International Urology and Nephrology 30 (4), pp. 439–444 (1998)

Modified Four Corner Bladder Neck Suspension in Anatomical Stress Incontinence with Moderate Cystocele

Ö. ATAHAN, Ö. KAYIGIL, A. METIN

Urological Clinics of TCDD Ankara Hospital, Ankara, Turkey

(Accepted March 16, 1998)

We aimed to evaluate the efficacy and the short- and long-term results of the modified four corner bladder neck suspension (FCBNS) procedure in the correction of type 2 stress urinary incontinence with moderate cystocele. We studied retrospectively 26 consecutive patients who underwent modified FCBNS procedure during a 2-year period at our institution. The modifications that were made were the distal sutures starting from the midurethra as a coil fashion of three centimetres to the bladder neck and its fixation to the pubic bone. Preoperative questionnaires, hospital and clinical records, and postoperative questionnaires were reviewed to assess comparative outcome among the patients. Patient follow-up ranged from 22 to 47 months (mean 33.5). The mean age at the time of surgery was 55.3±11.6, and mean parity was 3.2±1.3. Twenty-five of 26 women (96%) were cured after six months and 24 of 26 (92%) were cured after twenty-one months. Cystoceles were completely reduced. Complications occurred in 15% of the patients. The modified FCBNS is a useful and effective operation in treating anatomical stress urinary incontinence and an associated moderate cystocele since it elevates and supports midurethra as well in selected patients and it is associated with a low incidence of postoperative complications.

Introduction

Urinary incontinence, clinically defined as the involuntary loss of urine across the urethra, is influenced by several factors. The aetiology of stress urinary incontinence has been classified by several schemes based on anatomical causes (urethral hypermobility) or intrinsic sphincter deficiency [1, 2]. Surgical treatment of stress incontinence has been performed via several techniques, especially endoscopic suspension of the vesical neck, with a wide range of success rates [1]. Other vaginal vault disorders may coexist with anatomic stress urinary incontinence. The most common associated disorder is moderate cystocele. The surgical procedure chosen to correct stress incontinence should also correct moderate cystocele. One of these surgical procedures is four corner bladder neck suspension (FCBNS). However, few reports are available to assess the short- and long-term outcome of FCBNS [3]. In this study, the efficacy of modified FCBNS procedures and its short- and long-term results are reviewed.

Kluwer Academic Publishers, Dordrecht
Akadémiai Kiadó, Budapest

Patients and methods

We retrospectively reviewed the medical records of 26 consecutive women who underwent the modified FCBNS procedures at our institution between January 1992 and January 1994. Patient status was assessed 22 to 47 months postoperatively.

Records were reviewed with emphasis on patient characteristics, and techniques of preoperative evaluation such as duration and type of incontinence, parity, presence of obesity and chronic illness, prior pelvic or vaginal surgery, cytobacteriological examination of urine. Cystoscopy and urodynamics were eliminated in the majority of patients. Urodynamics were reserved for patients with urgency and frequency or abnormal neurological findings. A pelvic examination was performed to assess urethral hypermobility and urinary incontinence with the Valsalva manoeuvre and cough. On physical examination, an anterior vaginal wall bulge that reaches to the level of the vaginal introitus but does not protrude through the introitus qualified as a moderate cystocele. Symptoms of stress urinary incontinence were considered severe if the patient had leakage of urine with activities, such as walking or changes in posture, and mild if the patient lost urine only with coughing, sneezing or laughing. Incontinence was classified into separate types based on two urethral characteristics, the degree of urethral mobility and the functional status of the bladder neck and proximal urethra, according to the system of Blaivas and Olsson [2]. Only patients diagnosed preoperatively with anatomical stress urinary incontinence (types 1 and 2) with moderate cystocele are included in this study. Patients diagnosed with stress urinary incontinence secondary to intrinsic sphincteric damage (type 3 stress urinary incontinence) or severe cystocele are not included, since they underwent a different type of anti-incontinence procedure. Modified FCBNS was performed with distal sutures starting from midurethra instead of bladder neck as a coil fashion of 3 cm on each side in patients with a lateral defect only and moderate cystocele as described by Raz [4]. The two ends of the sutures adjacent to the bladder neck, proximal and midurethra are transferred slightly to retropubic area and fixed deeply into the pubic tubercle on each side instead of fixating to the rectus fascia. The other two sutures passed from cardinal ligaments and tied on the rectus fascia as a cross manner after a transfer to suprapubic region. Three accompanied rectoceles were repaired at the same time.

Urinary drainage usually was accomplished via a Foley catheter up to postoperative 5 days. Patients were kept on a low dose of oral antibiotics while the urethral catheter was in place; antispasmodic medication was prescribed as needed.

Follow-up evaluations included history, physical examination for assessment of vaginal wall prolapse and testing for persistent or recurrent stress urinary incontinence. Cure was defined as complete freedom from stress incontinence and failure was defined as any degree of persistent or recurrent stress urinary incontinence.

Statistical analysis was carried out by using SPSS software (Release 5.0). The *t*-test and paired *t*-tests were used for statistical analysis.

