoscopic Burch urethropexy and postoperative cure rate were identified. Cure rates ranged from 69% to 100%. A review of our experience revealed 130 of 171 patients had a Burch urethropexy and paravaginal repair, 23 of 171 patients a Burch urethropexy alone, and 18 of 171 patients a paravaginal repair alone. Of the authors' 171 patients, 4 (2.3%) had injury to the lower urinary tract during laparoscopic Burch urethropexy or paravaginal repair. All 4 injuries were cystotomies, 2 in patients with previous open retropubic urethropexies. No ureteral ligations or intravesical placement of suture was diagnosed. Other surgical parameters for the laparoscopic Burch uethropexy and paravaginal repair include an estimated blood loss of 50 mL, average hospital stay of less than 23 hours, and an average operative time of 70 minutes. All patients had their surgery completed via laparoscopy. The literature review and our personal experience suggests that the laparoscopic Burch urethropexy and paravaginal repair are safe and effective alternatives to traditional laparotomy for the treatment of genuine anatomic stress urine incontinence and cystourethrocele resulting from lateral vaginal wall defects. UROLOGY **56** (Suppl 6A): 64–69, 2000.

Since the introduction of the retropubic urethral suspension in 1910, over 100 different surgical techniques for the treatment of genuine stress urinary incontinence (GSUI) have been described.[1] Many have been modifications of original procedures in an attempt to improve clinical outcome, shorten operative time, and reduce surgical morbidity. Despite the number of surgical procedures developed each year, the Burch colposuspension and pubovaginal sling operations have remained the mainstay of surgical correction for GSUI because of their high long-term cure rates. However, these procedures do not address the concurrent anterior vaginal wall prolapse often associated with GSUI secondary to urethral hypermobility. We present a laparoscopic approach to anterior vaginal wall reconstruction using the paravaginal repair and Burch colposuspension for treatment of cystocele and stress urinary incontinence, respectively, resulting from lateral vaginal wall support defects.

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Emphasizing the principles of minimally invasive surgery, the laparoscopic approach has been successfully adopted for many procedures that previously relied on an abdominal or transvaginal route. First described in 1991, the laparoscopic retropubic colposuspension has rapidly gained popularity because of its many reported advantages, including improved visualization, shorter hospital stay, faster recovery, and decreased blood loss.[2]

OPERATIVE INDICATIONS

Laparoscopy should be considered only as a mode of abdominal access and not a change in the operative technique. Ideally the indications for a laparoscopic approach to retropubic colposuspension should be the same as an open (laparotomy) approach. This would include patients with GSUI and urethral hypermobility. The authors believe the laparoscopic Burch colposuspension can be substituted for an open Burch colposuspension in the majority of cases. Factors that might influence this decision include any history of previous pelvic or anti-incontinence surgery, the patient's age and weight, the need for concomitant surgery, contraindications to general anesthesia, and the surgeon's experience. The surgeon's decision to proceed with a laparoscopic approach should be based on an objective clinical assessment of the patient as well as the surgeon's own surgical skills. If the patient demonstrates a cystocele secondary to a paravaginal defect diagnosed either pre- or intraoperatively, a paravaginal defect repair should be performed before the colposuspension. This approach combines the paravaginal repair with Burch colposuspension for treatment of anterior vaginal prolapse secondary to paravaginal defects and stress urine incontinence secondary to urethral hypermobility.[3]

PREOPERATIVE CONSIDERATIONS

We recommend that all patients have a modified bowel preparation consisting of a full liquid diet 48 hours before scheduled surgery and a clear liquid diet and one bottle of magnesium citrate 24 hours before surgery. This regimen appears to improve visualization of the operative field by bowel decompression and reduces that chance of contamination in case of accidental bowel injury. A single dose of prophylactic intravenous antibiotics is administered 30 minutes before surgery. Antiembolic compression stockings are routinely used. The patient is intubated, given general anesthesia, and placed in a dorsal lithotomy position with both arms tucked to her side. A 16F 3-way Foley catheter with a 5-mL balloon tip is inserted into the bladder and attached to continuous drainage.

