available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Surgery in Motion

Transvaginal Repair of Apical Vesicovaginal Fistula: A Modified Latzko Technique—Outcomes at a High-volume Referral Center

De-Yi Luo [a,b], *Hong Shen* [a,b,*]

[a] *Department of Urology, West China Hospital, Sichuan University, Chengdu, Sichuan, PR China;* [b] *Department of Urology, Institute of Urology, West China Hospital, Sichuan University, Chengdu, Sichuan, PR China*

Article info

Article history:
Accepted April 11, 2019

Associate Editor:
Alexandre Mottrie

Keywords:
Apical vesicovaginal fistula
Transvaginal repair
Surgical technique

Please visit www.europeanurology.com and www.urosource.com to view the accompanying video.

Abstract

Background: Vesicovaginal fistula (VVF) is a distressing disorder in women. The transvaginal method of VVF repair is generally preferred, as its minimally invasive nature appears to offer several advantages compared with the abdominal approach, including decreased pain and blood loss and reduced hospital stay. A common technique used in VVF repair surgery is the Latzko technique, which may be difficult for the fistula located at the vaginal apex, due to the firm transverse scar left after the inciting gynecological surgery.
Objective: To show the efficacy and safety of an alternative modified transvaginal repair technique for apical vesciovaginal fistula.
Design, setting, and participants: A retrospective cohort study was conducted at a high-volume hospital. A total of 108 female patients, previously diagnosed with apical VVF, underwent fistula repair between 2009 and 2016. Those patients were contacted, and they underwent a follow-up examination.
Surgical procedure: The modified Latzko technique for apical VVF repair was performed.
Measurements: A chart review was performed.
Results and limitations: The mean age of the patients was 47 (22–77) yr. The average follow-up time was 40.7 (12–84) mo. The VVF was closed in all procedures. There was no immediate or delayed complication. All patients scored higher in the Patient Global Impression of Improvement questionnaire after the surgery.
Conclusions: Our study indicates that the transvaginal repair of apical VVF with a modified Latzko technique is feasible and effective, and offers durable results without apparent complications.
Patient summary: We studied an alternative surgical technique for the treatment of apical vesicovaginal fistula. We conclude that this technique is simple, safe, and effective, with no apparent complications.

* Corresponding author. Department of Urology, West China Hospital, Sichuan University, Chengdu, Sichuan, PR China. Tel. +86 189 8060 1433; Fax: +86 28 8542 2451.
E-mail address: shen1177hx@163.com (H. Shen).

1. Introduction

Vesicovaginal fistula (VVF) is the most common acquired fistula in the genitourinary tract [1]. In developed countries, most VVFs occur after benign gynecological surgery [1,2], and the incidence of VVF after hysterectomy for benign vaginal diseases ranges from 0.22% to 0.66% [3,4]. VVFs resulting from total hysterectomy are located at the vaginal apex and are thus called apical VVFs. In developing countries, most VVFs are associated with labor and delivery,

https://doi.org/10.1016/j.eururo.2019.04.010
0302-2838/

but the percentage of apical VVF after gynecological surgery is increasing [5,6]. Most apical VVF cases require surgical repair, which can be performed through a vaginal or an abdominal approach [7]. Benefits of a vaginal approach include shorter hospital stay, decreased blood loss, and reduced operative time [8,9]. Nevertheless, it is reported that in developed countries, the majority of apical VVFs, except at specialized centers, are treated by an abdominal approach (open, laparoscopic, or robotic assisted) [10]. However, no randomized studies, to date, have compared transvaginal repair with transabdominal approaches.

Apical VVF, resulting from gynecological surgery, is located at the vaginal apex and may be hard to access via a transvaginal approach in some cases. In addition, there is a growing trend for the management of VVF with a transabdominal approach in developed countries as surgeons become more facile with laparoscopic and robotic skills [11]. However, compared with laparoscopy or robotic-assisted procedures, the transvaginal approach has the advantages of a short learning curve and zero major operative complications such as bowel injury or trocar-induced epigastric artery injury [11]. Therefore, the transvaginal repair technique is still a classical procedure that is worth learning by surgeons in developing and developed countries [12].

