

Trauma and reconstruction

Transabdominal and transvaginal repair of vesico-vaginal fistula with bovine pericardium (Tutopatch®). A double case report

Dario Del Biondo^a, Dante Di Domenico^a, Giorgio Napodano^b, Marco Grillo^c, Felice Crocetto^d, Biagio Barone^{a,*}

^a Department of Urology, ASL NA1 Centro "Ospedale San Paolo", 80125, Naples, Italy

^b Department of Urology, ASL NA3 Sud "Ospedale San Leonardo", 80053, Castellammare di Stabia (NA), Italy

^c Department of Urology, ASL NA1 Centro "Ospedale del Mare", 80147, Naples, Italy

^d Department of Neurosciences, Sciences of Reproduction and Odontostomatology, University of Naples Federico II, Naples, 80131, Italy

ARTICLE INFO

Keywords:

Vesico-vaginal fistula
Transabdominal
Transvaginal
Tutopatch®

ABSTRACT

Vesico-vaginal fistula (VVF) is an abnormal connection between the bladder and vagina, usually occurring after complex oncologic gynecologic surgeries. It typically presents as continuous urinary incontinence and is diagnosed through clinical examination, imaging, and cystoscopy. Conservative management rarely achieves healing, making surgical repair the preferred option. We report two cases of VVF treated with Tutopatch®, a bovine pericardium-derived graft, used as an interposition graft via transabdominal and transvaginal approaches. Tutopatch® avoids the morbidity of autologous tissue harvesting and offers a feasible, safe, and effective alternative. It should be considered a valuable option in the surgical management of complex VVF.

1. Introduction

Vesico-vaginal fistulae (VVF) is an entity characterized by the presence of an abnormal fistulous tract extending between the bladder and the vagina, resulting in continuous and unremitting urinary incontinence.¹ With an incidence of 0.3–2 %, this condition represents a significant morbidity in female urology.² Although the aetiology of VVF could vary and is grossly divided into acquired or congenital, the most common cause of VVF is represented by complex onco-gynaecologic or pelvic surgery.³ The classical presentation symptom is continuous incontinence in the presence of a history of recent pelvic surgery. However, it is important to underline that also radiation therapy could provoke a VVF, up to 20 years after the treatment.⁴ A proper diagnosis is required in order to evaluate the size, number and location of the fistula and, most importantly, program a curative surgery. In addition to physical examination, further diagnostic procedures include CT scan and retrograde cystourethrography, in addition to vaginoscopy and cystoscopy.³ Although conservative management is advocated in literature (via continuous bladder drainage or bilateral percutaneous nephrostomies), only 10 % of cases report a spontaneous closing of the fistula in 0.5–2 months.⁵ As a result, a prompt and timely surgical repair (via abdominal or vaginal approach) is advised, delaying the procedure

only in case of devitalized tissues, cystitis or radiation damage. In recent years, a more individualized approach has been sought, implementing grafts and patches in the repair of VVF.

In this manuscript, we describe, for the first time, the successful utilization of bovine pericardium (Tutopatch®) in two VVF repairs performed via transabdominal and transvaginal approaches.

2. Case presentation

2.1. Transabdominal repair

A 72-year-old woman was referred to our institution in November 2021 for uncontrolled urinary incontinence for over 6 months. Past medical history was notable for a previous radical hysterectomy due to locally advanced cervical cancer. No other pathologies were described in the anamnesis, except for a non-sustained tachycardia and a positivity for the Hepatitis C Virus. A diagnosis of VVF was suspected via clinical examination and was further confirmed via cystoscopy, which showed a supratrigonal fistula of about 1cm. A subsequent ultrasound scan (US), performed at hospital admission, revealed a small infra-vesical extravasation of urine (51mm) while a computed tomography (CT) scan, prescribed and performed with contrast medium, confirmed the clinical

* Corresponding author.

E-mail address: biagio.barone@aslnapoli1centro.it (B. Barone).