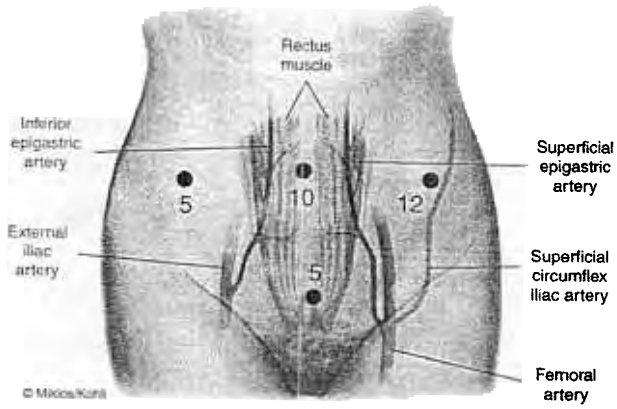

FIGURE 1. *Abdominal port placement: used for combined Burch procedure and paravaginal repair. (© 2000 by Miklos and Kohli.)*

SURGICAL TECHNIQUE

Laparoscopic Paravaginal Repair

We routinely perform open laparoscopy at the inferior margin of the umbilicus. A 10-mm access port is used at this site to introduce the laparoscope. The abdomen is insufflated with CO_2 to 15 mm Hg intra-abdominal pressure. Three additional ports are placed under direct vision (Fig. 1). The choice of the individual port size depends on what concomitant surgery is planned for that patient.

The bladder is filled in a retrograde fashion with 200 to 300 mL normal saline, allowing identification of the superior border of the bladder edge. Entrance into the space of Retzius is accomplished by a transperitoneal approach using a harmonic scalpel. The incision is made approximately 3 cm above the bladder reflection, beginning along the medial border of the right obliterated umbilical ligament. Immediate identification of loose areolar tissue at the point of incision confirms a proper plane of dissection.

After the space of Retzius has been entered and the pubic ramus visualized, the bladder is drained to prevent injury. The retropubic space is developed by separating the loose areolar and fatty layers using blunt dissection. Blunt dissection is continued until the retropubic anatomy is visualized. The pubic symphysis and bladder neck are identified in the midline and the obturator neurovascular bundle, Cooper's ligament, and the arcus tendinous fascia pelvis are visualized bilaterally along the pelvic sidewall (Fig. 2). The anterior vaginal wall and its point of lateral attachment from its origin at the pubic symphysis to its insertion at the ischial spine is identified. If paravaginal wall defects are present, the lateral margins of the pubocer-