A common technique used in transvaginal VVF repair surgery is the Latzko technique [11]. This may be challenging for a fistula located at the vaginal apex, due to the firm transverse scar left after the inciting gynecological surgery. The aim of this manuscript and the video is to demonstrate the modified Latzko technique that can improve successful transvaginal fistula repair, especially when the VVF is at the vaginal apex and with limited access. The primary outcome of interest was procedure success, defined as absence of leakage at follow-up.

2. Patients and methods

2.1. Study population

A cross-sectional and observational study was performed in a high-volume hospital. A total of 108 patients were diagnosed with apical VVFs resulting from gynecological surgeries between 2009 and 2016, who underwent fistula repair in our center. Patients with VVFs because of obstetric trauma were excluded. All patients underwent their initial gynecological surgeries in other hospitals and then were referred to our center where transvaginal VVF repair was recommended.

After local ethics committee approval (West China Hospital, Sichuan University) was obtained for this study, patients were contacted and they consented to undergo a follow-up examination. All methods in this study were performed in accordance with relevant guidelines and regulations.

2.2. Preoperative evaluation

A standard preoperative evaluation had been performed in all patients, including medical history assessment, physical examination, urine culture, vaginoscopy, methylene blue dye test, and ultrasound of the upper urinary tract. Computer tomography urography (CTU) was performed to exclude concomitant ureteral injury.

2.3. Surgical procedure

A vaginal apical fistula usually is at the vaginal apex, overlapping with the transverse vaginal scar left after the hysterectomy. In some cases, the scar complicates the process of finding the fistula opening and may make the insertion of a Foley catheter into the fistulous opening difficult. Therefore, a new surgical technique, inspired by the conventional Latzko technique (vaginal approach), to improve successful fistula closure is proposed [13,14].

After general anesthesia, the patient is placed in a dorsal lithotomy position. Both sides of the labia are retracted with suture to optimize vaginal exposure. Episiotomy is performed if the surgeon has difficulty with access. Unlike the conventional Latzko technique, catheterization of the fistula is not necessary because our surgical area is located in the normal anterior and posterior vaginal epithelium rather than the perifistulous area with scar. Urethral catheterization with a 16-Fr catheter is performed to drain the bladder. A circumferential incision in the normal anterior and posterior vaginal epithelium is made with a 15-blade scalpel or scissor (Fig. 1A), and the vaginal epithelium is dissected off the bladder epithelium using Metzenbaum scissors. Depending on the scar area, the vaginal mucosa inclusive of the fistula opening is usually circumcised with a 3–5-cm oval disk. The incision location is very important—it is made in the normal anterior and posterior vaginal epithelium to contain the entire transverse vaginal scar and to reconstruct a new vaginal apex, as opposed to just making a 1.5-cm-diameter incision around the fistula according to the conventional Latzko technique. It is necessary to make sure that the vagina is widely mobilized off the bladder wall for a tension-free fistula closure in multiple layers.

After vaginal walls are denuded, the fistula tract is released from the original vault scar together with the bladder wall. Afterward, the vault epithelium and redundant scar tissue are removed, but a ring of scar tissue very close to the fistula is retained to avoid expansion of the fistula and more bleeding. The ring of scar tissue is also useful for holding sutures when the fistula opening is closed and for avoiding suture placement within the bladder with possible ureteral injury. Then, the fistula is closed using 3-0 Monocryl suture (Fig. 1B). To confirm the absence of leakage, we fill the bladder with 300 ml saline solution. Once demonstrating that the bladder is watertight, we suture the perivesical tissue with a Halsted suture (3-0 Monocryl; Fig. 1 C). Then the perivesical tissue is sutured, making it the third layer of closure. In this modified Latzko technique, three or four layers of closure are made in perivesical tissue, which increases the distance between the mucosa of the fistula tract and the vaginal mucosa. Finally, the vaginal mucosa is closed with 2-0 Monocryl suture (Fig. 1D). Povidone-iodine–soaked sponge is inserted into the vagina and removed the following day. No cautery is used during the operation. Patients are discharged from the hospital within 24 h, antibiotics are prescribed for 14 d, antimuscarinics such as tolterodine are given to the patients for 4 wk, and Foley catheter drainage is maintained for 4 wk.

