Martius flap and anterior vaginal wall sling for correction of urethrovaginal fistula (UVF) associated with stress urinary incontinence (SUI) after vaginal delivery

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Abstract

Objective: To determine the efficacy, safety and urodynamic effects of the Martius flap and the anterior vaginal wall sling in treating post-birth trauma in the form of urethra-vaginal fistula (UVF) associated with stress urinary incontinence (SUI).

Patients and methods: Between July 2006 and August 2011, 19 patients underwent repair of UVF by interposition of a Martius flap and correction of associated SUI by a modified anterior vaginal wall sling. The procedure was carried out 3–17 (mean 7) months after post-birth trauma. Pre-operative evaluation consisted of history, voiding diary, physical examination, routine laboratory work-up, abdominopelvic ultrasonography, intravenous urography (IVU), and cystourethrography. The patients were followed up for a mean of 34 months. Follow-up included history, physical examination, urine analysis and pelvic ultrasonography for the assessment of residual urine. Urodynamic evaluation was performed at 3 months post-operatively.

Results: None of the patients developed recurrence of UVF. SUI was corrected in 16 patients (84%). In the post-operative period, 3 patients (16%) complained of an overactive bladder (OAB) with urodynamic detrusor overactivity (DO) and an obstructed flow. These problems were managed successfully using anticholinergics and urethral dilation. Three patients (16%) complained of mild SUI, but refused further management. Within 3 years following the intervention, 3 patients complained of a recurrence of SUI which was managed successfully by a rectus sheath sling.

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Conclusions: Patients with a post-birth trauma in the form of UVF should be examined intra-operatively for the presence of associated SUI following correction of UVF. The use of the Martius flap and anterior vaginal wall sling in treating such patients is safe, efficient and reproducible. An anterior vaginal wall sling should be avoided in distal UVF to avoid recurrence of SUI.

Introduction

Obstetric fistula is a complication of childbearing that has been relatively neglected. It usually occurs as a consequence of several days of obstructed labor without timely medical intervention. The impact of fistula on the patient's life may be disastrous [1].

It is important to understand the classification of obstetric fistulae. According to a review article published by Elkins, obstetric fistulae may be vesicocervical, juxtacervical, midvaginal vesicovaginal, suburethral, vesicovaginal or urethrovaginal [2].

An obstetric fistula results from tissue ischemia and subsequent necrosis during difficult labor. During normal labor, the anterior vaginal wall, bladder base and urethra are compressed between the fetal head and the pubic bone. If there is prolonged obstructed labor, the intervening soft tissues slough off within 3–10 days postpartum due to ischemia [3]. The obstetric fistula is a field injury with a large defect surrounded by damaged, ischemic tissue which, when occurring at the urethra, may lead to SUI due to weakening of the sphincter mechanism [4].

In patients with UVF, the defect may be proximal or (rarely) distal to the external sphincter which may or may not lead to incontinence. If the fistula is located proximal to the sphincter, total incontinence may mask associated SUI which should be searched for intra-operatively and corrected in the same session [5]. This prevents missing of masked associated SUI and the need of reoperation in an already ischemic field.

An organic suburethral sling procedure with or without an interposition flap is a useful technique at the time of a transvaginal approach for a UVF associated with SUI, especially, if fistula repair involves the bladder neck and proximal urethra [5].

The use of synthetic slings is unsafe in patients with SUI who have a concurrent UVF, as synthetic material may increase the risk of adverse effects. The AUA guidelines panel suggests that the use of autologous fascia and alternative biologic slings be considered in such patients [6].

In this study, care was taken to detect associated SUI intraoperatively after closure of the fistula. Associated SUI was corrected using an anterior vaginal wall sling rather than an anterior rectus sheath in order to decrease morbidity. To our knowledge, this approach had not been tried before, possibly for fear of encouraging recurrence of SUI by using already weak tissue.