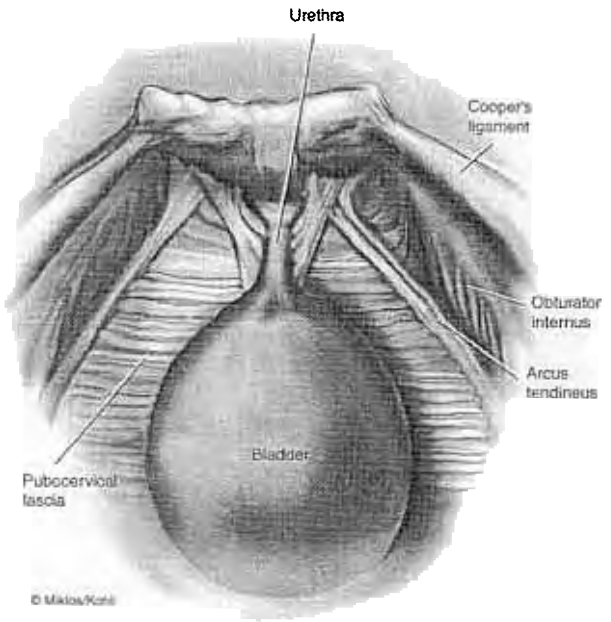

FIGURE 2. *Space of Retzius: normal anatomy. (© 2000 by Miklos and Kohli.)*

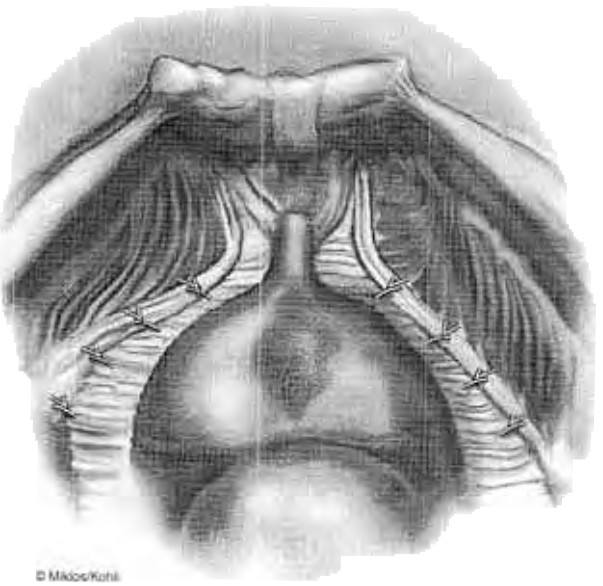

FIGURE 4. *Paravaginal repair: reapproximation of vaginal wall to the obturator internus at the arcus tendineus fascia pelvis. (© 2000 by Miklos and Kohli.)*

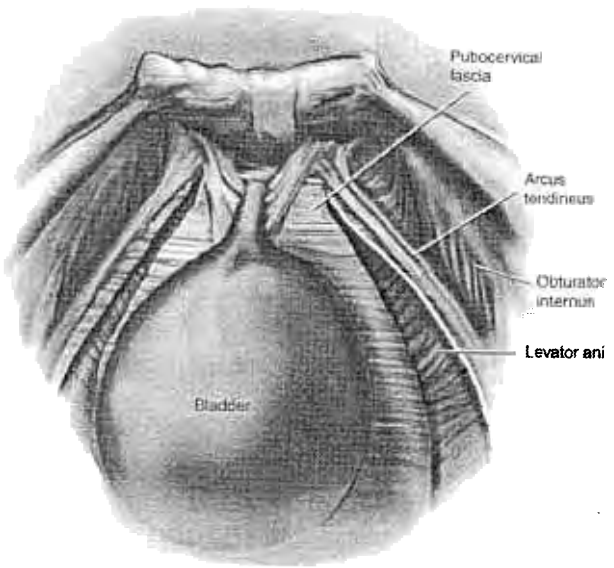

FIGURE 3. *Paravaginal defects: lateral vaginal wall defects result in a cystourethrocele as seen from the space of Retzius. (© 2000 by Miklos and Kohli.)*

vical fascia will be detached from the pelvic sidewall at the arcus tendinous fascia pelvis (white line). The lateral margins of the detached pubocervical fascia and the broken edge of the white line can usually be clearly visualized confirming the paravaginal defect. Unilateral or bilateral defects may be present (Fig. 3).

We recommend completion of the laparoscopic paravaginal repair before the colposuspension. After identification of the defect, the combined repair is begun by inserting the surgeon's nondominant hand into the vagina to elevate the anterior vaginal wall and the pubocervical fascia to their normal attachment along the arcus tendineus fascia pelvis. A 2-0 nonabsorbable suture with attached needle are introduced through the 12-mm port, and the needle is grasped using a laparoscopic needle driver.

The first suture is placed near the apex of the vagina through the paravesical portion of the pubocervical fascia. The needle is then passed through the ipsilateral obturator internus muscle and fascia around the arcus tendineus fascia at its origin 1 to 2 cm distal to the ischial spine. The suture is secured using an extracorporeal knot-tying technique. Good tissue approximation is accomplished without a suture bridge. Sutures are placed sequentially along the paravaginal defects from the ischial spine toward the urethrovesical junction. Usually, a series of 2 to 4 sutures is placed between the ischial spine and a point 1 to 2 cm proximal to the urethrovesical junction (Fig. 4). The laparoscopic colposuspension is performed distal to the urethrovesical junction. The surgical procedure is repeated on the patient's opposite side if bilateral defects are present. Upon completion of the bilateral paravaginal repair, the Burch colposuspension is performed. By performing the paravaginal defect repair first, normal anatomic support of the anterior vaginal segment is recreated, reducing the chance of overelevation of the paraurethral Burch sutures and subsequent voiding dysfunction.

