

The AINU Technique for Laparoscopic Vesico-Vaginal Fistula Repair: A Preliminary Report

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Key Words

Vesicovaginal fistula · Laparoscopic vesicovaginal fistula repair · Barbed suture · Transverse cystotomy

Abstract

Introduction: With safe obstetric practices now globally available, most vesico-vaginal fistulas (VVF) presenting in recent times are secondary to various gynecologic surgeries. Most of them are supra-trigonal in location. Laparoscopic repair of VVF is gaining ground as an alternative to open repair of VVF. In this study, we describe our initial experience with a novel technique of laparoscopic VVF repair involving a limited transverse cystotomy for access and a single-layered barbed suture closure of bladder. **Materials and Methods:** Twenty cases of supra-trigonal VVFs following gynecologic surgeries were taken up for repair by our novel technique. The mean age of the patients was 32 years and the mean VVF size was 1.5 cm. **Results:** The mean operative time was 54 min. Estimated mean blood loss was 30 ml and the mean postoperative stay was 2.5 days. None of the patients had any recurrence with a mean follow-up of 14 months. **Conclusion:** The limited transverse cystotomy approach has advantages in decreasing the operative time, improving ease of laparoscopic suturing, allowing an automatic separation of suture lines and allowing for an easier anterior dissection of

the bladder to reduce tension on the suture line if necessary. Further this approach provides excellent results in select patients of supra-trigonal VVF in terms of continence and postoperative bladder overactivity. © 2015 S. Karger AG, Basel

Introduction

Vesico-vaginal fistulas (VVF) and the resultant urinary incontinence entail immense social and psychological hardship on a patient. With the emergence of safe obstetric practices, the incidence of VVF secondary to obstructed labor and other obstetric complications are on a wane [1]. Most of the VVFs encountered today are seen after gynecological surgeries, most commonly after abdominal or vaginal hysterectomies. VVF, once confirmed, needs surgical repair in the majority of cases. VVF repair can be done by trans-abdominal or trans-vaginal route, the latter generally reserved for a low-lying VVF in the region of trigone. VVF repair can be accomplished by an open, laparoscopic or robotic route. The choice of repair is dictated by many factors including the etiology, the size, location and the complexity of the VVF and last but not the least, the surgeon's familiarity with the approach and the technique.



Fig. 1. **a** Scar between the bladder and the vaginal vault. **b** Limited transverse cystotomy. **c** Fistula site and ureteric orifices visualized.

Nezhat et al. [2] first reported laparoscopic VVF repair in 1994 and the procedure has largely remained unchanged until recent times. It is largely a derivation of the open surgical O'Connor's bivalving technique, in which a vertical bladder incision is made until the VVF, the fistula is circumscribed and the bladder proximal to it is dissected off the anterior vaginal wall. The vaginal end of the fistula is closed in layers, omentum interposed between the bladder and the vagina and the bladder is closed in layers after that [3–5].

We describe here our experience and results with a novel method of laparoscopic VVF repair, which involves a limited transverse cystotomy of the bladder. There are distinct advantages of this method in select patients of supra-trigonal VVF and efficacy is comparable to the traditional method of repair.

Materials and Methods

We did a retrospective analysis of VVF cases operated in the Asian Institute of Nephrology and Urology, Hyderabad, India from April 2013 to March 2015. A total of 12 cases were operated during this period. We excluded malignant VVF, post-radiation VVF and patients with a coexisting uretero-vaginal fistula. Patients underwent a thorough clinical examination followed by an ultrasonogram and a cystoscopy to identify and characterize the VVF and to assess its proximity to the ureteric orifices. All cases of VVF occurred subsequent to a gynecological intervention and all except one were supra-trigonal in location. The patient demographics are tabulated in table 1.

