The effectiveness of suburethral sling procedure with autologus rectus fascia in the cure of stress urinary incontinence.

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Abstract

Background: There are many different surgical procedures that can be employed when treating women with stress urinary incontinence. The surgeon is somewhat overwhelmed with choice. Sub-urethral autologous slings have been used since the early 1900s.

Objectives: to evaluate the surgical results after cruciate suburethral sling procedure with autologus rectus fascia in the cure of stress urinary incontinence in females.

Methods: in a prospective study done between June 2005 to January 2007 we enrolled ten women with stress urinary incontinence demonstrated by positive cough test, filling cystometry, and urethral hyper mobility (straining cotton swab $\geq 30^{\circ}$), with different grades of vaginal wall prolapsed underwent cruciate sub urethral sling procedure using rectus fascia flap. Demographic criteria, complications during surgery and post operative period, and subjective cure rate at three months were assessed.

Results: the average age of the patients was 42 years, median parity was 4. The mean operative time was (90±3.8 minute), mean blood loss was 300 ml. there was no bladder or urethral injury. One patient developed acute urinary retention in the fourth post operative day; urinary tract infection occurred in three patients postoperatively. Follow up examinations three months after surgery revealed that 80% of patients report subjective cure and one patient felt that her symptoms improved significantly. Only one patient has remained incontinent.

***Conclusion*:** The cruciate sub urethral sling procedure with autologous rectus fascia is an effective treatment for Stress urinary incontinence in females.

Key words: *suburethral*, sling procedure, autologous rectus fascia, stress incontinence.

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Introduction

A variety of surgical techniques have been described for the treatment of stress incontinence [(1)]. When the problem is primarily due to the loss of support of the bladder neck and urethra, an operation to resuspend these structures and restore normal support is generally successful in eliminating the patient's urine loss. Less commonly, stress incontinence results from failure of the intrinsic sphincteric mechanism itself with or without defective support. McGuire 1981 has labeled this as type III incontinence and notes that it is rarely helped by a repositioning operation alone but usually requires the use of an operation that supports and compresses the deficient sphincteric unit. In most cases this requires the use of the sling beneath the bladder neck to restore normal closure [(2)].

Different panels of experts [(3, 4, 5)] reviewing the long-term data concluded that retro pubic suspension and sling procedures had the best long-term results among all procedures used for stress urinary incontinence. Since the beginning of the 20th century, using a series of materials including muscle, tendon, fascia and synthetic tissues, sling procedure has been used for the treatment of female urinary incontinence [(6)]. The sling operation uses a strip of material to create a support for the bladder neck and proximal urethra. The use of a strip of rectus fascia beneath the bladder neck

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by a vaginal incision and anchored superiorly in the abdominal wall was proposed by Aldridge in 1942 [7].

Sling attachment to the abdominal aponeurosis would provide its movement with the abdominal wall during the increase of the intra-abdominal pressure. During cough or sneeze, the outwards movement of the abdominal wall would draw the sling upwards with consequent increase of the urethral pressure [7]. More recent studies have shown that the endo pelvic fascia has an important function in giving support to the urethra during stress [8, 9]. Thus, the sub urethral sling, instead of raising and actively compressing urethra during the effort, would act in a similar way as the endo pelvic fascia, supporting the urethra and making a passive resistance of urethra possible during the increase of intra-abdominal pressure [6].

Traditionally, slings have been indicated for the treatment of the recurrent stress incontinence, especially in patients who presented a scarred and fixed urethra leading to a defective urethral sphincter function and lower maximum urethral closure pressure. 6 The indication of sling as the first choice for all stress incontinence cases leads to about 90% of cure [10]. The development of less invasive techniques with synthetic material has been responsible for the renovated interest in the use of sling for the treatment of the female urinary incontinence.

Although the success rates for the autologous fascia sling are 65–95%[11,12] the advantages of using synthetic material are there is no need to harvest fascia from the patient, less postoperative pain, cosmetic reasons, and shorter hospital stays. Nevertheless, even though the incidence of complications has decreased significantly in the past decade, complications still cause significant and substantial morbidity, such as mesh erosion and internal organ injuries. Abdel-Fattah and Domingo reported that the erosion rate of synthetic material is 1.72% to 10% in female urinary incontinence surgery [13, 14].

Because of this high incidence of complications associated with synthetic material, in this study, we studied the results of cruciate sub urethral sling with autologous rectus fascia procedures and evaluated the outcomes, intraoperative and postoperative complications; patient's reported subjective outcomes, and their satisfaction.