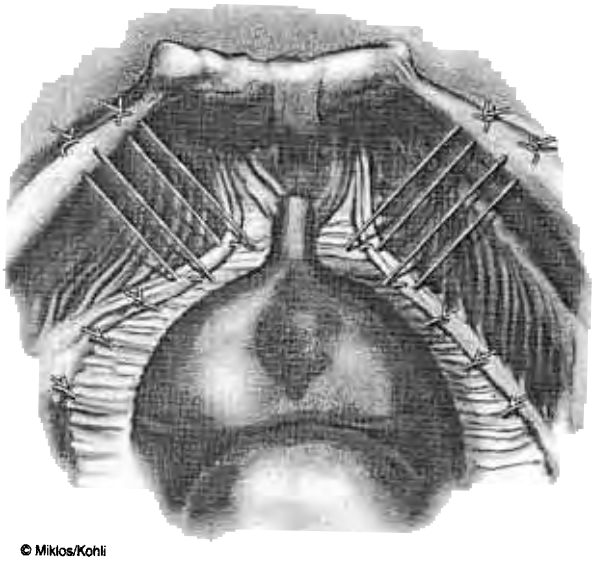

FIGURE 5. *Paravaginal repair plus Burch urethropexy. (© 2000 by Miklos and Kohli.)*

LAPAROSCOPIC BURCH COLPOSUSPENSION

This laparoscopic technique parallels our open technique and has previously been described.[4] The laparoscopic colposuspension is performed using nonabsorbable No. 0 sutures; we routinely use polytrifluoroethlyene. The surgeon's nondominant hand is placed in the vagina and a finger is used to elevate the vagina. The endopelvic fascia on both sides of the bladder neck and midurethra is exposed using an endoscopic blunt dissector. The first suture is placed 2 cm lateral to the urethra at the level of the midurethra. A figure of 8 suture, incorporating the entire thickness of the anterior vaginal wall excluding the epithelium, is taken, and the suture is then passed through the ipsilateral Cooper's ligament.

With an assistant's fingers in the vagina to elevate the anterior vaginal wall toward Cooper's ligament, the suture is tied down with a series of extracorporeal knots using an endoscopic knot pusher. An additional suture is then placed in a similar fashion at the level of the urethrovesical junction, approximately 2 cm lateral to the bladder edge on the same side. The procedure is repeated on the opposite side. Excessive tension on the vaginal wall should be avoided when tying down the sutures. We routinely leave a suture bridge of approximately of 2 to 3 cm (Fig. 5).

Upon completion of the paravaginal repair and Burch urethropexy, the intra-abdominal pressure is reduced to 10 to 12 mm Hg, and the retropubic space is inspected for hemostasis. Cystoscopy is performed to rule out urinary tract injury. The patient is given 5 mL of indigo carmine and 10 mL furosemide intravenously, and a 70-degree cystoscope is used to visualize the bladder lumen, assess for unintentional stitch penetration, and confirm bilateral ureteral patency. After cystoscopy, attention is returned to laparoscopy. We recommend routine closure of the anterior peritoneal defect using a multifire hernia stapler. All ancillary trocar sheaths are removed under direct vision to ensure hemostasis and exclude iatrogenic bowel herniation. Excess gas is expelled and fascial defects of 10 mm or more are closed using delayed absorbable suture. Postoperative bladder drainage and voiding trials are accomplished using either a transurethral catheter, suprapubic tube, or intermittent self-catheterization.