Operative Procedure

All patients were subjected to general anesthesia and placed in a low lithotomy position. They underwent a preoperative cystoscopy with placement of ureteric catheters in both ureters and another ureteric catheter of a different color through the VVF into the vagina, tagged with its urethral end with an artery forceps. A Foley's catheter with its bulb inflated with 5 ml water was kept in the bladder. Patients were then padded and strapped and placed in

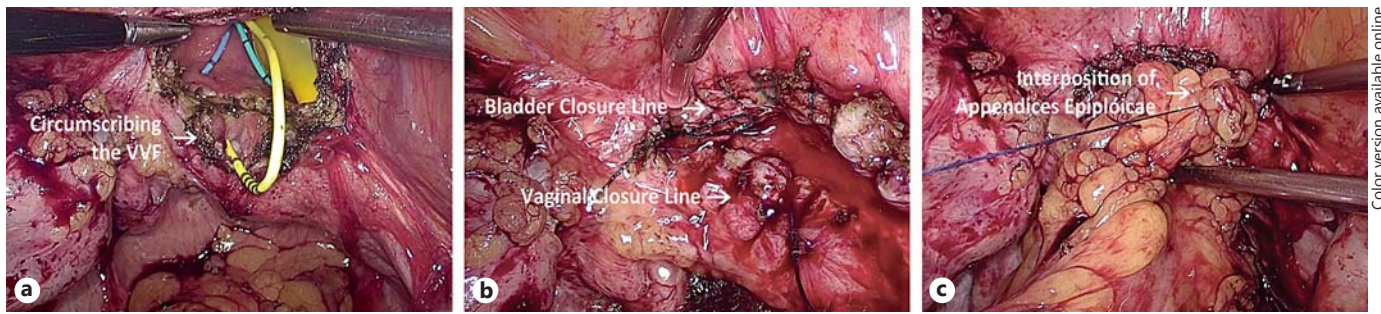
Table 1. Patient demographics and clinical data

Patient details	Number
Total patients, n	12
Mean age, years	32
Duration of VVF (median), months	9
Etiology of VVF	
TAH with BSO	10
LAVH	2
Mean size of VVF, cm	1.5

TAH = Total abdominal hysterectomy; BSO = bilateral salpingo-oophorectomy; LAVH = laparoscopic assisted vaginal hysterectomy.

a steep Trendelenburg position. Laparoscopic ports – umbilical or supra-umbilical camera port (10 mm), a 10 mm and a 5 mm working port on the right side and a 5 mm port on the left side – were placed in a fan-shaped manner.

The procedure was started by taking down the intestinal adhesions, which were invariably found following the primary gynecologic surgery. A scar line was always visualized at the junction of the bladder and the vaginal vault (fig. 1a). The bladder was opened by a limited transverse cystotomy (2 cm) just above this scar (fig. 1b). Once entry into the bladder was confirmed, the cystotomy was extended on either side to allow for good visualization of the fistula and both the ureteric orifices (fig. 1c). The VVF was seen between this cystotomy and the interureteric bar, generally within 2 cm from the cystotomy incision. The edges of the fistula and its relationship to the ureteric orifices were re-ascertained and the fistula was circumscribed and encompassed into the cystotomy incision (fig. 2a). Care was taken to include a 0.5 cm rim of bladder tissue during circumscription of the fistula to ensure that the remaining bladder tissue is healthy. Bladder wall distal to the fistula was dissected off the anterior vaginal wall to allow for comfortable closure of the vaginal opening. Fistulous opening on vaginal wall was closed with 2–0 vicryl continuous sutures and bladder closure was done in a single layer with 2–0 V-Loc suture in a continuous fashion (fig. 2b). Omentum or appendices epiploicae was used as an interposition tissue by tacking it to the vaginal wall distal to the fistula (fig. 2c).



Color version available online

Fig. 2. **a** Circumscribing the fistula into the cystotomy incision. **b** The fistula and the bladder closure lines. **c** Appendices epiploicae interposition.

Results

In our series, all patients remained continent and there was no recurrence of VVF. A single surgeon operated on all the patients. The mean operative time was 54 min (range 43–85 min). No patient needed an open conversion. The mean estimated blood loss was 30 ml. The mean duration of hospital stay was 2.5 days (protocol-based discharge on second postoperative day). There were no intra-operative complications. The ureteric catheters were removed on postoperative day 3 and the urethral catheter was removed on postoperative day 14 following a leak-negative cystogram. There was no recurrence in the follow-up period, which ranged from 3 to 26 months (mean 14 months). One month after surgery, none of the patients had any symptoms of bladder overactivity.

