

Martius flap repair of a vesicovaginal fistula: Case report and review

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Introduction

Vesicovaginal fistula (VVF) is the most common subtype of female urogenital fistula. It consists in an atypical connection (fistulous tract) between the bladder and the vagina that allows continuous leakage of urine into the vaginal vault. VVF has been known since ancient times. In 1663, Hendrik von Roonhuysen first described surgical repair. First reports of successful repairs emerged during the 19th century. James Marion Sims published his now famous surgical series describing his method of surgical treatment of VVF using silver wire in a transvaginal approach. But it was not until his 30th attempt at closure of VVF that he achieved success.

We present a case of VVF and a review of literature with focus on epidemiology, etiology, classification, medical presentation, diagnosis and management.

Case report

The patient, 38-year-old woman had undergone laparoscopic total hysterectomy in June 2017, due to myoma and metrorrhagia. She was referred to our hospital in September 2017 by the Gynecology group because of continuous and abundant urinary loss through the vagina in the past 75 days. On physical exam, she had a Foley catheter for the past month, profuse amount of liquid in the posterior fornix. There was increase of leakage after Valsalva maneuvers. It was possible to identify the fistulous orifice at the anterior vaginal wall, close to the anterior fornix.

At this point, the Foley catheter was replaced and urethrocytography (UCG) was performed. The patient returned after 3 weeks without any urinary loss, and the UCG couldn't show the fistulous path. With the Foley catheter withdrawn, the patient remitted symptoms.

A corrective procedure was proposed, using Martius flap. We initiated with an urethrocytography. The fistulous orifice, 5mm wide, was found above the vesical trigone (Figure 1). A hydrophilic guide wire was used to catheterize the orifice (Figure 2). The guide wire went through the vaginal orifice (Figure 3). It was followed by a 10 Fr Foley silicone catheterization (Figure 4). After inflating the Foley balloon, it was used for traction in order to expose and facilitate the dissection process. A second Foley catheter was placed, for vesical drainage, as usual. Inverted "U" incision at the anterior vaginal wall was performed (Figure 5), followed by fistulous path dissection until bladder wall and excision. Bladder wall was closed in two layers, Martius flap (Figure 6 and 7) was interposed between the bladder and vagina (Figure 8). Vaginal wall was closed in two layers [1-5].

The patient received hospital discharge on the second day, without complaints. She returns one week later, to check the operative wound. The Foley catheter was removed after two weeks.

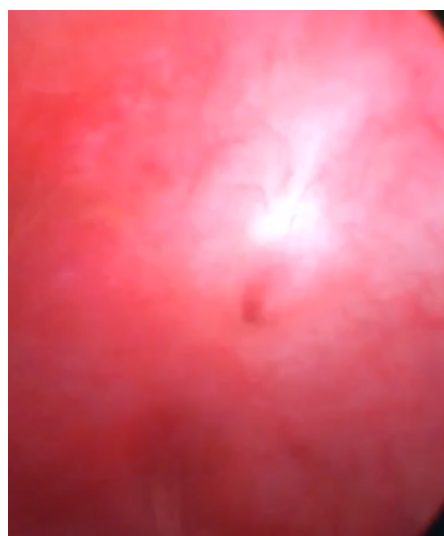


Figure 1. Cystoscopy shows fistulous orifice.

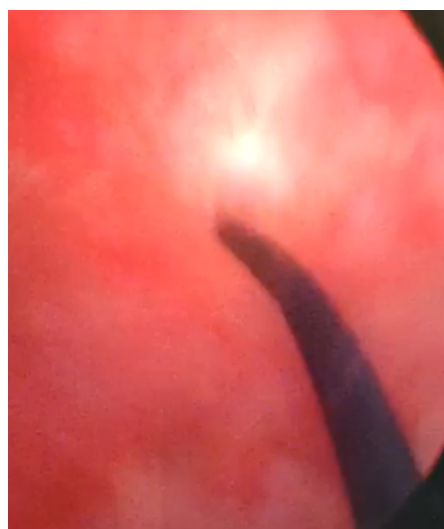


Figure 2. Fistulous path being catheterized by hydrophilic guide wire.

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Figure 3. Guide wire at the fistulous path.



Figure 5. Inverted "U" incision at anterior vaginal wall.



Figure 4. Silicone foley catheterization of the orifice.