Material and methods

Between June 2005 and January 2007, a total of 10 consecutive women with stress urinary incontinence (SUI) underwent cruciate suburethral sling procedure with autologous rectus fascia in al kadhymiyah teaching hospital.

Inclusion criteria were primary treatment of stress urinary incontinence (SUI) and showing SUI on filling cystometry without detrussor over activity and a straining Cotton swab $\geq 30^{\circ}$ test indicating urethral hyper mobility.

Preoperative assessment consisted of recording Patient's demographic details, detailed urinary history, physical, vaginal examination to assess for bladder neck mobility, prolapse and obvious incontinence. Neurological examinations and urinalysis were also performed.

Exclusion criteria were recurrent and difficult-to-treat urinary tract infections, significant symptoms of urge urinary incontinence, a history of or detrusor over activity at cystometry, post voiding bladder retention (>150 mL), bladder capacity <200 mL, or physical/mental impairment.

All patients received perioperative intravenous antibiotics (e.g. cefoxitin

2 g intravenously every 8 h for 24 h). , Other procedures, e.g. prolapse repair, perineal repair, were permitted and were fully documented.

The following complications were recorded: blood loss of >300 mL, bladder perforation, urethral lesion, and other intraoperative complications. Postoperative complications that were considered were the need for catheterization >24 hours, postoperative bleeding, hematoma, wound infection, urinary tract infection, and temperature rise >38°C.

All patients were asked to restrict any lifting after surgery, including avoiding lifting over 2.5 kg and abstinence from sexual intercourse for 12 weeks.

Follow-up

All patients were asked to come in for a follow-up at the outpatient department 1 week after being discharged.

Postoperative outcome variables were assessed at each office visit included SUI symptoms, de novo or worsening urge incontinence, and urinary retention.

Surgical outcome in the continence status was defined at three or more months during follow-up after surgery using a questionnaire assessment reported by patients themselves when patients were interviewed. A patient was classified as cured if she was dry and without urinary complaints. If the patient still suffers from some degree of stress incontinence, she is classified as improved, and failure is registered if urinary incontinence was unchanged or worse.

Objective assessment of surgical outcome, by filling cystometry was done during the follow up visit. Any leakage from the urethra during an increase in intra-abdominal pressure and in the absence of a detrusor contraction was interpreted as persistent stress incontinence.

Operative technique:

The operation was performed in the following progression in three set stages.

Stage I: preparation of fascial straps.

The patients were placed in the dorsal lithotomy position allowing free access to the perineum and lower abdomen. Emptying the bladder with Foley catheter was done inserted. Lower abdominal transverse incision to the abdominal apponeurosis two fingers above the symphysis pubis was done. The fascial straps were prepared from the rectus fascia and they should be at least 1 cm wide and 10 cm length.

Stage II:attachment of fascial straps to bladder base.

A midline vertical incision is made in the anterior vaginal wall. This is deep enough to cut through the vaginal skin and pubo cervical fascia. Separation of pubo cervical fascia from the vaginal skin was done.

A long curved forceps (Robert forceps) was introduced through the sub pubic fossa to bring the fascial strap into vaginal wound, and the straps were drawn down in to the vagina. The two flaps crossed over each other under the urethrovesical junction and thus indicate the cruciate nature of the planned fascial support. Cystoscopy was performed after that to check for any injury in the bladder. Suturing of the fascial straps to the pubo cervical fascia was done.

The excess vaginal skin was removed and the vaginal skin is closed by a series of interrupted no. 1 polyglycolic acid. Vaginal pack was inserted.

Stage III: closure of the abdominal wound.

The triangular shaped areas at the lower ends of the incisions in the

rectus sheath were closed. Abdominal wall was closed.

Foley catheter was removed morning after the operation and a voiding trial was initiated 4 hours after that and measurement of voided urine volume and catheterization was then performed to assess the post voiding residual urine volume, If it was less than 50 ml the catheter was removed.

