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Robotic uterine-sparing vesicovaginal fistula repair

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Abstract

Introduction and hypothesis The objective was to describe a technique for the robotic repair of complex vesicovaginal fistula (VVF) with uterine preservation.

Methods From 2015 to 2017, two patients underwent the procedure. Following placement of the patient in the lithotomy position, catheterization of the fistulous tract and laparoscopic omental harvesting is performed. Then, the robotic system is docked. A transverse incision was made in the peritoneum above the uterus was made to provide access to the bladder, the uterus is mobilized, and a cystotomy is performed to identify the structures. Subsequently, the cystotomy is extended toward the fistulous tract, the plane between the organs is dissected to proceed with the vaginal closure, the vagina is closed, the omental flap is interposed, and the bladder is closed.

Results Mean operative time (OT) was 219 min. Mean estimated blood loss (EBL) was 75 ml. One of the patients had an intraoperative cervix canal injury that was identified and repaired. The postoperative course was uneventful, and the mean length of hospital stay (LOS) was 1 day. A mean follow-up of 17 (±9.89) months showed no recurrence at cystoscopy or imaging evaluation.

Conclusions Uterine-sparing VVF repair is feasible and safe. More studies are needed to assess equivalence compared with other procedures.

Keywords Robotic · Vesicovaginal · Genitourinary · Fistula · Uterine

Introduction

Vesicovaginal fistula (VVF) is an abnormal communication between the vaginal and the bladder epithelium. It is considered a devastating condition with a varied clinical setting characterized by incontinence, repeated urinary infections, and psychological distress.

The overall incidence of VVFs in the developing world is estimated to be around 1.06%, in contrast with the developed countries, in which it is only 0.3% [1].

In developing countries, 98% of VVFs have obstetric causes [1, 2], mainly associated with prolonged labor. However, in developed countries, only 20% of the cases have obstetric causes; of those, most are related to hysterectomies.

A less common obstetric cause of VVF is the C-section. Up to 33% of VVFs are caused by C-sections in developing countries. Nonetheless, in developed nations, only 5% are associated with this procedure. Probably, this distinction is due to the higher rate of bladder injuries during C-section in these regions of the world (2.4% in developing countries vs <1% in developed ones), which is more likely to occur in emergency situations (31%) in comparison with programmed ones (11%) [1–4].

The surgical management of fistulas after C-sections is considered challenging. Previous descriptions of this surgery have recommended the usage of an open approach with concomitant hysterectomy, given the fact that the uterus hampers the mobilization and visualization of surrounding structures. Nonetheless, this could represent a troublesome consequence for women with the desire for fertility.

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Robotics has been shown to be a useful alternative for the management of complex VVF cases, with an overall rate of success of 98% due to the already known advantages of the robotic system [5, 6]. Herein, we present our step-by-step technique and initial experience on the repair of complex VVFs with preservation of the uterus.

Materials and methods

Patient positioning

After anesthesia induction, the patient was placed in a dorsal lithotomy position.

Cystoscopy

Identification and catheterization of the fistulous tract, and the ureters is a crucial step before intra-abdominal maneuvers. Classically, the catheterization of the fistulous tract is done before the beginning of surgery in an anterograde fashion, utilizing cystoscopy and a guide wire to cannulate the tract. The patient is prepared for cystoscopy in the usual sterile manner, and placed in the lithotomy position with previous topical urethral anesthetic gel with 2% lidocaine. Sometimes this step cannot be performed because of suboptimal visualization due to multiple scars in the bladder wall from previous surgeries or technical difficulties. Therefore, retrograde catheterization can be attempted from the vagina toward the bladder; this happened in our second patient. This step of the surgery can be done concomitantly with the port placement if the da Vinci Xi System is used. Also, different colored ureteral catheters should be used for ureters and fistulous tracts to facilitate their intraoperative identification.

Port placement Access to the abdominal cavity is achieved using the open Hasson technique, then the pneumoperitoneum is set to 15 mmHg. A 12-mm camera port is inserted through the anterior abdominal wall into the peritoneal compartment and the peritoneal cavity is inspected with the 0° camera to ensure that no intra-abdominal injury related to access had occurred; three further ports were then inserted under direct vision.

