

Effectiveness and initial outcomes of transvesicoscopic bipolar sealing of vesicovaginal fistula

Vezikovajinal fistülün transvezikoskopik olarak bipolar mühürlenmesinin etkinliği ve ilk sonuçları

Ali Akkoç¹, Cemil Aydın²

¹ Department of Urology, Faculty of Medicine, Alanya Alaaddin Keykubat University, Antalya, Turkey

² Department of Urology, Faculty of Medicine, Hitit University, Corum, Turkey

ORCID ID of the author(s)

AA: 0000-0002-4325-1075

CA: 0000-0002-7271-5748

Corresponding author/Sorumlu yazar:

Ali Akkoç

Address/Adres: Alanya Alaaddin Keykubat Üniversitesi, Üroloji AD, Antalya, Türkiye
e-Mail: aliakkoc@gmail.com

Ethics Committee Approval: University of Health Sciences, Diyarbakır Gazi Yaşargil Training and Research Hospital Ethics Committee, October 2019 (No: 2019-10/03). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Etik Kurul Onayı: Sağlık Bilimleri Üniversitesi, Diyarbakır Gazi Yaşargil Eğitim ve Araştırma Hastanesi, Klinik Araştırmalar Etik Komite, Ekim 2019 (No: 2019-10/03). İnsan katılımcıların katıldığı çalışmalarda tüm prosedürler, 1964 Helsinki Deklarasyonu ve daha sonra yapılan değişiklikler uyarınca gerçekleştirilmiştir.

Conflict of Interest: No conflict of interest was declared by the authors.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Financial Disclosure: The authors declared that this study has received no financial support.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

Published: 4/28/2020

Yayın Tarihi: 28.04.2020

Copyright © 2020 The Author(s)

Published by JOSAM

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 (CC BY-NC-ND 4.0) where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.



Abstract

Aim: Vesicovaginal fistula (VVF) is a social and psychological problem for the female population, causing urinary incontinence and foul-smelling urine. Open, laparoscopic, robotic, and various minimally invasive techniques have been described for the treatment of VVF. In this study, we presented the effectiveness and initial outcomes of transvesicoscopic bipolar sealing of vesicovaginal fistula (TBSF), a novel, minimally invasive technique which we had previously described.

Methods: This surgical case series included 9 patients with VVF of <1 cm located away from ureteral orifices who underwent TBSF from July 2015 to December 2019. The fistula tract was sealed transvesicoscopically with a bipolar vessel sealer. All patients were informed about the modified surgical procedure prior to the operation.

Results: The mean age of the patients was 47.2 (4.6) years. The mean fistula diameter was 6.6 (1.2) mm. The mean operation time was 41 (9.7) minutes. The hospital stay was 1 day in all cases. After catheter removal at 3 weeks, 8 (89%) patients remained dry while one (11%) patient experienced continuous incontinence.

Conclusion: Transvesicoscopic bipolar sealing of vesicovaginal fistula is a simple and safe procedure to perform for small VVF, has a short learning curve and operative time, and results in reduced blood loss and morbidity, brief hospital stay and improved cosmesis.

Keywords: Vesicovaginal fistula, Sealing, Bipolar, Transvesicoscopic, Laparoscopic

Öz

Amaç: Vezikovajinal fistül (VVF), idrar kaçırma ve idrar kokusu nedeniyle, kadınlar için sosyal ve psikolojik bir problemdir. VVF tedavisi için açık, laparoskopik, robotik ve çeşitli minimal invaziv tedavi seçenekleri tanımlanmıştır. Bu çalışmada, daha önce tarif ettiğimiz yeni bir minimal invaziv teknik olan vezikovajinal fistülün transvezikoskopik yolla bipolar mühürlenmesinin etkinliğini ve ilk sonuçlarını sunduk.

Yöntemler: Cerrahi olgu serisi olarak planlanan bu çalışmada, Temmuz 2015-Aralık 2019 tarihleri arasında, üreter orifislerinden uzak yerleşimli ve çapı 1 cm'den küçük vezikovajinal fistülü olan, 9 hastaya transvezikoskopik olarak bipolar damar mühürleme cihazı kullanılarak vezikovajinal fistül mühürleme işlemi gerçekleştirildi. Tüm hastalar ameliyat öncesi modifiye cerrahi prosedür hakkında bilgilendirildi.