Patients and methods

Preoperative evaluation

Between July 2006 and August 2011, 19 patients underwent correction of post-birth trauma in the form of UVF and correction of associated SUI, utilizing the procedure described below.

The patients were evaluated by recording their medical history with an emphasis on the mode of delivery, onset and type of incontinence, as well as previous trials of treatment. Three patients were operated on at Bani Swaif University Hospital, Egypt, while the other 16 patients were operated on at Balbala Hospital in Djibouti. The procedure was carried out 3–17 (mean 7) months after birth trauma. All the patients had had a difficult prolonged normal labor. Evaluation included history, voiding diary, examination in Trendelenburg position (trying to detect the site, size and number of fistulae, the condition of local tissues, and the presence of pelvic organ prolapse (POP)). The fistulous site ranged from 5 to 20 mm distal to the bladder neck. Investigations included routine laboratory investigations, abdominopelvic ultrasonography, IVU (to exclude associated vesicovaginal fistula), cystourethrography, and urodynamic studies (for the 3 patients without continuous leakage). Cystoscopy was done intra-operatively to assess the fistula, the presence of other fistulae, and the bladder neck. Successful surgery was defined as one or no pad usage per day with one or no leakage episode per day and mild or no leakage on stress test.

Surgical technique

The patient was placed in a high, dorsal lithotomy position. The lower abdomen and genital area were prepared and draped in a sterile fashion. The labia were retracted laterally with stay sutures. If cystoscopy was free, a 16F Foley catheter was inserted per urethra and the bladder was emptied. A weighted vaginal speculum was used for exposure. The fistula was probed with a ureteric catheter (if it was small) (Fig. 1). An Allis clamp was used to grasp the anterior vaginal wall around the fistulous tract. The fistulous tract around the ureteric catheter was dissected until the urethra was reached (Fig. 1). The fistulous tract was then excised and the urethra closed longitudinally with Vicryl 4/0 sutures (Fig. 2). A Martius flap was created to cover the urethral suture line (Fig. 3). The anterior vaginal wall was closed by continuous Vicryl 3-0 sutures. Patients who had complained of total incontinence pre-operatively were asked to cough in order to demonstrate associated masked SUI.

In proximal fistulae, a modified anterior vaginal wall sling of Raz was performed [7] utilizing a separate anterior vaginal wall incision, while in distal fistulae, the local vaginal wall covering the fistula was used.

The vaginal sling was a rectangle of anterior vaginal wall that was undermined to free the edges, but was not completely freed from its local tissues. The four corners of the rectangle were anchored by Prolene 0 sutures to be fixed retropubically in the anterior rectus sheath. A vaginal pack was used for 24 h.
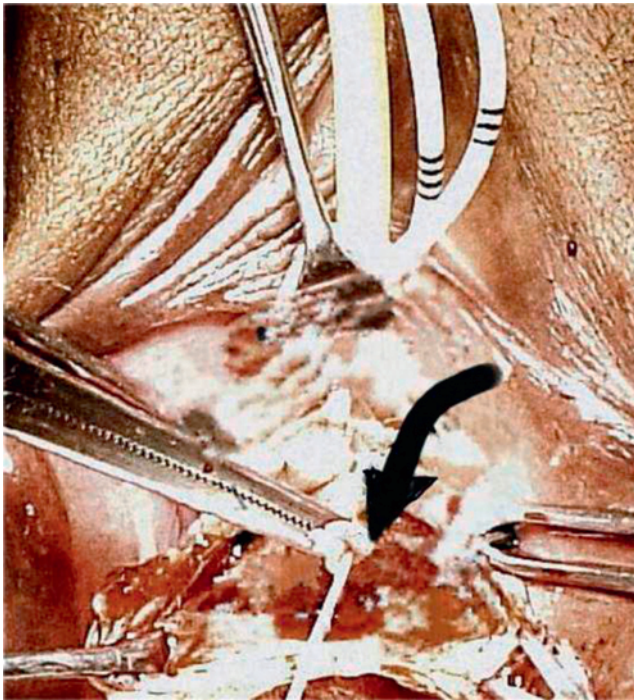
Figure 1   Dissection of the fistulous tract around the ureteric catheter.