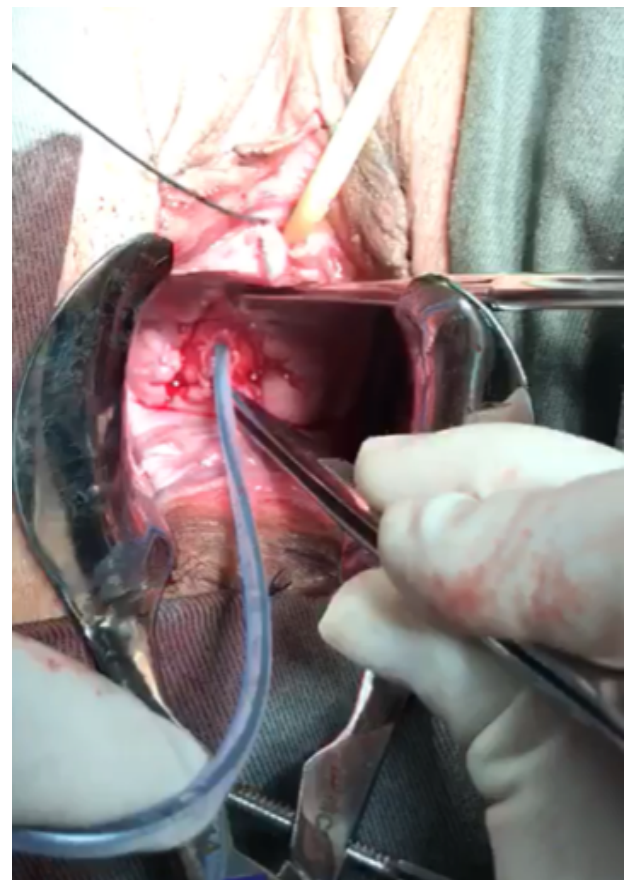


Figure 6. Labia majora incision and Bulbocavernosus muscle dissection.



Figure 7. Flap mobilization.

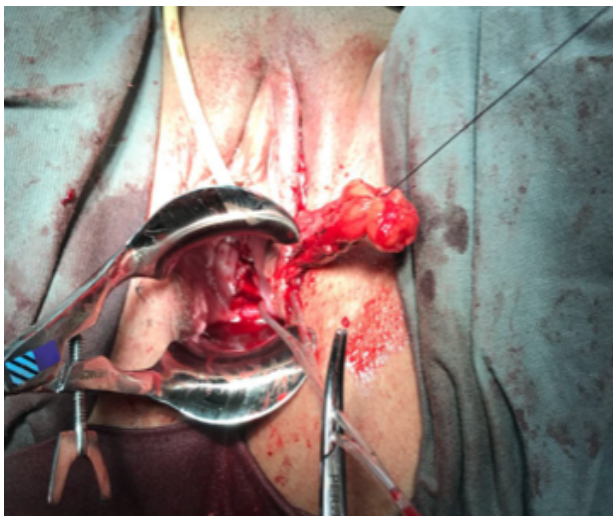


Figure 8. Tunnel creation below labia minora, followed by flap positioning and fixation.

A month after procedure, there were no symptoms relapse and the patient is satisfied with the results.

Background and epidemiology

VVF is an abnormal fistulous tract extending between bladder and vagina that enables continuous involuntary discharge of urine into the vagina. The incidence of VVF is decreasing all over the world in the past decades. Although, statistics suggest that there are over three million women with non-treated fistula and up to 130 thousand new cases every year on Africa. This data represents a major public health problem, as it impacts on quality of life.

The causes of VVF usually vary between developed and developing countries, as iatrogenic operatory vesical lesion respond for 75% of

VVF in developed countries, a VVF case series in Nigeria suggest that 96% were related to labor issues [6-9].

Etiology

Developing countries: usually associated with labor trauma. It's well known that cephalopelvic disproportion, especially if full pelvic growth isn't achieved, can lead to genital tissue lesion. Prolonged labor can also determine genital lesion, usually related to larger time of tissue hypoxia, edema and necrosis.

Developed countries: the major cause of VVF is inadvertent bladder injury during pelvic surgery (90%). Commonly bladder wall laceration or suture placement can provoke a hematoma or necrosis, subsequently evolving with site infection. Gynecologic procedures are the most common iatrogenic factor (75%), followed by radiotherapy in 10% of cases. Other types of procedures (urologic, gastrointestinal) also contribute to the incidence of VVF [10-12].

There are some risk factors related to VVF such as prior pelvic or vaginal surgery, diabetes, arteriosclerosis, carcinoma, endometriosis, anatomic distortion, infection and cuff abscess.

Classification

VVF may be classified using Goh's or Waaldijk's system.

Goh's system divides fistulas by anatomic localization, size and particular findings.

- Type 1:** Distal edge of fistula >3.5cm from external urinary meatus
- Type 2:** Distal edge of fistula 2.5–3.5cm from external urinary meatus
- Type 3:** Distal edge of fistula 1.5–<2.5cm from external urinary meatus
- Type 4:** Distal edge of fistula < 1.5 cm from external urinary meatus
 - (a) Size <1.5cm, in the largest diameter
 - (b) Size 1.5–3cm, in the largest diameter
 - (c) Size >3cm, in the largest diameter
- i.** None or only mild fibrosis (around fistula and/or vagina) and/or vaginal length > 6 cm, normal capacity.
- ii.** Moderate or severe fibrosis (around fistula and/or vagina) and/or reduced vaginal length and/or capacity.
- iii.** Special consideration e.g. postradiation, ureteric involvement, circumferential fistula, previous repair.

Waaldijk's system is simpler, describing location and size.