Figure 1: Preparation of the fascial straps

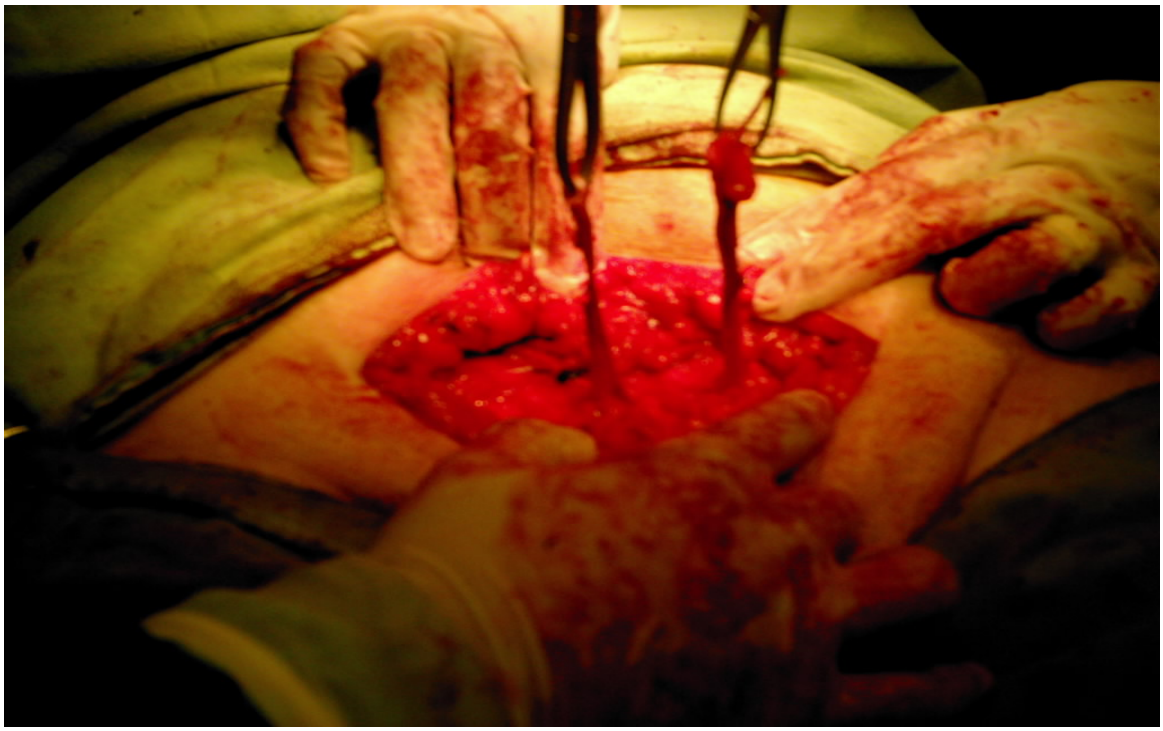

Figure 2: The rectus fascial straps are held with allis forceps

Figure 3: The fascial strap retrieved from the retropubic space held with forceps.

Results

A total of 10 consecutive patients, with a mean age of 42 years (range 36-48) and a median parity of 4(range 2–6) were included in this study. Two patients had undergone prior cesarean section. No patient had undergone prior anti-incontinence surgery. Concomitant surgery was anterior colporrhaphy in 4 patients and colpoperineorrhaphy in seven patients. The mean body mass index at the time of the operation was 25.5 (range 15.4–34.5) kg/m2. 2 (20%) patients were menopausal.

The basic characteristics of the patients are shown in Table 1.

Mean operating time was (90.1 ±3.8 minutes); there was no bladder or urethral injury. Only one patient have blood loss of about 500 cc from dissection of the retropubic space the haemostasis was ensured with suturing of the bleeding areas. One (10%) patient developed urinary retention after being discharged home required catheterization 4 Th postoperative days after taking an allermin tablet. Catheterization was done for her and the catheter removed 24 hours later and voiding trial was successful with posvoid residual volume was 85 cc.

Urinary tract infection occurred in three patients.

Overall SUI was cured in 8 (80%) and improved in 1 (10%) with at least 3 months follow up as shown in table 3.

One patient developed voiding difficulty with a complain of straining to intiate and maintain voiding 7 months following surgery, urine analysis and filling cystometry were done and the post voiding residual urine volume was 50 ml.

Before suburethral sling surgery, 3 patients (30%) had urgency, of which urgency resolved in 2 and persisted in 1 after surgery. De novo urgency appeared in one patient. Urge incontinence appeared in one patient following surgery, as shown in table 4.

Table 5 shows the findings of filling cystometry. It reveals decreased bladder capacity and increased post voiding urine residuals following surgery indicate increased outflow resistance.

None of the patients had functional deficit or an abdominal wall hematoma after the abdominal rectus fascia had been harvested. There was only temporary wound discomfort after the sling procedure.