Results

The patient characteristics are given in Table 1. Duration of stress incontinence symptoms ranged from 3 months to 25 years. Urinary frequency was noted by 5 patients (19%). No urgency incontinence, nocturnal enuresis and urinary infection were noted in the patients. No patient had undergone a previous anti-incontinence and pelvic or vaginal procedure and Bonney test was positive in all patients.

The postoperative results are shown in Table 2. Follow-up ranged from 22 to 47 months (mean 33.5±8.8). At 6 months 25 patients (96%) were cured. After long-term follow-up 24 patients (92%) were cured. Cystoceles were completely reduced. Average length of hospitalization was 7.7±3.9 days.

Complications occurred in 15% of patients. Protracted suprapubic pain occurred in 2 patients and was often relieved by infiltration of a local anaesthetic. Of the 2 patients with chronic incomplete bladder emptying postvoid residual volumes of 50 to 240 ml persisted up to 10–30 days postoperatively but all eventually voided on their own. There were no ureteral and bladder injuries.

Table 1
Patient characteristics

No. of patients	26
Mean age (range), years	55.3±11.6
Mean of parity (range)	3.2± 1.3
Obesity, No.*	15
Medical illness	6
Chronic chest disease	1
Diabetes mellitus	2
Hypertension	3

* Weight more than 20% over ideal body weight.

Table 2
Results of modified FCBNS procedure

No. of patients	26	
Initial (at 6 months)		
Cure	25	(96%)
Failure	1	(4%)
Long-term (>21 months)		
Cure	24	(92%)
Failure	2	(8%)

Discussion

Surgical treatment of stress incontinence has been performed via several techniques with a wide range of success rates [5]. However, during the last two decades a variety of needle suspension techniques have become popular because of the decreased morbidity [6, 7, 8]. Selection of an operation is based on accurate diagnosis of the type of stress incontinence, which is generally categorized as urethral hypermobility (types 1 and 2) or intrinsic sphincter deficiency (type 3). Traditionally, type 1 or type 2 stress urinary incontinence has been treated with a form of transabdominal or transvaginal bladder neck suspension, while a pubovaginal sling operation has been reserved for correction of type 3 incontinence.

The aim of suspension operations in the treatment of stress incontinence is to elevate and fix the bladder neck, thereby enabling unobstructed voiding [1, 5]. Since Pereyra [6] described the first transvaginal bladder neck suspension, different methods have been described [1, 5, 7, 8]. Elevation and fixation may be reached by different means. The point of difference between these techniques is the choice of the anchoring tissue at the vaginal end: Stamey [7] used the pubocervical fascia, Pereyra [6] pubourethral ligament and endopelvic fascia, and Raz [8] endopelvic fascia and the full thickness of the vaginal wall. Stamey described a method in which monofilament knitted polypropylene patches are used to prevent the sutures from cutting through the periurethral tissues [7].

Any operation to correct stress urinary incontinence depends not only on the anatomical origin of incontinence but also on the degree of coexistent anterior vaginal wall prolapse. Anterior vaginal wall prolapse is the most common type of pelvic organ prolapse, and its repair represents approximately 20% of gynaecological surgery. There are 3 anatomical structures that can be involved in the prolapse: the bladder base, bladder neck and urethra. The classical approach to cystocele repair involves approximation of lax pubocervical fascia through the anterior vaginal wall with narrowing of the bladder neck and proximal urethra by Kelly plication. This operation corrects the prolapse but, when performed for treatment of incontinence, it has high failure rate because the bladder neck and urethra are not placed into a high, nonobstructed retropubic position. Furthermore, due to elevation of the bladder base without simultaneous elevation of the bladder neck and urethra de novo stress urinary incontinence occurs with notable frequency [4]. A small cystocele is corrected with a routine bladder neck suspension, but a simple suspension procedure is not sufficient to correct a moderate cystocele. Two methods exist to correct a moderate cystocele: the formal cystocele repair that is usually reserved for a large cystocele that protrudes out of the vaginal introitus at rest or with straining, and the four corner bladder neck suspension. The four corner suspension is technically easier and is preferable to a formal cystocele repair for most patients with a moderate cystocele. The other procedure commonly used for repair of certain types of anterior wall prolapse is the Burch colposuspension, which can achieve

a successful repair in most cases but the need for laparotomy increases the morbidity of the operation, hospital stay and postoperative rehabilitation [3, 4].

Uniformly, all these procedures use the anterior abdominal wall as the fixation point for the suspension sutures, tying the sutures to each other across the midline, utilizing the anterior rectus fascia to tie each suture individually, or use synthetic pledget material to facilitate suture fixation, running the risk of infection by a foreign body. The abdominal wall fixation may be inadequate to maintain the bladder neck in an elevated position [9]. The abdominal wall, being a movable structure with time-related changes in its elasticity, cannot ensure that the tension applied to the sutures during surgery remains unchanged. On the other hand, fixation to the abdominal wall forces the elevation of the bladder neck to rely upon two sutures with only one fixation point at the vaginal end, probably leading to the frequent suture detachment both intraoperatively and during the patient's physical activities postoperatively. In our patients we preferred the pubic bone for fixating the distal two sutures.