Post-operative care

Twenty-four hours after the procedure, the vaginal pack was removed, and the patient had been discharged with the urethral catheter indwelling for 1 week, after which the catheter was removed. The patient was instructed to void, and her post-void residual volume was recorded. When no post-void residual urine was present, the patient was discharged. The patients were followed up
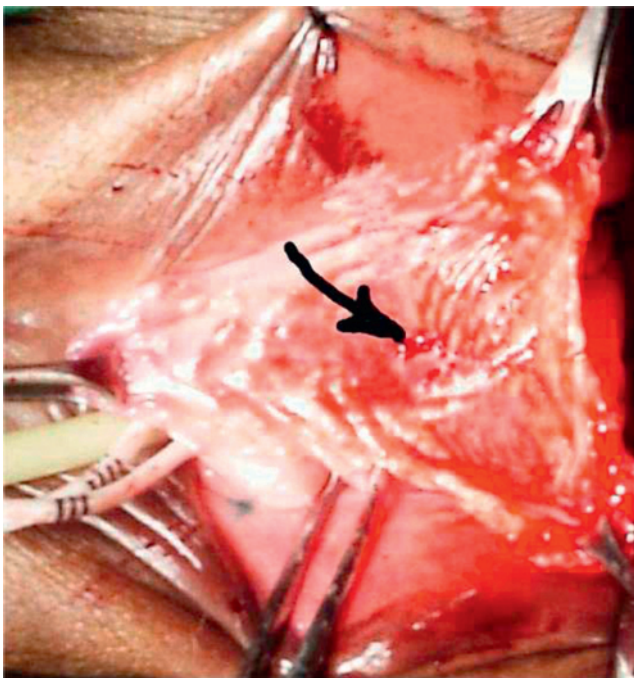

Figure 2   Excision of the fistulous tract and closure of the urethra.
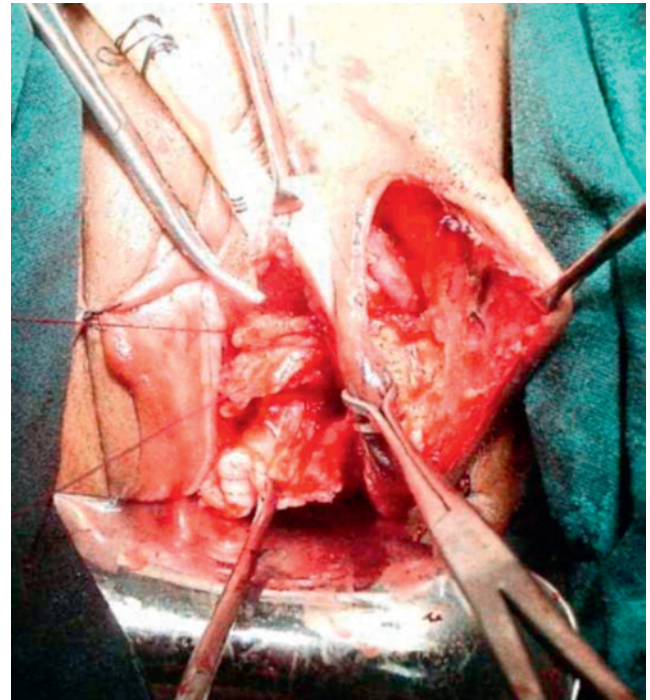

Figure 3   Creation of a Martius flap to cover the urethral suture line.

in 3-month intervals for a mean of 34 months. Each follow-up visit included history, physical examination, urine analysis and pelvic ultrasonography in order to detect residual urine. Urodynamic evaluation was only performed 3 months after the operation to allow for complete healing of the wound, for the fibrosis to be complete and the voiding pattern to be stabilized.