2.4. Postoperative follow-up

In the last postoperative visit, symptom assessment, physical examination, and vaginoscopy are performed. Subjective assessment of the success of the surgery was performed using the Perception Global Impression of Improvement (PGI-I) questionnaire. The PGI-I questionnaire is a self-administered questionnaire with seven questions, comparing the current life quality with that before treatment—it ranges from very much worse to very much better. Complications of the procedure were assessed according to the patients' medical records and also form the direct description of patients during the last visit. The complications were classified based on the Clavien classification [15].

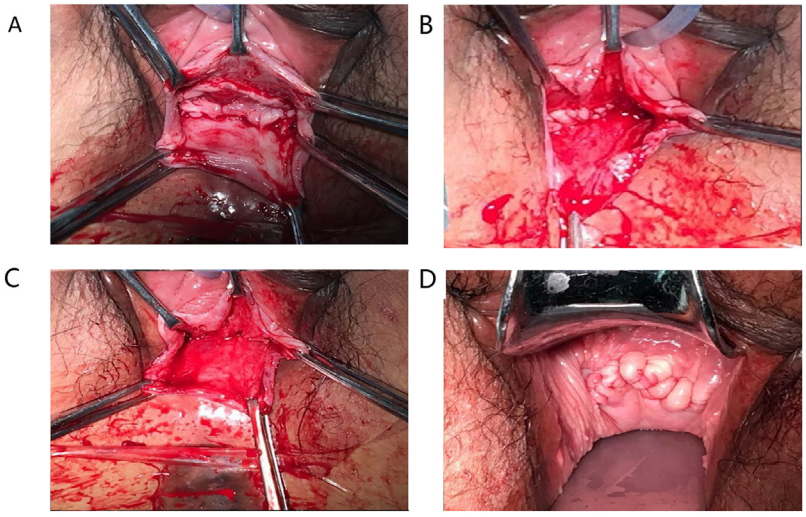

Fig. 1 – Transvaginal repair of apical vesicovaginal fistula with a modified Latzko technique. (A) A circumferential incision in normal anterior and posterior vaginal epithelium is made, and the vault epithelium and redundant scar tissue is removed, leaving a ring of scar tissue close to the fistula to avoid expansion of the fistula and more bleeding. (B) Then the fistula is closed using 3-0 Monocryl suture. (C) The perivesical tissue is sutured with a Halsted stitch (3-0 Monocryl). Then the perivesical tissue is sutured at the further end, making it the third layer of closure. In this modified Latzko technique, three or four layers of closure are made in the perivesical tissue. (D) Finally, the vaginal mucosa is closed with 2-0 Monocryl suture.

2.5. *Data analysis*

A statistical analysis was performed. Normally distributed continuous parameters were presented as the mean ± standard deviation, and analyzed using paired Student *t* test in the pre- and postoperative comparison; non-normal distribution parameters were presented as median (range); and categorical parameters were presented as number (percentage). A p value of <0.05 was considered statistically significant.

3. Results

A total of 108 women agreed to participate in a medical review and undergo examination. Seven patients refused to return to the hospital for physical examination, but agreed to complete the outcomes questionnaire over the telephone.

The patients and fistula characteristics are shown in Table 1. The mean age of the patients at the time of surgery was 47 (22–77) yr. The mean follow-up time was 40.7 (12–84) mo. Among these 108 patients, 88 were primary VVF patients (no prior treatment), whereas 20 were recurrent VVF patients (one to three attempts of repair at other hospitals). The mean duration between fistula onset and repair was 3.4 (3–12) mo. Of these fistulas, 94.5% developed as a consequence of previous hysterectomy, among which 38 (35.2%) had a malignant pathology and 64 (59.3%) were benign. Five patients presented with VVFs after other gynecological surgeries, and one had a VVF after bladder augmentation.