Bulgular: Hastaların ortalama yaşı 47,2 (4,6) yıldır. Ortalama fistül çapı 6,6 (1,2) milimetre, ortalama ameliyat süresi 41 (9,7) dakikaydı. Tüm hastalarda hastanede kalış süresi 1 gündü. 3. haftada kateter çıkarıldıktan sonra 8 (%89) hasta kontinan olup, bir (%11) hastada nüks izlendi.

Sonuç: Vezikovajinal fistülün transvezikoskopik yolla bipolar mühürlenmesi; kısa öğrenme eğrisi ve ameliyat süresi, azalmış kan kaybı ve morbidite oranı, kısa hastanede kalış süresi ve iyi kozmetik sonuçları ile küçük fistüller için uygulaması kolay ve güvenli bir prosedürdür.

Anahtar kelimeler: Vezikovajinal fistül, Mühürleme, Bipolar, Transvezikoskopik, Laparoskopik

Introduction

Vesicovaginal fistula (VVF), a social and surgical problem for centuries, is a debilitating, devastating and stressful condition among the female population. Due to continuous urinary incontinence and foul-smelling urine, women are exposed to social casting out. The incidence of VVF varies between 0.3% and 2%. While most of them are iatrogenic, other etiologies include pelvic trauma, radiation necrosis, illegal abortion, and radical pelvic surgery [1,2]. In developed countries, it is most caused by gynecological operations, particularly abdominal hysterectomy. In developing countries, however, inadequate obstetric care is the leading cause of VVF [3,4]. VVF generally occurs within 1–6 weeks after gynecological or obstetric surgery [5].

The purpose of treatment in VVF is stopping urine leakage with return of normal urogenital function. VVF can be treated conservatively by bladder drainage in particularly small fistulas. When conservative treatment fails, surgical repair remains the only option. Controversies still exist regarding the surgical approach of VVF repair. The most performed surgical repairs include transvaginal, transabdominal, laparoscopic and robot assisted laparoscopic approaches. Although there is no consensus on which approach is best, laparoscopic repair is the currently preferred method. [6].

We herein present the effectiveness and initial outcomes of "transvesicoscopic bipolar sealing of vesicovaginal fistula (TBSF)", a novel, minimally invasive technique which we have previously reported [6].

Materials and methods

Between July 2015 and December 2019, nine patients with failed catheterization treatments underwent TBSF. All patients had continuous urine leakage from the vagina. Our inclusion criteria consisted of fistulas less than 1 cm in diameter and away from ureteral orifices. Complete blood count, routine biochemistry parameters, urinalysis, urine culture as well as urinary system ultrasonography were obtained from all patients. Imaging studies included cystograms, intravenous urogram, and magnetic resonance imaging when necessary and appropriate. In all cases, we identified the fistula orifice with flexible cystoscopy at the outpatient clinic prior to surgery. The patients were undertaken for surgery at least 3 months after their primary gynecological surgery to allow the inflammation to subside. All patients were informed about the modified surgical procedure, and an informed consent was obtained from all patients. Approval was received from the ethics committee of Health Sciences University, Diyarbakır Gazi Yaşargil Education and Research Hospital (No. 2019/10-03, Date: 15/10/2019).

Surgical technique

All patients placed a povidone-iodine vaginal suppository into the vagina 12 hours before surgery. All procedures were conducted with the patients in lithotomy position under spinal anesthesia. A second-generation cephalosporin was administered as a prophylactic antibiotic half an hour before induction. VVF was identified with a cystoscope using insufflation of gas and fistula tract was verified by a guide wire or ureter catheter (Figure 1). The vagina was packed with

Vaseline soaked gauze to block leakage during bladder filling and escape of CO₂ during the operation. A 5 mm laparoscopic port was inserted into the bladder under cystoscopic guidance lateral to the midline, halfway between the umbilicus and symphysis pubis. The second 5 mm port was inserted into the bladder lateral to the midline and inferior to the first port (Figure 2). The cystoscope was used as the transurethral camera for vesicostomy. Bladder mucosa and muscular layer were gripped with a forceps and raised up for a multilayer closure. If needed, the fistula was manipulated upwards with the help of a finger through vagina. The fistula tract was grasped and sealed by a bipolar vessel sealing device (LigaSure™ 5 mm blunt tip 37 cm sealer, Medtronic, Inc., Dublin, Ireland) (Figure 3). An 18 Fr Ryle's tube was placed into the bladder as a cystostomy through one of the existent ports. In addition, an 18F foley catheter was placed in the bladder.