Discussion

The highlight of our method of VVF repair is the limited transverse cystotomy used to gain access into the bladder. The classical description of standard O'Connor technique involves complete bivalving of the bladder from the dome to the fistula site. Although it gives good visualization of the fistula site, it increases the complexity of laparoscopic suturing, increasing the operative time. It would also cause more bladder overactivity due to a longer bladder suture line.

Rizvi et al. [6] described a modified limited O'Connor cystotomy with advantages of a limited suture line. Miklos and Moore [7] described a completely extravesical VVF repair technique without cystotomy, entailing just a site-specific dissection and closure of the VVF. The biggest disadvantage of this technique is the non-visualiza-

tion of ureteric orifices, which makes it unsuitable in large fistulas or in cases where the edges of the fistula lie close to the ureteric orifices.

The disadvantage of a vertical cystotomy is the need for a significant bladder dissection and lateral mobilization during closure of a large fistula. With our technique of a transverse cystotomy, if suture line tension is encountered, mobilization of bladder for a tension-free closure is easier, requiring an easy division of the anterior bladder attachment, which achieves significant mobilization to allow closure. Another advantage is the easier laparoscopic suturing of a transverse cystotomy as compared to a vertical bladder incision. The other important advantage of a transverse bladder closure is the automatic retraction of the bladder and vaginal suture lines away from each other, thereby greatly diminishing the chances of recurrence (fig. 2b).

Previous authors with laparoscopic suturing have reported the use of barbed sutures for bladder and vaginal repair [8, 9]. It provides for a secure bladder closure while obviating the need for tying knots. The same was used in our case series and it has contributed to decreasing the total operative time.

Conclusion

The limited transverse cystotomy approach has advantages in decreasing the operative time, improving ease of laparoscopic suturing, allowing an automatic separation of suture lines and allowing for an easier anterior dissection of the bladder to reduce tension on the suture line, if necessary. Further, this approach provides for excellent results in select patients of supra-trigonal VVF in terms of continence and postoperative bladder overactivity.

References

- 1 Kumar A, Goyal NK, Das SK, Trivedi S, Dwivedi US, Singh PB: Our experience with genitourinary fistulae. *Urol Int* 2009;82:404–410.
- 2 Nezhat CH, Nezhat F, Nezhat C, Rottenberg H: Laparoscopic repair of a vesicovaginal fistula: a case report. *Obstet Gynecol* 1994;83(5 pt 2):899–901.
- 3 Chibber PJ, Navinchandra S, Jain P: Laparoscopic O'Connor's repair for vesico-vaginal and vesico-uterine fistulae. *BJU Int* 2005;96:183–186.
- 4 Sotelo R, Mariano MB, Garcia-Segui A, et al: Laparoscopic repair of vesicovaginal fistula. *J Urol* 2005;173:1615–1618.
- 5 Modi P, Goel R, Dodia S: Laparoscopic repair of vesicovaginal fistula. *Urol Int* 2006;76:374–376.
- 6 Rizvi SJ, Gupta R, Patel S, Trivedi A, Trivedi P, Modi P: Modified laparoscopic abdominal vesico-vaginal fistula repair – 'Mini-O'Connor' vesicotomy. *J Laparoendosc Adv Surg Tech A* 2010;20:13–15.
- 7 Miklos JR, Moore RD: Laparoscopic extravesical vesicovaginal fistula repair: our technique and 15-year experience. *Int Urogynecol J* 2015;26:441–446.
- 8 Bogliolo S, Musacchi V, Dominoni M, Casani C, Gaggero CR, et al: Barbed suture in minimally invasive hysterectomy: a systematic review and meta-analysis. *Arch Gynecol Obstet* 2015;292:489–497.
- 9 Bai Y, Pu C, Yuan H, Tang Y, Wang X, Li J, et al: Assessing the impact of barbed suture on vesicourethral anastomosis during minimally invasive radical prostatectomy: a systematic review and meta-analysis. *Urology* 2015;85:1368–1375.