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Laparoscopic Extraperitoneal Bladder Neck Suspension (LEBNS) for Stress Urinary Incontinence

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Seventy-nine patients of bladder neck suspension using an extraperitoneal variation of laparoscopic surgery were performed for the treatment of stress urinary incontinence. Using a balloon dissector the anterior vesical pelvic space is secured. The bladder neck suspension similar to the Burch operation was performed through a laparoscopic procedure. Symptoms of patients were assessed preoperatively and at one and six months following surgery. Operative times and complications were also evaluated. Success rate was 89.8 % at six months. Complications such as bladder perforations were observed. Laparoscopic extraperitoneal bladder neck suspension-(LEBNS) is a viable option to the conventional methods of suspension, it has definite cosmetic advantages, is devoid of intraperitoneal dissection and adhesion, and has a comparable success rate.

Key Words : *Extraperitoneal laparoscopy, Bladder neck suspension, Stress urinary incontinence*

INTRODUCTION

Minimally invasive surgery has been gaining popularity in all facets of surgery, and also in the field of urologic laparoscopic surgery has been widely utilized with some controversy about its benefits. We have performed laparoscopic bladder neck suspensions via extraperitoneal approach, rather than the conventional transperitoneal laparoscopic surgical technique(Vancaille and Schuessler, 1991 ; Liu, 1993). This approach is plausible when considering the fact that most urologic procedures are performed in the retroperitoneum. The results of laparoscopic extraperitoneal bladder neck suspension(LEBNS) in stress urinary incontinence have been analyzed to investigate the possibility of it being an alternative technique to current operative methods, and to improve other conventional laparoscopic surgery performed in urology.

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MATERIALS AND METHODS

Subjects were seventy-nine patients who received laparoscopic extraperitoneal bladder neck suspensions due to stress urinary incontinence at the Urology Center in the Medical College of Virginia from February, 1994 to April, 1995. Success rates, along with the benefits and complications are analyzed.

Patients complaining of stress urinary incontinence underwent the following evaluation. A thorough history of voiding problems and past medical history were assessed preoperatively. A complete physical ex-

amination followed to determine the presence of cystocele, rectocele, as well as other abnormalities. Cystourethroscopy was done to evaluate the state of the urethra and intravesical space. Urodynamic studies were performed to investigate detrusor dysfunction and instability, and to rule out sphincter incontinence (type III stress incontinence) and also to confirm stress incontinence.

A retrospective analysis of patients with stress urinary incontinence was performed including operation time, concommitant surgery, operative complications, hospital stay, return to work, and resumption of physical activity. Postoperative evaluations of incontinence, pain and voiding problems were performed at the immediate postoperative period, 1 month, and 6 months.

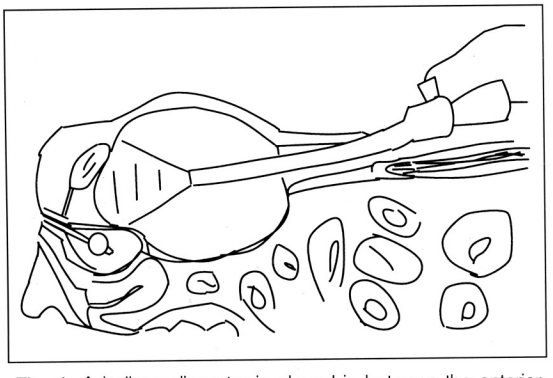

Fig. 1. A balloon dissector is placed in between the anterior and posterior rectus sheath. A space approximately 1000 cc is secured.

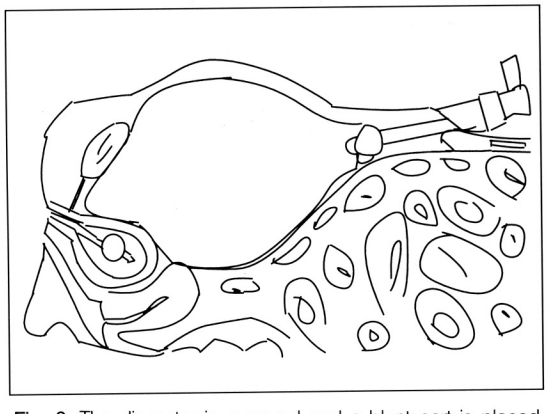

Fig. 2. The dissector is removed and a blunt port is placed into the space. CO_2 insufflation to secure the space is then done.