Location	Type
Not involving the urethral sphincter	I
Involving the urethral sphincter	II
• with partial involvement of the urethra	IIA
• with (sub)total involvement of the urethra	IIB
Fistula involving a ureter or other remote site	III

Subtypes for IIA and IIB	Finding
a	without a circumferential defect
b	with a circumferential defect

Size classification:

- (1) Small
- (2) Medium

(3) Large

(4) Extensive

Medical presentation

The most frequent clinical finding is uncontrolled leakage of urine through the vagina. It can be generally preceded by pelvic procedure, radiotherapy or complicated labor. Recurrent cystitis, pyelonephritis and hematuria can also be present [12-17].

The time to present symptoms may vary according to the etiology. VVF caused by direct trauma (laceration of the bladder, point of suture) will develop symptoms in a short period of time (7-30 days). A anterior vaginal wall laceration associated with obstetric fistulas presents within 24h. In the other hand, fistulas due to radiation may present 30 days to 30 years later.

Workup

All investigation should initiate with a complete physical exam. The presence of fluid collection in the exam of the vaginal vault, along with the history can indicate further investigation. The fluid can be tested for urea, creatinine or potassium concentration to determine the probability of VVF. Also, urine should be collected for culture, and if positive, should be treated before surgical procedure.

Indigo carmine or Methylene blue dye can be used to confirm the presence of fistula.

After confirmation, differential diagnosis should be performed, in order to clarify the fistula origin (vesicovaginal, urethrovaginal, or ureterovaginal fistulas and fistula formation between the urinary tract and the cervix, uterus, vagina, vaginal cuff, or ureteral fistula to a fallopian tube). Therefore, urethrocytostcopy must be considered. The fistula orifice can be determined by catheterization with hydrophilic guide wire.

Patients with malignancy risk should be biopsied.

Radiologic studies should be performed previous to repair. Urethrocytostography filling and voiding phases) will demonstrate the fistula path, while intravenous urogram (IVU) or abdominal computerized tomography could help to investigate ureteral fistulas. If ureteral fistula is highly suspected, retrograde ureteropyelography can be performed to complement investigation.

Management

The first and most important statement is that there is no preferable surgical approach. It may be defined including many variables, such as surgeon expertise, patient condition, type of fistula e duration.

In 10% of cases, fistula will close spontaneously after 2 weeks to 2 months of indwelling catheterization and anticholinergic medication. The conservative treatment is mostly indicated if fistula orifice is small (less than 2-3mm), prompt diagnosed and without epithelization. With the delayed diagnosis, it becomes necessary to fulgurate the fistula mucosa, followed by catheterization during 4 weeks.

As a complementary conservative treatment, fibrin sealant can be used as adjuvant therapy for larger fistula or if there is inflammation around the orifice.

If the VVF maintains patency after 3 weeks, it seems that conservative management will fail and surgical repair becomes necessary.

In cases of non-complicated fistula, early repair is advised, once there is no evidence that the time of repair modifies the outcome in

long time studies and improves patient quality of life. On the contrary, in the management of obstructed labor-induced fistula, is accepted that surgical procedure must be postponed for 3-6 months if cystitis, ischemic tissue, edema or inflammation. Longer periods, 6-12 months, are recommended to treat radiation-induced fistula, which are frequently related to poor vascularization, endarteritis and prolonged inflammatory response.

Vaginal versus Abdominal approach: non-complicated fistula is well managed with vaginal repair and complex fistula is treated with abdominal approach or vaginal approach using flaps.

The vaginal approach has many advantages such as reduced morbidity, short operative time, minimal blood loss, reduced pain, possibility of posterior abdominal approach is not compromised, and concomitant vaginal procedures are possible. It shouldn't be the first choice of repair if low bladder capacity and/or compliance, need of ureteral reimplantation, pelvic structures impairment or vaginal stenosis.

The abdominal approach is indicated for narrow vaginas, VVF close to the ureter meatus, large orifices (greater than 5cm), multiple orifices fistula, and need of other abdominal procedure, refractory and recidivist fistula. O'Connor technique is well accepted for the treatment of supra-trigonal VVF and is performed through suprapubic incision. The bladder is dissected extraperitoneally, followed by bipartition. The fistula's orifice is indentified and dissected. After excision, a double layer suture with absorbable wire and tissue interposition is done.

Some modifications were added during time in order to improve success of the procedure, such as the tissue interposition. Henrich Martius described in 1928 a labial flap using the bulbocavernosus muscle. This procedure increased cure rate up to 97% of distal VVF. Peritoneal flap, omental flap, Gracilis muscle flap, Rectus abdominis flap are other possible tissue for interposition.

The technological advance during the last decades created the opportunity of different strategies, such as laparoscopic and robotic approaches. They both are transperitoneal abdominal approaches. Many specialists advocate the benefits of minimally invasive techniques, showing reduced pos operatory pain, brief inpatient stay, lower blood loss and faster recover with same success rate.

Conclusion

VVF still is a public health problem, especially in developing countries. It brings major impact on quality of life of millions of patients. In some cases, if early diagnosed, can be treated with conservative measures. In the order hand, the delayed diagnostic along with complications may represent a clinical and surgical challenge.

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