<https://doi.org/10.1016/j.eucr.2025.103117>

Received 4 June 2025; Received in revised form 29 June 2025; Accepted 3 July 2025

Available online 5 July 2025

2214-4420/© 2025 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

diagnosis of VVF, showing a fistula opening measuring 92mm. After discussing potential treatments, including the possibility of performing local flaps (which were however limited by the previous irradiation of the pelvic area, resulting in a local generalized fibrosis) the patient consented to undergo an open surgical procedure consisting of retrieving material for histopathological analysis and closure of the VVF via the use of a patch of bovine pericardium (Tutopatch®), after signing a consent form. The surgery was performed in a transabdominal approach, firstly introducing a ureteral catheter in the opening on the vaginal side of VVF, in order to ease the identification of the fistula tract. A urethral catheter was placed at this time. Successively, an umbilical-pubic incision was performed, proceeding to the lysis of extensive intra-abdominal adhesions and entering the peritoneum. We further proceeded to the isolation of posterior and cupola walls of the bladder from the vagina and, after locating the ureteral catheter previously placed, a complete resection of VVF with its tract was performed. Material excised was sent for histopathological analysis. Vaginal and bladder fistula defects were then closed in two layers using running 2-0 polyglactin (Vicryl, Ethicon) and a patch of bovine pericardium (Tutopatch®) was placed and fixed via 3-0 interrupted polyglactin (Vicryl, Ethicon). After proceeding to the suture of the bladder cystotomy, the bladder repair was tested using bladder distension with saline solution. Successively, a 19F drain was placed in the pelvis and closure of the abdominal wall was performed. The total operative time was 90min with a blood loss of 50 cc. No intraoperative or postoperative complications were reported. The patient was discharged on postoperative day 3, with no drainage but with a urethral catheter. Histopathological analysis confirmed the diagnosis of VVF, reporting a fibroadipose tissue characterized by a pseudo-cystic lumen surrounded by squamous epithelium. A cystogram was performed at 2 weeks postoperatively, demonstrating the resolution of the fistula (Fig. 1). The urethral catheter was then removed and a follow-up was scheduled at 6 months. To date, the patient, who was reached telephonically, does not complain of any symptoms or disturbances.

2.2. Transvaginal repair

A 64-year-old was referred to our institution in September 2020 for urinary incontinence and anamnesis of chronic VVF. Past medical history was notable for a previous left mastectomy for breast cancer and a previous laparoscopic radical hysterectomy for locally advanced ovarian cancer with successive radiotherapy and chemotherapy. Other medical issues were type II diabetes, hypertension and hyperuricemia. After the confirmation of the diagnosis of VVF via cystoscopy, which was located near the bladder trigon, and the discussion of potential approaches for resolving the VVF, the patient accepted the experimental repair with a patch of bovine pericardium. Surgery was scheduled for October 2020. The patient was positioned in a lithotomic position and a urethral catheter was placed before proceeding to the incision of the anterior

wall of the vagina. Successively, after the careful lysis of numerous adhesions, the bladder was isolated up to the fistula tract, located at the vaginal cupola, and the devitalized tissue near the VVF was excised. Also in this case, the excised material was sent for histopathological analysis. A vertical double-layer bladder rhaphy was then performed with interrupted 3-0 polyglactin (Vicryl, Ethicon). The bladder repair was then tested using bladder distension with saline solution. Successively, a patch of bovine pericardium (Tutopatch®) was placed over the rhaphy and a horizontal suture with interrupted 3-0 polyglactin (Vicryl, Ethicon) was performed to close the vaginal wall. Finally, a vaginal gauze was placed. The total operative time was 150min with a blood loss of 30 cc. No intraoperative or postoperative complications were reported. The patient was discharged on postoperative day 3, maintaining a urethral catheter. A cystogram was performed 10 days postoperatively, demonstrating the resolution of the fistula and the absence of extravasation (Fig. 2). A follow-up visit was scheduled at 15 days and 30 days. The histopathological analysis resulted in a fibroadipose tissue with massive infiltration of inflammatory cells, excluding any oncological result. The urethral catheter was removed at the second follow-up visit. A further follow-up visit was scheduled at 3 months and then every 6 months. To date, the patient is still in follow-up and did not report any symptoms or disturbances at the last follow-up visit.