Patients were discharged after removal of the cystostomy on the first postoperative day. The foley catheter was kept in place for three weeks. Oral anticholinergics were administered until removal of foley catheter. Patients were instructed to return to our office 3 weeks after surgery for urethral foley catheter removal and subsequent cystoscopic and vaginal inspection to confirm VVF repair (Figure 4).

Statistical analysis

Data were entered into Excel version 2013 and then converted into SPSS version 15 for analysis. Continuous variables were presented as mean (standard deviation) (SD) and categorical data, as number and percentages.



Figure 1: Cystoscopic confirmation of the vesicovaginal fistula



Figure 2: Port configurations of transvesicoscopic bipolar sealing of vesicovaginal fistula

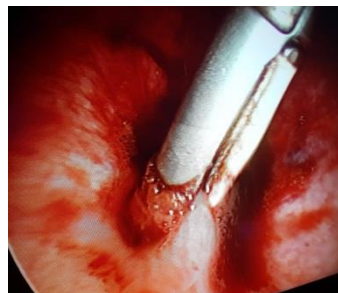


Figure 3: Sealing of the fistula tract using a bipolar vessel sealer



Figure 4: Cystoscopic appearance of a repaired vesicovaginal fistula three weeks after surgery

Results

The mean age of the patients included in the study was 47.2 (4.6) years (range: 40-53 years). All patients had a prior hysterectomy. The mean fistula diameter was 6.6 (1.2) mm (range: 5-9 mm). The mean operation time was 41 (9.7) minutes (range: 30-65 minutes). The first case lasted the longest. Blood loss was minimal in all cases and could not be measured. There were no serious intraoperative or postoperative complications including conversion to laparotomy, aborted operative procedure,

bowel or ureteral injury, blood transfusion, blood clots, pulmonary embolisms, cardiac events, or strokes. All patients began oral feeding within 2-6 hours. Patients were allowed to move within 12 hours. The hospital stay duration was 1 day in all cases. After catheter removal at 3 weeks, 8 patients (89%) remained dry while one patient (11%), who had a fistula diameter of 9 mm, experienced continuous incontinence. That patient underwent open transvesical VVF repair and is followed with no recurrence 6 months after the first operation. No recurrence was observed in other patients during the 6-month follow-up.

Discussion

Many surgical methods, such as transabdominal, transvaginal, suprapubic transvesical, laparoscopic and robot assisted laparoscopic approach, have been described for the repair of VVF. There is currently no consensus on the best surgical approach or timing of the repair. Laparoscopic repair of vesicovaginal fistula was first reported by Nezhat et al. [7] in 1994. At present, laparoscopic procedures tend to replace open surgery with comparable results [8,9]. Laparoscopic VVF repair is beneficial over open surgery as the patient has less postoperative pain and analgesic requirement, shorter recovery time and shorter hospital stay [10,11]. Although laparoscopic repair has excellent success, the major disadvantages with this technique are difficult intracorporeal suturing, prolonged operation time and steep learning curve. For small sized VVF, various conservative treatments have become increasingly popular, reducing the invasiveness of treatment, and shortening convalescence period. Several minimally invasive techniques such as curettage and fulguration have been described for repair of VVF. Endoscopic treatment of VVFs by fulguration of the fistulous tract is the most common minimally invasive technique for small sized fistulas on day-care basis. O'Connor, who popularized the transabdominal approach, applied electrocoagulation for highly situated small fistulae of 3.5 mm or less [12]. Curettage of fistula track with a screw followed by prolonged catheterization has been reported as successful in a small series of patients by Aycinena [13].

Advanced bipolar energy devices such as LigaSure™ are used to seal veins, arteries, lymphatics, and tissue bundles in a number of specialty fields such as gynecologic, colorectal, cardio-thoracic and urologic surgeries [14]. They are particularly advantageous for sealing vessels up to 7 mm in diameter through uniform compression and efficient energy delivery [15]. In addition, they have greatly reduced the need for laparoscopic suturing, which is technically demanding and time consuming [14]. These systems provide precise energy delivery and electrode pressure to tissues for a controlled time to achieve a complete and permanent fusion of tissues and vessel lumens. They have been designed to produce minimal sticking, charring or thermal spread to adjacent tissue.