Most bladder neck suspension procedures today address the proximal urethra and bladder neck without providing support to the midurethral complex. However, evidence points to the midurethra as an important site for continence. More recently, Klutke et al. advocated a vaginal wall sling for stress incontinence that uses the underlying fascia for compression and support of the proximal and midurethra [10]. Using magnetic resonance imaging of the pelvis in patients with stress incontinence they demonstrated poor support of the midurethra, which led to exaggerated posterior rotation of the urethral segment and urethral descent. Because it might support the midurethral complex, the pubovaginal sling procedure seems as the ideal overall treatment for stress incontinence regardless of type [11]. Benizri et al. proposed an interesting new vaginal procedure for cystocele repair and treatment of stress urinary incontinence with 95% success rates. The technique incorporates anterior colporrhaphy with buttressed support of the bladder neck through a rolled tube of de-epithelialized vaginal mucosa [12]. High success rates observed in our patients lies on the modification of the process with the sutures starting from the midurethra up to bladder neck with a 3 cm helixial fashion on each side, supporting mainly the midurethra and bladder neck.

The fixation of two sutures adjacent to the bladder neck, proximal and midurethra to the pubic bone enabled us to tie the sutures firmly without the risk of detachment at the vaginal end during surgery and after the patient's discharge from the hospital. We believe that this procedure will provide long-term bladder neck support.

The initial report describing the four corner repair by Raz [4], with subjective follow-up, reports a stress incontinence cure rate of 94% (84 of 89 patients) and a cystocele cure rate of 98% (105 of 107 patients). Our results at 4-year follow-up are encouraging with a cure rate of 92% of the patients.

The complications after FCBNS are similar to those reported after routine bladder neck suspension. Juma and Sdrales noted urinary retention in 14 of 85

patients undergoing Raz bladder neck suspension for type 2 stress incontinence and reviewed all preoperative urodynamics for the cohort [13]. It also has been stated that only 1.5% of patients undergoing cystourethropexy will have urinary retention unexpectedly [14]. In this study urinary retention was noted in 2 of 26 patients (8%) but all eventually voided on their own.

Our study showed that the modified four corner bladder neck suspension is a useful and effective operation in treating patients with the type 2 stress incontinence and with moderate cystocele. Treatment of female stress urinary incontinence remains a formidable task for the health care community. Great strides have been made but better understanding of the problem and more effective treatments are needed. The surgical treatment of this condition will remain an important aspect of urological care. Because anatomic defects could affect the bladder base, the bladder neck and the urethra, surgeon must think more radically in the choice of surgical procedure of treating anatomical stress urinary incontinence.

References

1. Stothers, L., Chopra, A., Raz, S.: Vaginal reconstructive surgery for female incontinence and anterior vaginal-wall prolapse. *Urol. Clin. N. Amer., 22,* 641 (1995).
2. Blaivas, J. G., Olsson, C. A.: Stress incontinence: Classification and surgical approach. *J. Urol., 139,* 727 (1988).
3. Zimmern, P. E., Leach, G. E., Sirls, L.: Four-corner bladder neck suspension. *Urol. Clin. N. Amer., 2,* 29 (1994).
4. Raz, S., Golomb, J., Klutke, C.: Four corner bladder and urethral suspension for moderate cystocele. *J. Urol., 142,* 712 (1989).
5. Lam, T. C., Hadley, H. R.: Surgical procedures for uncomplicated ("routine") female stress incontinence. *Urol. Clin. N. Amer., 18,* 327 (1991).
6. Pereyra, A. J.: Simplified surgical procedure for the correction of stress urinary incontinence in women. *West. J. Surg. Obstet. Gynecol., 67,* 223 (1959).
7. Stamey, T. A.: Endoscopic suspension of the vesical neck for urinary incontinence. *Surg. Gynecol. Obstet., 136,* 547 (1973).
8. Raz, S.: Modified bladder neck suspension for female stress incontinence. *Urology, 17,* 82 (1981).
9. Leach, G. E.: Bone fixation techniques for transvaginal needle suspension. *Urology, 31,* 388 (1988).
10. Klutke, C., Golomb, J., Barbaric, Z., Raz, S.: The anatomy of stress incontinence: Magnetic resonance imaging of the female bladder neck and urethra. *J. Urol., 143,* 563 (1990).
11. Zaragoza, M. R.: Expanded indications for the pubovaginal sling: Treatment of type 2 or 3 stress incontinence. *J. Urol., 156,* 1620 (1996).
12. Benizri, E. J., Volge, P., Pushkar, D., Chevallier, D., Amiel, J., Sanian, H., Toubol, J.: A new vaginal procedure for cystocele repair and treatment of stress urinary incontinence. *J. Urol., 156,* 1623 (1996).
13. Juma, S., Sdrales, L.: Etiology of urinary retention after bladder neck suspension. Part 2. *J. Urol., 149,* 401A, abstract 752 (1993).
14. Mcguire, E. J., Letson, W., Wang, S.: Transvaginal urethrolysis after obstructive urethral suspension procedures. *J. Urol., 142,* 1037 (1989).