OPERATIVE TECHNIQUE

After the patient is placed in the dorsal lithotomy position, a 1 cm-sized longitudinal skin incision is made at the right side of the umbilicus. Then the underlying fascia and muscles are dissected with Metzenbaum scissors. An Origin balloon dissector (Origin®, Origin Med Systems, Inc. CA, USA) is placed between the anterior and posterior rectus sheath and pushed to the level of the pubic bone. A space approximately 1000 cc is sucured (after bagging about 40 times) (Fig. 1). The dissector is then removed and a blunt port is placed in the dissected space. CO_2 insufflation was performed into the dissected area reaching 15 mmHg (Fig. 2). A Hasson trocar (Origin®) is placed in the provided space and 10-mm trocars are placed bilaterally below the umbilicus, avoiding damage to inferior epigastric vessels (Fig. 3). The bladder neck is exposed with a laparoscopic dissector, and a right angle endoclip (Origin®) is used to occlude blood vessels embedded in adipose tissue located at the 12 o'clock direction to the bladder neck (Fig. 4). Further dissection is carried out on the anterior vaginal wall adjacent to the bladder neck, then a similar procedure to that described by Burch (Burch, 1961) is performed using

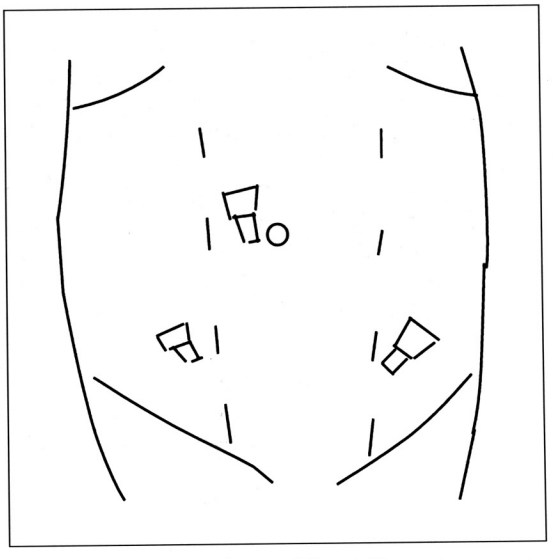

Fig. 3. A blunt port and two additional 10 mm trocar ports are placed bilaterally below the umbilicus, avoiding damage to epigastric vessels.

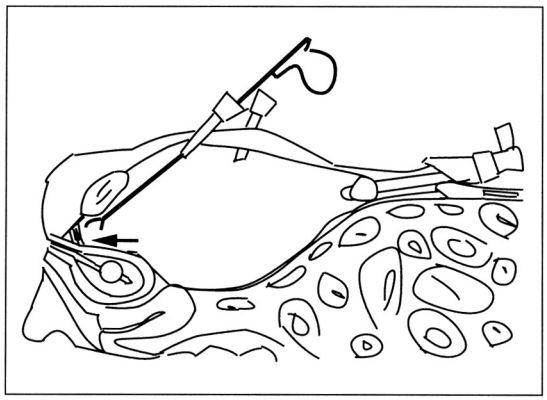

Fig. 4. The endoclip is used to occlude small blood vessel embedded in adipose tissue located at the 12 o'clock direction to the bladder neck (arrow). This sweeping procedure of fatty tissue should be done as thoroughly as possible.

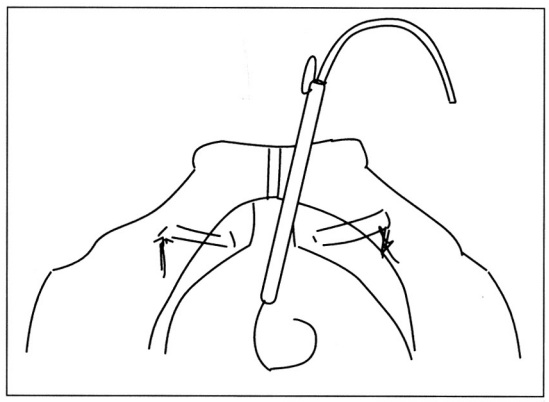

Fig. 5. A 2-0 Gortex suture is inserted into the vaginal wall, and the paravaginal tissue at the level of the bladder neck. Each suture is passed through the ipsilateral Cooper's ligament. The sutures are then tied extracorporeally using a knot pusher. A 6-Fr. cystocath is inserted into the bladder via a suprapubic route.

2-0 Gortex suture (Fig. 5). The knots are made extracoporeally using a knot pusher, and before removing the laparoscope, any bleeding at the puncture site is observed. A 6-Fr. cystocath (Bonnano catheter) is inserted into the bladder via a suprapubic route (Fig. 5), and the fascia overlying the puncture site of the 10 mm trocars are closed.