Two 8-mm da Vinci trocars were placed bilaterally in approximately the midclavicular line, 1 cm below the umbilicus. As 10-mm assistant port was placed at the upper left abdominal quadrant in the midclavicular line.

Subsequently, laparoscopic omental flap harvesting is performed replicating the open omentoplasty technique [7]. Then, the flap is brought down with the guarantee that it reaches the location between the bladder and the vagina properly. After that, the patient is placed in an extreme Trendelenburg position and the da Vinci Surgical System Si or Xi (Intuitive Surgical, Sunnyvale, CA, USA) is docked. Instruments are inserted into the peritoneal cavity under direct vision. Hook electrocautery and monopolar scissors are used in the right robotic arm and bipolar forceps in the left working arm.

Vertical cystotomy

The peritoneum is incised transversely above the uterus with a monopolar cautery hook to provide access to the bladder. The uterus is mobilized to ensure appropriate access to the space.

After that, a vertical cystotomy is performed, exposing the previous catheters that delineate the fistulous tract and the two ureteral orifices.

Proper identification of the fistulous tract

After the structures are identified, the cystotomy is extended toward the fistula defect.

Bladder opening toward the fistula

Next, the margins of the fistulous tract, along with the fibrous tissue within it, are refreshed until there is healthy tissue. The plane between the bladder and vagina is thoroughly dissected.

Closure of the vaginal defect

After the complete resection of the fistulous tract, the plane between the organs is extensively dissected to allow a tension-free closure. Then, the vaginal wall is closed in a longitudinal fashion with a continuous running 3–0 V-Loc suture. In these cases, a transversal closure is hampered by the presence of the uterus, which imposes considerable tension on the suturing.

Omentum interposition

The previously harvested omental flap is interposed and anchored to the anterior vaginal wall with a 3–0 V-Loc suture.

Bladder closure

The bladder is closed in a longitudinal fashion in two layers with a 2–0 V-Loc suture and a leak test is performed with 150 cc (methylene blue can also be used in this step) to ensure that the bladder is watertight. A Jackson–Prat drain is placed in the pelvic cavity.

Results

Two successful robotic-assisted repairs of VVFs with uterus preservation has been performed by our team to date. Both cases occurred as a complication of a C-section. In both patients, the conservative management failed to resolve the fistula. Additionally, one of the patients underwent three attempts at surgical repair (two transvaginal and one transabdominal).

The mean OT was 219 (±77.07) min. Mean EBL was 75 (±35.35) ml. One of the patients presented an intraoperative cervical canal injury that was identified and repaired in an interrupted fashion with a Monocryl 3–0 suture. One year after the procedure the patient delivered a healthy full-term infant without complications. The complication in the first case occurred when a retrovesical approach was attempted with the intention of localizing the fistula in the plane between both organs, we believe that this approach could add unnecessary complexity to the procedure, which is why we recommend a transvesical approach when uterus preservation procedures are performed. The postoperative course was uneventful in both, and the mean LOS was 1 (±0) day. The Foley catheter and double J stents were removed at 21 and 30 days after the procedure respectively. A mean follow-up of 17 (±9.89) months showed no recurrence at cystoscopy or imaging evaluation, plus a total resolution of the symptoms.

Conclusion

Uterine-sparing robotic-assisted VVF repair is a more demanding procedure owing to the presence of the uterus, which makes vaginal mobilization challenging. Nonetheless, the intrinsic features of the robotic system such as: tridimensional view, better ergonomics, an increased range of movement, and elimination of the fulcrum effect make it a feasible, safe, and reproducible procedure in properly trained hands [5, 6]. The classical transabdominal approach has been reported for these cases, first performing a hysterectomy to enhance the visualization of the defect, hence ruling out the possibility of pregnancy for the patient. Fertility is not a minor issue if we consider that in developing countries the age of women with VVF after C-section ranged from 12 to 45 years with a mean of 25 (±6) years, and approximately 10.1% are younger than 18 years [1]. Larger studies and comparisons are needed to prove the equivalence or superiority in terms of outcomes compared with other procedures.

Compliance with ethical standards

Conflicts of interest None.

Consent Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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