The most common location of VVF was between the vaginal cuff and the supratrigonal posterior wall of the bladder. Among the patients, 88.9% had a single fistula, and

Table 1 – Characteristics of patients and fistulas

	Primary (n = 88)	Secondary (n = 20)	Total (n = 108)
Age (yr)	48.3 (22–67)	46.4 (25–77)	47 (22–77)
Duration (mo)			
<3	80	0	80 (74.1%)
>3	8	20	28 (25.9%)
Etiology			
Hysterectomy for malignant condition	29	9	38 (35.2%)
Hysterectomy for benign condition	53	11	64 (59.3%)
Others	6	0	6 (5.5%)
Fistula number			
Single	78	18	96 (88.9%)
Multiple	10	2	12 (11.1%)
Fistula size			
Small (<2 cm)	87	19	106 (98.1%)
Medium-large (≥2 cm)	1	1	2 (1.9%)
Perifistula fibrosis			
Moderate-severe	68	18	86 (79.6%)
Mild/no fibrosis	20	2	22 (20.4%)
Outcome			
Success	84	16	100 (92.6%)
Failure	4	4	8 (7.4%)

Table 2 – Results and complications

	Value
Hospitalization time, d (mean ± SD)	1.2 ± 0.3
Success rate, no. (%)	
First repair	100/108 (92.4)
Second repair	8/8 (100)
Complications	
Major complications[a]	0
Minor complications	12/108 (11.1%)
Fever >38 °C	6/108 (5.6%)
Hematuria	3/108 (2.8%)
Vaginal bleeding	3/108 (2.8%)
Opening of the incision	0
Infection in incision area	0
Scarring causing cosmetic problems in incision area	0

[a] Defined as Clavien class 2 or greater.

others had two or more fistulas. Of these fistulas, 98.1% were of short diameter (<2 cm in diameter). In 79.6%, moderate to severe perifistula fibrosis was observed.

The procedure was defined as success if the patient was leak free in the follow-up period. The VVF was closed in 92.6% of the first procedures, and failure was observed in eight procedures. Initial failures of all the eight patients were cured after a second repair. As defined by Clavien class 2 or greater, there was no major complication in either group. There was also no bowel, ureteral, or nerve injury. Minor complications, according to Clavien class 1, are shown in Table 2. All the patients fell into the categories of either “much better” (PGI-I: 46.3%) or “very much better” (PGI-I: 53.7%) in the follow-up. No patient abstained from sex because of postoperative discomfort.

4. Discussion

VVF is the most frequently acquired fistula, and causes both physical and psychosocial morbidity [16]. In the industrialized world, the most common causes of VVF are gynecological or pelvic surgery, radiotherapy, and malignancy [17,18]. The overall incidence of VVF, due to gynecological surgery, is 1 in every 1200 hysterectomies and 1 in every 455 laparoscopic hysterectomies [19]. Other gynecological procedures account for up to 11% of VVFs [20].

A patient is highly suspected to have a VVF when she has a postoperative (gynecological) urine leak 1–2 wk postoperatively. This is often as a result of necrosis of tissue captured in surgery or due to cautery. Diagnosis can be made by filling the bladder with methylene blue, inserting a tampon in the vagina, and having the patient to ambulate [21]. Vaginoscopy is important as it can help map the fistula accurately and evaluate the surrounding tissue. Surgery should be postponed if there are signs of acute inflammation, edema, necrosis, or other pathological abnormalities of the bladder or vagina. Most urologists prefer to perform cystoscopy as well to check the location, size, and number of fistulas. In this study, 98.1% of the fistulas were <2 cm in diameter. In our clinical practice, with a suspicion of concomitant ureteral injury, CTU is performed; other more advanced and costly techniques, such as magnetic resonance fistulography (highly informative), have also been suggested [22]. It is worth noting that bladder capacity can be reduced in some cases, which can ultimately lead to a neurogenic-type bladder; the incidence is higher in patients who had a hysterectomy for malignant conditions [23]. When this occurs, it may lead to changes in management.

When to proceed with the surgery is determined by the condition of the surrounding tissue. The surgery can be carried out early if the tissue is healthy; otherwise, the surgery should be postponed for 2–3 mo to allow recovery from inflammation, edema, infection, or necrosis [21]. In this study, all the patients with VVF underwent surgery approximately 3 mo after diagnosis. Some experts even recommend waiting at least 4–6 wk prior to attempting repair regardless of the surrounding tissue condition [24].