In most cases, laparoscopic management of VVFs takes a relatively long time. The mean operative time in the literature ranges from 70 to 280 minutes in laparoscopic repairs and from 110 to 330 minutes in robot-assisted laparoscopic repairs [16-18]. The mean operative time in our study is 41 minutes. The first case lasted the longest (65 min). Intraoperative difficulties

were noted in the first case in grasping the fistula and adjusting the pressure of insufflation to maintain pneumovesicum during port insertion. These difficulties subsided in the other cases as we were able to overcome these initial discomforts.

Generally, there is no major bleeding in VVF repair operations. There are some studies comparing bleeding rates in VVF repair in the literature. It was reported that blood loss in robotic surgery was significantly less compared to open surgery (88 vs. 170 mL) [17,19]. In addition, it was reported that blood loss ranges from 50 mL to 125 mL in various laparoscopic repair cases [18]. There was no notable blood loss in our cases.

Increased number of ports and the internal dissections are the main causes of postoperative pain following laparoscopic repair. Four ports have been used in many studies about repair of VVF while more ports have been used in others [18]. In the present study, all cases were done using 2 ports only.

The success rate in transabdominal and transvaginal approaches ranges from 65% to 100% [20]. The reported overall success rate in the literature is 86 to 100% for laparoscopic VVF repair [18,21]. Stovsky and colleagues [22] reported success in 11 of 15 patients by electrocoagulation of small fistula of <3.5 mm. Falk and Orkin [23] reported that they applied electrocoagulation to 10 cases with a fistula diameter of 3 to 6 millimeters and were successful in 8 patients. Shah [24] reported success in 4 of 5 patients who underwent endoscopic fulguration of VVF <7 mm. Our success rate is 80%. Recurrence of the VVF occurred in the patient with the largest fistula diameter (9 mm). Bipolar vessel sealing devices are designed for sealing vessels as large as 7 mm in diameter [25]. We think that this diameter cut-off is valid for fistulae as well. The success of this technique will increase with the number of cases and experience. However, this approach is probably not applicable for large, complicated fistulae or those located near the ureteral orifices.

No matter which approach performed, surgeons believe that the most prominent issue of VVF repair remains a "watertight seal", and adequate bladder drainage after surgery to allow for tissue healing, as suggested by the literature. We believe that a watertight seal is achieved in TBSV operations.

Limitations

Small number of patients is the most important limitation of the study, but it should be noted that VVF is already a rare condition. The other limitation is the lack of comparison with other VVF repair techniques. However, this is the initial study on the treatment of VVF by transvesicoscopic bipolar sealing, which is its strength.

Conclusion

Transvesicoscopic bipolar sealing of vesicovaginal fistula appears to be a simple, safe, and effective procedure for small sized VVF with some advantages such as short learning curve and operative time, reduced blood loss and morbidity, brief hospital stay and improved cosmesis. However, a larger number of patients are needed to thoroughly evaluate this approach.

References

- Kochakarn W, Pummangura W. A new dimension in vesicovaginal fistula management: an 8-year experience at Ramathibodi hospital. *Asian J Surg.* 2007;30(4):267-71. doi: 10.1016/S1015-9584(08)60037-8.
- Bai SW, Huh EH, Jung DJ, Park JH, Rha KH, Kim SK, et al. Urinary tract injuries during pelvic surgery: incidence rates and predisposing factors. *Int Urogynecol J Pelvic Floor Dysfunct.* 2006;17(4):360-4. doi: 10.1007/s00192-005-0015-4.