Ethical considerations

All patients completed an informed-patient consent form that included the details of the operation and the possible complications including failure. The study was approved by the local ethical committees of the Urology Department of Bani Swaif University Hospital and the Djiboutian health authority. The study was not supported by any funds except for the routine salaries paid by the local health authorities.

Statistical methods

Survival analysis of recurrence data was depicted using Kaplan–Meier plot. Statistical analysis was performed using SPSS (Version 20, 2011) and MedCalc software. Other patients data were described using the range, median, direct percentage, mean, and standard deviation when appropriate.

Results

Table 1 shows the patient characteristics. The intervention was the first trial of treatment of incontinence in all cases. SUI was due to intrinsic sphincteric deficiency (ISD) in all patients according to the severity of SUI and the presence of a wide bladder neck on cystoscopy. The average operative time was 65 min. In all our patients, SUI was detected during intra-operative examination after closure of the fistula. Intra-operative or major post-operative complications were not recorded. All procedures were completed with no

Table 1   Patient characteristics.

Variable	Minimum	Maximum	Median
Age (years)	24	45	34
Number of deliveries	1	4	1
Duration of incontinence (months)	3	17	6
Size of fistula (mm)	2	6	3
Distance to bladder neck (mm)	5	20	8
Rectocele grade	0	2	1
Cystocele grade	0	2	1
Operative time (min)	40	90	60
Duration of follow up (months)	12	60	32

recurrence of fistulae. Three patients (16%) complained of mild SUI (defined as using one pad per day with minimal wetting of the pad), but they refused any further management. The three failures were those who had had distal fistulae and in whom the local vaginal wall was used. Their pre-operative abdominal leak point pressure (ALPP) was less than 30 cm H_2O and rose above 90 cm H_2O post-operatively. Post-operative cystometry was normal in the remaining 16 patients except for 3 patients (16%) who complained of OAB with DO and an obstructed flow. They were managed successfully with anticholinergics and urethral dilation. Three patients complained of recurrence of SUI within 3 years after the procedure and were operated on successfully, using an anterior rectus sheath sling. Fig. 4 shows Kaplan–Meier survival curve of the distribution of patients with recurrence of SUI. We found a recurrence-free cumulative survival rate of 70% at 35 months. The median survival time could not be calculated because the cumulative survival rate did not fall to 50% during the follow-up period.

Discussion

The delivery mode is the major environmental determinant of SUI with delivery by Cesarean section only conferring a nearly 3-fold reduction in SUI risk relative to those having undergone vaginal birth [8]. When normal labor becomes a traumatic event (like in obstructed labor), tissue ischemia may lead to sloughing and fistula formation between the bladder or the urethra and the vagina. The fistula may involve the trigone, ureters, bladder neck, proximal or
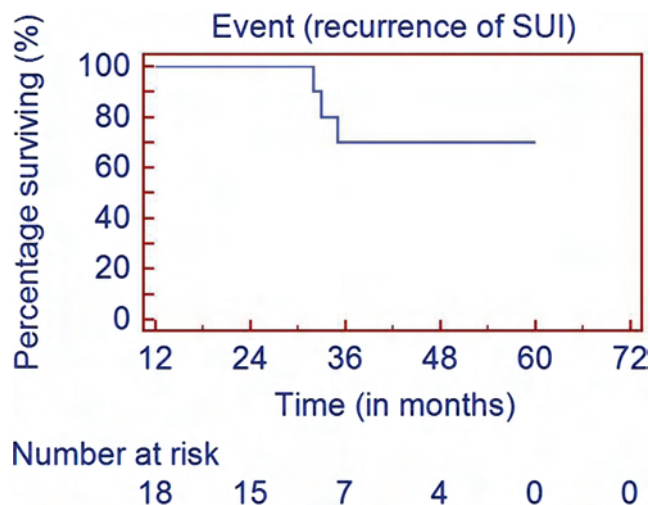

Figure 4   Kaplan–Meier survival curve of the distribution of recurrence of SUI.

distal urethra. Tissue ischemia at the area of the external sphincter may lead to SUI [4]. In the present study, all the patients developed incontinence after a difficult prolonged normal labor. They all had SUI in addition to the UVF. After surgery, they were all advised to postpone pregnancy for at least 1 year and to choose a Cesarean section for their next delivery.