3. Discussion

The management of VVF has widely changed over the years. If conservative management has been a feasible approach in small VVF or relatively new defects, a surgical repair has become the first-line approach in complicated, large and post-radiotherapy fistulae. The choice between the transabdominal approach and the transvaginal approach depends on the surgeon, the location of the fistula, available space in the vaginal cavity and the need for ancillary procedures such as ureteric reimplant.⁶ In addition, the necessity to utilize interposition grafts and flaps, similarly indicates the route of approach. In order to avoid recurrence of the condition indeed, a wide variety of grafts and flaps have been used as interposed tissue between the bladder and the vagina. Among them, labial fibrofatty tissue (Martius flap), peritoneum, omentum, small intestinal submucosa, human dura grafts and urachus are some of the tissues used for interposition.⁷ Recently, the use of dehydrated amniotic allograft has been advocated and used as a low-morbidity alternative to other interposition tissue.⁸ In addition, considering the past medical history of patients with VVF, is more and more plausible that omentum and other flaps could have a lowered

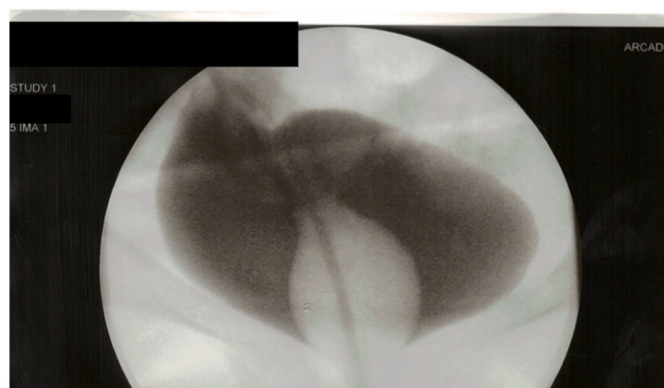


Fig. 1. Post-operative cystogram of VVF transabdominal repair.

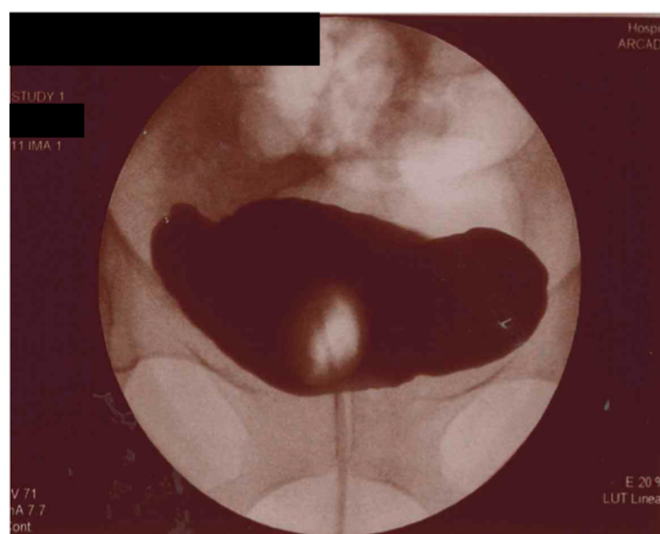


Fig. 2. Post-operative cystogram of VVF transvaginal repair.

vascularization due to chemotherapy and radiotherapy, increasing the risks of recurrence.⁹ Furthermore, due to multiple and tenacious adhesions, is not always possible to mobilize a proper flap in those patients and the concomitant comorbidities (such as diabetes) could further lower the possibility of success of simple excision and suture of VVF.

Tutopatch® is a sterile and dehydrated patch of connective tissue derived from bovine pericardium, widely used in neurosurgery as a substitute for dura mater. Its use has further extended in ophthalmology, for tendon elongation in strabismus and repair of corneal ulcers, and in otolaryngology, for myringoplasty.^{10–12} More recently, Tutopatch® has been used as an alternative to skin grafts in surgical defects of oral cancer surgery.¹³ Due to the possibility to easily obtain this material from the neurosurgery in our institution and the extended use, reported in the literature, of this type of patch in many reconstructive surgeries, which comprehended even its use in urological surgery, we hypothesized the possibility of using Tutopatch® as an interposition patch in the repair of VVF.¹⁴ The rationale resides in the characteristics of this patch, as stated by the manufacturer, which provides a matrix guide for connective tissue formation and gradual tissue repair. Although autologous materials have several advantages, it is not always possible to use flaps of tissue as interposition patches. In addition, additional surgery is required to harvest a proper amount of material. The use of Tutopatch® permits overcoming those limitations. In addition, its intrinsic characteristics of modelling and the possibility of using it as a free flap is a tempting alternative in the repair of VVF.

Although our study embraces only two cases, the success of Tutopatch® in repairing two complicated fistulae is encouraging. To our knowledge, this is the first time that a xenograft is used for the repair of VVF and further studies are required in order to explore the possibility associated with the use of this material.