The basic principles of VVF repair were first described by Hedrick in 1663, and J. Marion Sims [18] carried out the first successful VVF repair in 1852. The choice of surgical procedures depends on the surgeon's experience, location and size of the fistula, and patients’ preferences [25]. Three-fourths of gynecological supratrigonal VVF can be repaired vaginally in one attempt with a higher success rate with an abdominal approach [26], and in select cases, it is acceptable even if vaginal repair has to be performed a second time if the first one fails [24]. Although the vast majority of VVFs in the industrialized world are amenable to a transvaginal repair [27], we have to recognize that many urologists choose the abdominal approach due to a lack of familiarity with the vaginal repair.

Most posthysterectomy fistulas coincide with a transverse firm scar in the vaginal vault. In this modified Latzko operation, vaginal mucosa of the anterior and posterior vaginal walls along with the vaginal mucosa removed around the fistula tract is easily approximated without tension and provides an excellent layered closure of the fistula. The important surgical principles are included in the video to demonstrate the successful closure of a VVF (by vaginal route) and the good functional results. First, it is necessary to make sure that the vagina is widely mobilized off the bladder wall for a tension-free fistula closure in multiple layers. Then, a circumferential incision in normal anterior and posterior vaginal epithelium is made to overlap in the upper vaginal vault. Second, excision of the fistula tract is not recommended because excision of the fistula tract may lead to bleeding and increase the possibility of ureteral injury (in this technique, sutures are not placed through the bladder). Third, in this modified Latzko technique, three or even four layers of tension-free closure are made in the perivesical tissue, which increases the distance between the bladder mucosa of the fistula tract and the vaginal mucosa. Based on these modifications, the operation is a simple and feasible approach to most apical VVFs. Therefore, more complex and extensive operations such as laparoscopic or robotic-assist VVF repair are not necessary.

In this study, VVF was successfully closed in 92.6% of first procedures and all eight cases that initially failed were cured with a second repair. Based on our experience, it is

easier to repair fistulas in these failed cases compared with first-time cases, because the failed cases have single and smaller fistula after our initial alternative repair technique.

5. Conclusions

Our study demonstrates that transvaginal repair of apical VVF with the modified Latzko technique is a simple, effective, and feasible approach offering durable results without apparent complications.

Author contributions: Hong Shen had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Luo, Shen.
Acquisition of data: Luo, Shen.
Analysis and interpretation of data: Luo, Shen.
Drafting of the manuscript: Luo, Shen.
Critical revision of the manuscript for important intellectual content: Luo, Shen.
Statistical analysis: Luo, Shen.
Obtaining funding: Luo, Shen.
Administrative, technical, or material support: Luo, Shen.
Supervision: Luo, Shen.
Other: None.

Financial disclosures: Hong Shen certifies that all conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or materials discussed in the manuscript (eg, employment/affiliation, grants or funding, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patents filed, received, or pending), are the following: None.

Funding/Support and role of the sponsor: This study was supported by 1.3.5 project (ZY 2017301) for disciplines of excellence, West China Hospital, Sichuan University; Huohua Project of Sichuan University (2018) and NSFC (No. 8177063).

Acknowledgments: We would like to acknowledge Dr. Howard Goldman and Ms. Ziyuan Xia for their help with English editing and voice-over recording.

Appendix A. Supplementary data

The Surgery in Motion video accompanying this article can be found in the online version at https://doi.org/10.1016/j.eururo.2019.04.010 and via www.europeanurology.com.