3. Miller EA, Webster GD. Current management of vesicovaginal fistulae. *Curr Opin Urol.* 2001;11(4):417-21. doi: 10.1097/00042307-200107000-00014.
4. Kumar A, Goyal NK, Das SK, Trivedi S, Dwivedi US, Singh PB. Our experience with genitourinary fistulae. *Urol Int.* 2009;82(4):404-10. doi: 10.1159/000218528.
5. Hilton P, Ward A. Epidemiological and surgical aspects of urogenital fistulae: a review of 25 years' experience in southeast Nigeria. *Int Urogynecol J Pelvic Floor Dysfunct.* 1998;9(4):189-94. doi: 10.1007/bf01901602.
6. Akkoç A, Aydın C, Uçar M, Şentürk AB, Topçuoğlu M, Metin A. Transvesicoscopic Bipolar Sealing of Vesicovaginal Fistula. *J Endourol Case Rep.* 2018; 4(1):94-6. doi: 10.1089/cren.2018.0013.
7. 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.
8. Shah SJ. Laparoscopic transabdominal transvesical vesicovaginal fistula repair. *J Endourol.* 2009;23(7):1135-7. doi: 10.1089/end.2009.0080.
9. Gözen AS, Teber D, Canda AE, Rassweiler J. Transperitoneal laparoscopic repair of iatrogenic vesicovaginal fistulas: Heilbronn experience and review of the literature. *J Endourol.* 2009;23(3):475-9. doi: 10.1089/end.2008.0236.
10. Tiong HY, Shim T, Lee YM, Tan JK. Laparoscopic repair of vesicovaginal fistula. *Int Urol Nephrol.* 2007;39(4):1085-90. doi: 10.1007/s11255-006-9168-4.
11. Wong C, Lam PN, Lucente VR. Laparoscopic transabdominal transvesical vesicovaginal fistula repair. *J Endourol.* 2006;20(4):240-3. doi: 10.1089/end.2006.20.240.
12. Shah SJ. Role of day care vesicovaginal fistula fulguration in small vesicovaginal fistula. *J Endourol.* 2010;24(10):1659-60. doi: 10.1089/end.2009.0557.
13. Aycinena JF. Small vesicovaginal fistula. *Urology.* 1977;9(5):543-5. doi: 10.1016/0090-4295(77)90248-5.
14. Chekan EG, Davison MA, Singleton DW, Mennone JZ, Hinoul P. Consistency and sealing of advanced bipolar tissue sealers. *Med Devices (Auckl).* 2015;8:193-9. doi: 10.2147/MDER.S79642.
15. Lyons SD, Law KS. Laparoscopic vessel sealing technologies. *J Minim Invasive Gynecol.* 2013;20(3):301-7. doi: 10.1016/j.jmig.2013.02.012.
16. Bragayrac LA, Azhar RA, Fernandez G, Cabrera M, Saenz E, Machuca V, et al. Robotic repair of vesicovaginal fistulae with the transperitoneal-transvaginal approach: a case series. *Int Braz J Urol.* 2014;40(6):810-5. doi: 10.1590/S1677-5538.IBJU.2014.06.12.
17. Pietersma CS, Schreuder HW, Kooistra A, Koops SE. Robotic-assisted laparoscopic repair of a vesicovaginal fistula: a time-consuming novelty or an effective tool?. *BMJ Case Rep.* 2014; pii: bcr2014204119. doi: 10.1136/bcr-2014-204119.
18. Singh V, Sinha RJ, Mehrotra S, Gupta DK, Gupta S. Transperitoneal transvesical laparoscopic repair of vesicovaginal fistulae: experience of a tertiary care centre in northern India. *Curr Urol.* 2013;7(2):75-82. doi: 10.1159/000356253.
19. Gupta NP, Mishra S, Hemal AK, Mishra A, Seth A, Dogra PN. Comparative analysis of outcome between open and robotic surgical repair of recurrent supra-trigonal vesico-vaginal fistula. *J Endourol.* 2010;24(11):1779-82. doi: 10.1089/end.2010.0049.
20. Wahab F, Nasir A, Manan F. Outcome of VVF repair without omental interposition. *J Pak Med Assoc.* 2016;66(5):590-2.
21. Lee JH, Choi JS, Lee KW, Han JS, Choi PC, Hoh JK. Immediate laparoscopic nontransvesical repair without omental interposition for vesicovaginal fistula developing after total abdominal hysterectomy. *JSLS.* 2010;14(2):187-91. doi: 10.4293/108680810X12785289143918.
22. Stovsky MD, Ignatoff JM, Blum MD, Nanninga JB, O'Connor VJ, Kursh ED. Use of electrocoagulation in the treatment of vesicovaginal fistulas. *J Urol.* 1994;152(5 Pt 1):1443-4. doi: 10.1016/s0022-5347(17)32441-2.
23. Falk HC, Orkin LA. Nonsurgical closure of vesicovaginal fistulas. *Obstet Gynecol.* 1957;9(5):538-41.
24. Shah SJ. Role of day care vesicovaginal fistula fulguration in small vesicovaginal fistula. *J Endourol.* 2010;24(10):1659-60. doi: 10.1089/end.2009.0557.
25. Karande VC. LigaSure™ 5-mm Blunt Tip Laparoscopic Instrument. *J Obstet Gynaecol India.* 2015;65(5):350-2. doi: 10.1007/s13224-015-0745-2.

This paper has been checked for language accuracy by JOSAM editors.

The National Library of Medicine (NLM) citation style guide has been used in this paper.