CLINICAL RESULTS

Since Vancaillie and Schuessler[2] published the first laparoscopic colposuspension case series in 1991, many other investigators have reported their experience. Review of the literature reveals a lack of uniformity in surgical technique and surgical materials used for colposuspension. This lack of standardization is also noted with the conventional open (laparotomy) technique. Because of this lack of standardization and the steep learning curve associated with laparoscopic suturing, surgeons have attempted to develop faster and easier ways of performing a laparoscopic Burch colposuspension. These modifications have included the use of stapling devices,[5] bone anchors,[6] synthetic mesh,[7] and fibrin glue.[8] However, we believe the laparoscopic approach should be identical with the open technique to allow comparative studies.

There are several reported laparoscopic Burch colposuspension case series that have used conventional surgical technique and suture materials. Published cure rates range from 69% to 100%, with the majority of the studies reporting cure rates greater than 80% (Table I).[10–29] Although there have been no studies regarding the long-term results of the laparoscopic paravaginal plus colposuspension procedure, one would assume that there is a higher cure rate for the paravaginal plus Burch colposuspension (8 to 12 sutures) compared with the Burch colposuspension only (4 sutures) for the treatment of stress urinary incontinence, because more sutures results in a greater distribution of force to the pelvic floor during episodes of increased abdominal pressure.

Most authors have reported decreased blood loss, shortened hospitalization, and decreased postoperative pain and recovery time. Our experience of 171 laparoscopic paravaginal repair and Burch urethropexy procedures has seen an average operative time of 70 minutes, hospital stays of less than 23 hours, estimated blood loss of less than 50

TABLE I. *Review of laparoscopic Burch urethrocystopexy conventional suturing technique*

Author (year)	No. of Patients	Follow-up (mo)	Objective Data	Cure Rate (%)
Albala *et al* (1992)[10]	10	7	Yes	100
Burton (1993)[11]	30	12		73
Polascik *et al* (1994)[12]	12	20.8		83
Liu (1994)[13]	132	18	Yes	96
Gunn *et al* (1994)[14]	15	4–9	Yes	100
Nezhat *et al* (1994)[15]	62	8–30	Yes	100
Lyons (1995)[16]	10	>12		90*
McDougal *et al* (1995)[17]	10	12		78*
Ross (1995)[18]	32	12	Yes	94
Langebrekke *et al* (1995)[19]	8	3	Yes	88
Radomski *et al* (1995)[20]	34	17.3		85
Ross (1996)[21]	35	12	Yes	91
Cooper *et al* (1996)[22]	113	8		87
Lam *et al* (1997)[23]	107	16	Yes	98
Su *et al* (1997)[24]	46	12	Yes	80*
Papasakelariou and Papasakelariou[25]	32	24		91
Lobel and Davis (1997)[26]	35	34		69*
Ross (1998)[27]	48	24	Yes	89
Miannay *et al* (1998)[28]	36	24		69
Saidi *et al* (1998)[29]	70	15.9		91

* *Some or all urethrocystopexies performed using only one suture on each side.*

mL, and an overall lower urinary tract injury rate of less than 3% without an incidence of ureteral compromise. Although some have reported subsequent laparotomy to repair the cystotomy, in all cases we have been able to repair the bladder laparoscopically. This is performed using a delayed absorbable suture in an interrupted single-layer fashion. Because all cystotomies were found in the dome of the bladder, prolonged bladder catheterization was not necessary. The Foley catheter was removed when the patient could empty 80% of her total bladder volume. Early recognition of bladder injury and proficiency in laparoscopic suturing techniques are critical elements in this approach. Reports suggest this complication depends on the learning curve and declines with increasing surgical experience.[16]

CONCLUSION

Despite its recent introduction and lack of long-term data, the laparoscopic Burch colposuspension has become popular for treatment of urinary stress incontinence. Although initial data suggest this technique is a safe and effective alternative to traditional laparotomy, surgeons should approach it with caution. Laparoscopic suturing and a thorough knowledge of anatomy are essential if we are to have long-term outcome data equivalent to the traditional open technique. Future prospective randomized clinical trials may establish the laparoscopic approach as a minimally invasive method for successful long-term treatment of genuine anatomic stress urinary incontinence as well as anterior vaginal segment prolapse.

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