Obstetric UVF rarely occurs without associated vesicovaginal fistula, however the number of reports in the literature is limited. Pushkar et al., who did not use Martius flap in all their patients, reported a success rate of 90% in 19 patients with obstetric fistulae. However, 50% of their patients developed post-operative SUI [9]. Lee similarly reported a 92% correction rate of UVF in 50 patients [10]. In the present study, using the Martius flap, a 100% success rate of fistula repair was recorded. On intra-operative examination, all our patients had shown SUI which was corrected in the same session by a modified anterior vaginal wall sling, achieving an 84% success rate. Pushkar et al. reported that 52.11% of their patients with UVF developed SUI symptoms after successful fistula closure which may be due to the different pathophysiology (26.76% of their patients had obstetric fistulae). They corrected the SUI in a second session with a 52% success rate, which may be due to the dissection in a field with recurrent local ischemia. This emphasizes the need to search for the presence of associated occult SUI intra-operatively to avoid reoperation in an already weak area. They used an autologous sling in all but 3 patients in whom they used a transobturator tape (TOT) with no complications.

Five percent of the patients treated by Pushkar et al. developed obstructed flow due to urethral stenosis [9]. In the present study, 3 patients (16%) developed obstructed flow, possibly due to the longitudinal closure of the fistula. The three patients were managed successfully with urethral dilation, not requiring urethrotomy, while Pushkar et al. corrected the urethral narrowing with dilation and urethrotomy [9]. In the present study an anterior vaginal wall sling was used to avoid the morbidity which may be caused by other autologous fascia and synthetic slings when used in already weak tissues.

Ghoniem and Monga recommended that associated SUI be searched for intra-operatively and corrected in the same session in cases where the fistula is proximal to the sphincter and total incontinence may mask SUI [5]. In the present study, there were 3 patients with distal urethral fistulae who were complaining of SUI, while the other 16 patients with proximal fistulae were complaining of total incontinence and needed intra-operative examination after closure of the fistulae to detect associated SUI.

Sling procedures have been used successfully for the treatment of SUI. Synthetic slings are used to avoid the morbidity associated with using autologous fascia [11], but post-birth trauma patients usually have local ischemia that increases the risk of complications when using synthetic materials. Pushkar et al. corrected the SUI in a second session with TOT with no complications [9]. The AUA guidelines panel suggests the use of autologous fascia in these patients [6]. In the present study, an autologous sling was used taking the risk of inefficient correction of SUI, but avoiding the risk of erosion that may occur when using a synthetic sling in an area with local ischemia.

The anterior vaginal wall sling has been reported to cause few complications, with the main criticism being a decrease of

sexual function owing to vaginal shortening. In the present study no such complication was encountered. Since the epithelium is buried, inclusion cysts may occur, as reported by Baldwin and Hadley [12]. In a comparison of pubovaginal slings using rectus fascia versus vaginal wall, the satisfaction rates were similar, but the group subjected to the approach using the vaginal wall sling had a somewhat shorter operative time and hospital stay [13]. The disadvantages are thought to be the fact that the tissue used is already weak. Choe and Battino reported a 70% cure rate after 1 year [14], whereas Ferrari and Frigerio reported a 100% cure rate after 1 year [15]. The results shown in the present study (86%) are comparable to those in the literature, keeping in mind the different type of patients who had additional UVF. Browning used the ischiocavernosus muscles bilaterally in the midline as a sling with a 90% success rate [16]. Recurrence of SUI within 3 years occurred in three patients who had distal UVF, which may be explained by the weakness of the part of the vaginal wall used as a sling.