RESULTS

The mean age, weight, and height of subjects were 56.9+/−1.4 years (range : 22−77), 67.45 Kg (range : 48.92−113.25), and 163.63 cm (range 147.32−177.80), respectively. 25 patients had histories of previous pelvic operations (eg. hysterectomy), and 6 patients had received bladder neck suspensions previously and 2 cases of these were treated with collagen instillations. 18 cases were treated with vaginal cream. 21 cases presented with a cystocele, and 12 cases had a rectocele. 79 cases of extraperitoneal suspensions were performed and 18 of these were switched to intraperitoneal technique during operation. Concomittant operations performed include one laparoscopic cholecystectomy, one laparoscopic umbilical herniorraphy, one diagnostic laparoscopy for a cyst on the ovary, and one rectocele repair. Mean operation time of LEBNS was 121+/−7 minutes (range : 57−330). For patients whose surgery was strictly extraperitoneal, the mean operative time was 108+/−3 minutes (range : 57−172).

Average length of hospital stay was 0.9+/−0.1 days (range : 0−15days), and the periods the patients returned to work and engaged in their usual physical activities were 16.5+/−1.4 (2−42) and 28.7+/−2.9 (4−47) days, respectively (Table 1).

Among the 79 cases who were operated extraperitoneally, intraoperative complications were 2 bladder perforations, 7 gross hematuria, and 4 severe bleedings due to injury to inferior epigastric vessels obscuring the procedure. Significant postoperative complications included pulmonary edema and atelectasia, pulmonary embolism developed 5 days post-surgery, and urinary retention. One patients stitches broke following surgery rendering her incontinent. Other complications included severe gross hematuria, lumbar stenosis, nausea or diarrhea for more than 3 days, and abdominal bruising or bleeding around the suprapubic tube (Table 2). Overall success rate was

Table 1. Recovery rates for laparoscopic extraperitoneal bladder neck suspension (LEBNS).

Days required	Mean+/−SEM	Median
Hospital stay	0.9+/−0.1	1
Return to work	16.5+/−1.4	14
Able to return to work	17.0+/−1.5	14
Return to normal activity	16.2+/−2.2	13
Resume physical activity	28.7+/−2.9	28
Resume normal diet	2.9+/−0.5	2
Resume driving	10.9+/−1.1	10

Table 2. Complications in 79 cases of laparoscopic extraperitoneal bladder neck suspension(LEBNS).

Complications	No. of cases
Bladder perforation	2
Longstanding Gastrointestinal symptoms	5
Abdominal bruising	5
Pulmonary embolism	1
Pulmonary edema	1
Severe gross hematuria	1
Urinary retention	8
Lumbar stenosis	1

89.8 % at 6 months, 2 patients have continued to leak, but were better than their preoperative states, and 3 patients were not better off at all. Pain was relieved in time for most patients. Voiding difficulties such as dysuria and urgency were observed in a high percentage of patients, but the degrees of suffering were variable (Table 3).

DISCUSSION

Various methods of surgical management in stress urinary incontinence have been described, with various rates of success. Endoscopic bladder neck suspension is a simple, minimally invasive technique but carries a rather high recurrence rate. Techniques described by Burch (1961) and Raz (1981) are highly successful but they are invasive procedures with modest postoperative pain and long hospital stays. Suprapubic pain complained of by many patients is due to the dragging sense with the suspension itself, however the discomfort produced by wide dissection in the space of Retzius is probably greater than that of the endoscopic bladder neck suspension.

The length of hospital stay and return to work is shortest for the laparoscopic suspension, and longer for the techniques such as the Raz procedure, Burch operation, and open surgery, in increasing order.

LEBNS is essentially similar to the Burch operation in operative procedures, with a smaller skin incision and less abdominal wall dissection thus offering cosmetic advantages and lesser degrees of postoperative pain. Its success rate is comparable to open surgery.

Postoperative incidences of voiding difficulties are essentially similar to the conventional bladder neck suspension. However a reduced incidence of voiding difficulties is expected due to the smaller incision and less dissection of abdominal musculature which all contributes to reducing lower abdominal discomfort more than the conventional open bladder neck suspension.

Success and recurrence rates and operative time are essentially similar to those of the Burch operation.

The continence pattern exhibited by patients after operation is also comparable to that of results after the Burch operation.

Length of hospital stay and return to daily activities (work) are relatively shorter and comparable to minimally invasive procedure such as endoscopic bladder neck suspension. This is due to the dissection of the Retzius space.