References

[1] Hillary CJ, Osman NI, Hilton P, Chapple CR. The aetiology, treatment, and outcome of urogenital fistulae managed in well- and lower sourced countries: a systematic review. Eur Urol 2016;70:478–92.
[2] Oakley SH, Brown HW, Greer JA, et al. Management of vesicovaginal fistulae: a multicenter analysis from the Fellows' Pelvic Research Network. Female Pelvic Med Reconstr Surg 2014;20:7–13.
[3] Harkki-Siren P, Sjoberg J, Tiitinen A. Urinary tract injuries after hysterectomy. Obstet Gynecol 1998;92:113–8.
[4] Hilton P. Trends in the aetiology of urogenital fistula: a case of 'retrogressive evolution'? Int Urogynecol J 2016;27:831–7.
[5] Mumtaz R, Fariha M, Shafqat AT. Vesicovaginal fistula repair. Urologist's experience at Bhawalpur. Profession Med J 2006;13:445–52.
[6] Sheikh AR, Gulzar A, Tariq H, Anjum SA. Repair of vesicovaginal fistulae. Ann King Edward Med Univ 2011;17:80–5.
[7] Malik MA, Sohail M, Malik MTB, Khalid N, Akram A. Changing trends in the etiology and management of vesicovaginal fistula. Int J Urol 2018;25:25–9.
[8] Cohen BL, Gousse AE. Current techniques for vesicovaginal fistula repair: surgical pearls to optimize cure rate. Curr Urol Rep 2007;8:413–8.
[9] Gedik A, Deliktas H, Celik N, Kayan D, Bircan MK. Which surgical technique should be preferred to repair, benign primary vesicovaginal fistulas? Urol J 2015;12:2422–7.
[10] Dwyer P, Kaplan F, Alvarez J. Transvaginal repair of vesicovaginal fistula: surgical techniques to improve access and successful vaginal closure. Int Urogynecol J 2013;24:531–2.
[11] Moses RA, Ann Gormley E. State of the art for treatment of vesicovaginal fistula. Curr Urol Rep 2017;18:60.
[12] Theofanides MC, Sui W, Sebesta EM, Onyeji I, Matulay JT, Chung DE. Vesicovaginal fistulas in the developed world: an analysis of disease characteristics, treatments, and complications of surgical repair using the ACS-NSQIP database. Neurourol Urodyn 2017;36:1622–8.
[13] Latzko W. Post-operative vesicovaginal fistulas, genesis and therapy. Am J Surg 1942;58:211–28.
[14] Sims JM. On the treatment of vesico-vaginal fistula. AM J Med Sci 1852;23:59–82.
[15] Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205–13.
[16] Taylor RS, Wasson M, Ashurst JV. Vesicovaginal fistula. J Am Osteopath Assoc 2017;117:789.
[17] Singh O, Gupta SS, Mathur RK. Urogenital fistulas in women: 5-year experience at a single center. Urol J 2010;7:35–9.
[18] Milicevic S, Krivokuca V, Ecim-Zlojutro V, Jakovljevic B. Treatment of vesicovaginal fistulas: an experience of 30 cases. Med Arch 2013;67:266–9.
[19] Pshak T, Nikolavsky D, Terlecki R, Flynn BJ. Is tissue interposition always necessary in transvaginal repair of benign, recurrent vesicovaginal fistulae? Urology 2013;82:707–12.
[20] McKay HA, Hanlon K. Vesicovaginal fistula after cervical cerclage. Repair by transurethral suture cystorrhaphy. J Urol 2003;169:1086–7.
[21] Malik MA, Sohail M, Malik MT, Khalid N, Akram A. Changing trends in the etiology and management of vesicovaginal fistula. Int J Urol 2018;25:25–9.
[22] Dwarkasing S, Hussain SM, Hop WC, Krestin GP. Anovaginal fistulas: evaluation with endoanal MR imaging. Radiology 2004;231:123–8.
[23] Laterza RM, Sievert KD, de Ridder D, et al. Bladder function after radical hysterectomy for cervical cancer. Neurourol Urodyn 2015;34:309–15.
[24] Angioli R, Penalver M, Muzii L, et al. Guidelines of how to manage vesicovaginal fistula. Crit Rev Oncol Hematol 2003;48:295–304.
[25] Latzko W. Postoperative vesicovaginal fistulas. Genesis and therapy. Am J Surg 1992;48:21.
[26] Rajamaheswari N, Chhikara AB, Seethalakshmi K, Bail A, Agarwal S. Trans-vaginal repair of gynecological supratrigonal vesicovaginal fistulae: a worthy option! Urol Ann 2012;4:154–7.
[27] Margolis T, Mercer LJ. Vesicovaginal fistula. Obstet Gynecol Surv 1994;49:840–7.