The present study emphasizes the importance of searching for associated SUI after correction of obstetric UVF and of managing SUI in the same session. The new issue is using the anterior vaginal wall for correction of SUI in patients with UVF.

Limitations in the present work are the small number of patients, which does not allow for a comparison with other types of autologous slings, and the need for a longer follow-up to confirm the efficiency of such management.

In conclusion, the preliminary results of this study show that it is advisable to search for associated SUI after correction of obstetric UVF and to manage SUI in the same session in order to avoid reoperation in an ischemic field, which may increase the rate of complications or failure. SUI can be corrected utilizing the anterior vaginal wall to avoid the morbidity associated with the use of other autologous slings. It is preferable not to use the anterior vaginal wall as a sling if the UVF is distal, because the vaginal tissue will be too weak to enable correction of SUI. Further studies are needed to compare several autologous slings and their efficiency in patients with UVF and SUI. These studies should be carried out in African countries, such as Ethiopia, Djibouti, or Niger, where the fistula rate is high and a sufficient number of patients can be managed, in order to obtain convincing results.

Conflict of interest

No conflict of interest to declare.

References

[1] Goodwin WE, Scardino PT. Vesicovaginal and ureterovaginal fistulas: a summary of 25 years of experience. Journal of Urology 1980;123:370–4.
[2] Elkins TE. Surgery for the obstetric vesicovaginal fistula: a review of 100 operations in 82 patients. American Journal of Obstetrics and Gynecology 1994;170:1108–20.
[3] Kelly J. Ethiopia: an epidemiological study of vesico-vaginal fistula in Addis Ababa. World Health Statistics Quarterly 1995;48:15–7.
[4] Zacharin RF. Obstetric fistula. New York, NY: Springer-Verlag; 1988.
[5] Ghoniem G, Monga M. Modified pubovaginal sling and Martius graft for repair of the recurrent vesicovaginal fistula involving the internal urinary sphincter. European Urology 1995;27(3):241–5.
[6] AUA guidelines on surgical management of stress urinary incontinence updated [Published online December 28, 2009].
[7] Raz S. Modified bladder neck suspension for female stress incontinence. Urology 1981;17:82.
[8] Goldberg R, Gandhi S, Abramov Y, Botros S, Nickolov A, Sherman W, et al. Delivery mode is the major determinant of stress urinary incontinence in parous women: analysis of 288 identical twins. Neurourology and Urodynamics 2004;23:407–8.
[9] Pushkar DY, Dyakov VV, Kosko JW, Kasyan GR. Management of urethrovaginal fistula. European Urology 2006;50:1000–5.
[10] Lee RA. Current status of genitourinary fistula. Obstetrics and Gynecology 1988;72:313–9.
[11] Rodriguez LV, Raz S. Polypropylene sling for the treatment of stress urinary incontinence. Urology 2001;58:783–5.
[12] Baldwin DD, Hadley HR. Epithelial inclusion cyst formation after free vaginal wall swing sling procedure for stress urinary incontinence. Journal of Urology 1997;157:952.
[13] Haab F, Trockman BA, Zimmern PE, Leach GE. Results of pubovaginal sling for the treatment of intrinsic sphincteric deficiency determined by questionnaire analysis. Journal of Urology 1997;158:1738–41.
[14] Choe JM, Battino BS. Antimicrobial mesh versus vaginal sling: a comparative outcome analysis. Journal of Urology 2000;163:1829–34.
[15] Ferrari A, Frigerio L. The triangular vaginal patch sling for stress urinary incontinence and hypermobile urethra. American Journal of Obstetrics and Gynecology 1997;177:1426–31.
[16] Browning A. Prevention of residual urinary incontinence following successful repair of obstetric vesico-vaginal fistulausing a fibro-muscular sling. BJOG 2004;111(April):357–61.