Other than its obvious advantage of being minimally invasive, the operative space provided during the operation enables other conventional and laparoscopic surgery to be easily performed concommittantly. To perform an open surgical procedure such as a Burch operation, a deep incision involving the skin, subcutaneous tissues, and musculature is necessary, causing severe postoperative pain and discomfort. Gas insufflation requires high gas pressure in the operative field, which reduces venous oozing and easy deflection of floating viscera.

Laparoscopic bladder neck suspension is a new alternative to the surgical management of women with stress urinary incontinence, and is expected to become more attractive to the patient population as long-term follow-up is obtained (Vancaillie and Schuessler, 1991 ; Liu, 1993). Surgery for stress incontinence using the laparoscope can be performed either intraperitoneally or extraperitoneally. But, most

Table 3. Results of 79 cases of laparoscopic extraperitoneal bladder neck suspension(LEBNS).

Symptoms \ Postop. followup period(Pts)	Immediate(79)	1 month(77)	6 months(49)
Incontinence(%Pts)	3(3.8)	6(7.7)	5(10.2)
Pain(%Pts)	72(91.1)	42(54.5)	3(6.1)
Voiding difficulties(%Pts)	70(88.6)	46(59.7)	23(46.9)

urologic operations are performed in the retroperitoneum, and LEBNS avoids unnecessary intraperitoneal manipulation. Thus along with the cosmetic advantage of a laparoscopic procedure, bowel injury or postoperative adhesions can be minimized which often occurs during conventional laparoscopic surgical technique.

LEBNS is a less (minimally) invasive surgical technique. The extraperitoneal approach involves direct access to and expansion of the retropubic space using CO_2 gas or a water inflated surgical glove (Taylor and Tsokos, 1994). Its advantages are its simplicity and large visual and operative fields obtained by using CO_2 gas insufflation. Especially, age and patient physiques such as marked obesity are not usually limiting factors. Considering the height and weight of subjects, laparoscopic suspension does not have limitations due to obesity or short stature.

Another advantage of LEBNS is concommittant procedures such as herniorrhaphy and oophorectomy are possible, and diagnostic laparoscopy can be easily performed without significant further efforts. Namely, concommitant abdominal operations can be performed via the same trocar.

The major shortcoming of the extraperitoneal approach is the subcutaneous emphysema associated with CO_2 insufflation. Vulva emphysema is commonly seen but quickly absorbed. A caution is advised on the pressure of gas insufflation, but it seems not to be a problem. The most common intraoperative complication is bladder perforation associated with aggressive dissection. When such a complication occurs, the perforated bladder is closed with absorbable suture utilizing extracorporeal tying technique.

The extraperitoneal approach is the recommended standard procedure, but in cases where severe adhesions are expected such as previous pelvic surgery or radiotherapy, the intraperitoneal method can reduce the risk of bladder perforation. In case of such perforation, closure with absorbable suture materials using extracoporeal tying techniques was successful. LEBNS is not recommended in these cases.

Doubts can be raised whether laparoscopic surgery is simpler and faster than the conventional open procedures. In the case of procedures such as bladder neck suspension, it is simple and easier than the open procedures, and actual operative time is shorter if cases are carefully selected. Since its incisions are much smaller and more superficial than the open surgical procedures, time is definitely saved.

Traditional standards of safety and success along with cosmetically plausible and functionally less invasive results can be achieved with LEBNS. Improvements in instruments and operative techniques will bring an advanced, more successful laparoscopic procedure.

In conclusion, laparoscopic extraperitoneal bladder neck suspension is a viable option to the conventional methods of suspension, having definite cosmetic advantages being devoid of intraperitoneal dissection and adhesion, and having a comparable success rate. It is easy to learn and simple to perform, and in this "laparoscope age" it can be widely employed.

REFERENCES

Burch JC. *Urethrovaginal fixation to Cooper's ligament for the correction of stress incontinence, cystocele and prolapse. Am J Obstet Gynecol 1961 ; 81 : 281-90.*

Liu CY. *Laparoscopic retropubic colposuspension (Burch procedure). A review of 58 cases. J Reprod Med 1993 ; 38 : 526-30.*

Raz S. *Modified bladder neck suspension for female stress incontinence, cystocele and prolapse. Am J Obstet Gynecol 1961 ; 81 : 281-90.*

Taylor JD, Tsokos N. *A retroperitoneal approach to surgery for stress incontinence using the laparoscope. Med J Australia 1994 ; 160 : 42.*

Vancaillie TG, Schuessler W. *Laparoscopic bladder neck suspension. J Laparoendoscop Surg 1991 ; 1 : 169-73.*