4. Conclusions

Tutopatch® could represent a favourable, newer and safe alternative for the repair of VVF, especially in those cases that are at high risk of failure (diabetes, previous radiotherapy, impaired local vascularization), reducing the morbidity associated with autograft harvesting, operative time and risk of recurrence.

CRedit authorship contribution statement

Dario Del Biondo: Writing – original draft, Supervision, Resources, Methodology, Conceptualization. **Dante Di Domenico:** Resources, Investigation. **Giorgio Napodano:** Writing – original draft, Visualization, Resources, Methodology. **Marco Grillo:** Writing – review & editing, Resources, Investigation. **Felice Crocetto:** Supervision, Data curation. **Biagio Barone:** Writing – review & editing, Writing – original draft, Supervision, Software, Methodology, Data curation, Conceptualization.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval were waived for this study due to the already reported use of bovine pericardium in urological reconstructive surgery.

Data availability statement

Data available on request.

Funding

This research received no external funding.

Declaration of competing interest

The authors declare no conflict of interest.

References

- Hadley HR. Vesicovaginal fistula. *Curr Urol Rep.* 2002;3:401–407. <https://doi.org/10.1007/s11934-002-0085-5>.
- Bragayrac LAN, Azhar RA, Fernandez G, et al. Robotic repair of vesicovaginal fistulae with the transperitoneal-transvaginal approach: a case series. *Int Braz J Urol.* 2014;40:810–815.
- Stamatakis M, Sargedi C, Stasinou T, Kontzoglou K. Vesicovaginal fistula: diagnosis and management. *Indian J Surg.* 2014;76:131–136. <https://doi.org/10.1007/s12262-012-0787-y>.
- Malik MA, Sohail M, Malik MT, Khalid N, Akram A. Changing trends in the etiology and management of vesicovaginal fistula. *Int J Urol.* 2018;25:25–29. <https://doi.org/10.1111/iju.13419>.
- Bazi T. Spontaneous closure of vesicovaginal fistulas after bladder drainage alone: review of the evidence. *Int Urogynecol J Pelvic Floor Dysfunct.* 2007;18:329–333. <https://doi.org/10.1007/s00192-006-0194-7>.
- Rajaian S, Pragasheeswarane M, Panda A. Vesicovaginal fistula: review and recent trends. *Indian J Urol: IJU: J Urol Soc India.* 2019;35:250.
- Altaweel WM, Rajih E, Alkhudair W. Interposition flaps in vesicovaginal fistula repairs can optimize cure rate. *Urol Ann.* 2013;5:270–272. <https://doi.org/10.4103/0974-7796.120305>.
- Price DT, Price TC. Robotic repair of a vesicovaginal fistula in an irradiated field using a dehydrated amniotic allograft as an interposition patch. *J Robot Surg.* 2016;10:77–80. <https://doi.org/10.1007/s11701-015-0546-8>.
- Delamou A, Delvaux T, Beavogui AH, et al. Factors associated with the failure of obstetric fistula repair in Guinea: implications for practice. *Reprod Health.* 2016;13:135. <https://doi.org/10.1186/s12978-016-0248-3>.
- Alio JL, Rodriguez AE, Martinez LM. Bovine pericardium membrane (tutopatch) combined with solid platelet-rich plasma for the management of perforated corneal ulcers. *Cornea.* 2013;32:619–624. <https://doi.org/10.1097/ICO.0b013e31825a6d9a>.
- Gérard JM, Gersdorff M. The Tutopatch graft for transcanal myringoplasty. *B-ENT.* 2006;2:177–179.
- Gupta M, Lyon F, Singh AD, Rundle PA, Rennie IG. Bovine pericardium (Tutopatch) wrap for hydroxyapatite implants. *Eye.* 2007;21:476–479. <https://doi.org/10.1038/sj.eye.6702227>.
- Tirelli G, Tofanelli M, Piccinato A, Boscolo Nata F. An alternative to skin graft for superficial surgical defect in oral cancer surgery. *Braz J Otorhinolaryngol.* 2021;87:678–682. <https://doi.org/10.1016/j.bjorl.2020.02.002>.
- Moon SJ, Kim DH, Jo JK, et al. Bladder reconstruction using bovine pericardium in a case of enterovesical fistula. *Korean J Urol.* 2011;52:150–153. <https://doi.org/10.4111/kju.2011.52.2.150>.