Table 1: Patient's characteristics (n=10)

Age	42 ±6
Parity	4 ±2.1
BMI	27.1 ±2.5
Postmenopausal state	2 (20%)
Pelvic floor defects	7 (70%)
Prior cesarean section	2(20%)

Table 2: Summary of operative details, perioperative complications, readmissions

Mean operative time (min)	90.1 ±3.8
Mean blood loss (ml)	300
Perioperative complications Bladder injury	0(0%)
Hemorrhage	1(10%)
Urinary tract infection	3(30%)
Urinary retension	1(10%)
Pain at site abdominal wound	1(10%)
Readmissions within 3 months	0 (0%)

Table 3: Procedure outcome (n = 10)

Cure	8 (80%)
Failure	1 (10%)
Improved	1 (10%)

Table 4: Overactive bladder symptoms

Overactive bladder symptoms	**Urgency**	**Urge incontinence**
Before surgery	3	0
After surgery		1
Persistent	1	
Denovo urgency	1	

Table 5: Filling cystometry parameters

Cystometry parameters (n =10)	**before surgery**	**after surgery**
Bladder capacity (mL)	400±25	350±20
Detrusor overactivity	0 (0%)	1(10%)
Postvoiding residual (mL)	40±10	90±20

Discussion

Our results show 80 % succes rate in the cure of SUI with additional 10 % improvements of the pubovaginal sling procedure using autologus rectus fascia. The failure rate was 10 %. Some investigators have reported recurrent urinary incontinence after a pubovaginal slingplasty of over 25% [15, 16]. The risk of failure of sling procedure increases 2.3 times when a cadaveric graft is used, Howden et al. reported that autologous grafts used in pubovaginal slingplasty had superior continence outcomes compared with cadaveric fascia.16 In their study, 153 patients had autologous grafts and 150 had cadaveric grafts. The need for a second operation for recurrent urinary incontinence occurred less in the autologous vs. the cadaveric group (3.3% vs. 12.7%, $P<0.05$) [16].

Muller and his colleagues reported that the success rate of a sling procedure dropped to 37% when patients had proven preoperative urge urinary incontinence [17]. Latini et al. used autologous fascia lata as sling material and had an 85% rate of dry and improved outcomes [18].

Overactive bladder symptoms such as urgency and urgency incontinence can be associated with SUI. In the present study, 3 patients (30%) had urgency as an associated symptom. As possible causes of overactive bladder associated with SUI, several factors are implicated that include weakness of the support provided by the muscle and connective tissue in the bladder neck and urethra, changes of abdominal pressure transmission to the urethra and neuromuscular disorder in the urethra. There has been no convincing theory; however, that explains the difference between SUI with and without an overactive bladder. In the present study, urgency was cured in 2 patients after surgery. This finding indicates that the strengthened support of the bladder neck and urethra by fascial sling may contribute to the resolution of an overactive bladder in some patients. Meanwhile, *de novo* urgency is a perplexing condition that could hamper the therapeutic benefit of anti-incontinence surgery. Bladder outlet obstruction and damage to bladder autonomic innervations by the sling procedure are implicated as possible pathogenesis of *de novo* urgency. However, the precise mechanisms of de novo urgency are poorly understood. In the present study, de novo urgency and de novo detrusor overactivity appeared in only one patient each after surgery.

A comparison of the preoperative and postoperative cystometric parameters indicates an increase in urethral resistance after suburethral sling surgery.

Hilton reported that voiding difficulty increased after a Sling operation compared with a Stamey bladder neck suspension. 12 However, only one patient in our study have been unable to void smoothly after the sling operation. Hilton also found that the sling Operation resulted in a significant reduction in peak urine flow rate and a rise in maximum voiding pressure, suggesting a degree of outflow obstruction [12].

The most important step in the different sling procedures is determining how much tension should be applied to the sling before fixing it or before leaving it free (TVT). Experienced authors [19] report that it is difficult to establish an objective response, because it is subjective and acquired only with experience. McGuire *et al.* [20] noted that tension is not required for supporting the urethra, but on the contrary in the case of sphincter dysfunction more tension

should be applied to increase the coaptation and urethral resistance.

Many methods have been used to evaluate the tension that should be applied to the sling. McGuire and Lytton measured the intraurethral pressure [21]. Yamada *et al.* [22] applied ultrasonography to determine the position of the bladder neck, and Blaivas 19 recommended using a cystoscope to lower the pressure at the moment of suturing the sling. All of these methods are subjective and none of them have confirmed utility with time. In the present study subjective adjustment of tension of the sling by applying it so that it lie comfortably over closed scissor over bladder neck.

As Chapple *et al.* [23] report in their review of surgical treatment for urinary incontinence, the most common complications of sling procedures are voiding difficulty (10.4%), new detrusor instability (7-27%) and lower urinary tract damage (< 3%). Unnecessary tension applied to the sling will clearly affect the first two types of complications mentioned.

Autologous rectus fascial suburethral slings are an effective treatment for the management of stress urinary incontinence in women.

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