

Robotic-Assisted Laparoscopic Repair of a Vesicouterine Fistula

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ABSTRACT

Background: As cesarean sections become a more common mode of delivery, they have become the most likely cause of vesicouterine fistula formation. The associated pathology with repeat cesarean deliveries may make repair of these fistulas difficult. Computer-enhanced telesurgery, also known as robotic-assisted surgery, offers a 3-dimensional view of the operative field and allows for intricate movements necessary for complex suturing and dissection. These qualities are advantageous in vesicouterine fistula repair.

Case: A healthy 34-year-old woman who underwent 4 cesarean deliveries presented with a persistent vesicouterine fistula. Conservative management with bladder decompression and amenorrhea-inducing agents failed.

Results: Robotic-assisted laparoscopic repair was successfully performed with the patient maintaining continence after surgery.

Conclusion: Robotic-assisted laparoscopic repair of vesicouterine fistulas offers a minimally invasive approach to treatment of a complex disease process.

Key Words: Robotic-assisted laparoscopy, Vesicouterine fistula, Genitourinary fistula.

INTRODUCTION

Vesicouterine fistulas are an uncommon phenomenon. Since the first case reported by Knipe in 1908, these fistulas have been estimated to account for 1% to 4% of all genitourinary fistulas.^{1,2} During the first half of the century, prolonged labor and vaginal obstetric procedures contributed to the formation of vesicouterine fistulas. In 1957, Youssef reported on the syndrome which now bears his name: bladder injury during cesarean delivery that causes vesicouterine fistula formation. The classic symptoms of Youssef's syndrome are amenorrhea and cyclic hematuria coinciding with time of expected menstruation, or menouria.³ As lower uterine segment cesarean deliveries have increased in popularity, they have become the more common cause of vesicouterine fistula formation.⁴

Treatment options include conservative management, such as bladder decompression with indwelling Foley catheter or medical management to induce amenorrhea to aid in fistula healing. Surgical removal of the fistulous tract, historically via laparotomy, is also an option. As minimally invasive surgery becomes utilized more frequently in both gynecologic and urologic procedures, laparoscopic and even robotic-assisted laparoscopic repair of vesicouterine fistulas are viable treatment options.⁵⁻⁸

We present the case of a robotic-assisted laparoscopic repair of a vesicouterine fistula occurring after a patient's fourth cesarean delivery.

CASE REPORT

A 34-year-old, G4P4, Caucasian female with a past medical history significant for obesity with BMI 31.2, dyslipidemia, and 3 prior cesarean deliveries, underwent a presumptively uncomplicated cesarean delivery where the low-transverse hysterotomy was reapproximated in one layer. Upon expressing retained clots from the uterus after the procedure, it was noted that she had transient hematuria that resolved the next day. Four weeks after her delivery, the patient reported watery vaginal discharge. A tampon test was performed, which showed vaginal extravasation of urine. The patient was referred to a urologist, who performed an office cystoscopy, noting the presence of a

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posterior fistula. The fistula was cauterized, and the patient underwent bladder decompression with a Foley catheter for 4 weeks. She then underwent repeat cystoscopy, which showed resolution of her fistula. Two weeks later, she again reported urinary leakage from her vagina. Cystoscopy was again performed, while the patient was menstruating, and the well-epithelialized fistula was visualized with bloody efflux through the tract. This confirmed the presence of a recurrent vesicouterine fistula. She underwent a second fulguration of the fistula with subsequent bladder decompression and was placed on continuous oral contraceptives to induce amenorrhea. She continued to have urinary leakage for 10 months after her cesarean delivery, despite these conservative measures. She was referred by her obstetrician for evaluation of laparoscopic repair of her persistent vesicouterine fistula.

Pelvic examination with the speculum revealed urine present in the vaginal vault. Urine was also visibly expressed during valsalva and cough. Bimanual pelvic examination showed a 6-week size uterus that was anteverted, mobile, and mildly tender to palpation. Transvaginal sonogram demonstrated a lower uterine segment vesicouterine fistula measuring 0.56cm.

The patient chose to undergo another repair of her vesicouterine fistula, along with an abdominoplasty by her plastic surgeon. She underwent a hysteroscopy, cystoscopy, robotic-assisted laparoscopic vesicouterine fistula repair, lysis of pelvic adhesions, and abdominoplasty.

During hysteroscopy and cystoscopy, a 0.5-cm fistulous tract was visualized connecting the anterior lower uterine segment to the bladder. This tract was confirmed after injecting indigo carmine through the HUMI (Coopersurgical, Trumbull, CT) into the uterus and visualizing extravasation of dye into the bladder (Figure 1). Laparoscopically, there were dense adhesions from the anterior cul-de-sac to the bladder and lower uterine segment.

The procedure was performed with the da Vinci Standard Surgical System (Intuitive Surgical, Sunnyvale, CA). Robotic electro-surgical scissors, bipolar forceps, and needle holders were the instruments utilized to perform the procedure. One 12-mm cannula was placed through the umbilicus for the laparoscope. One 8-mm, steel accessory port was placed 5cm superior and 1cm medial to each anterior superior iliac spine. A 10-mm assistant port was placed 2cm above the umbilicus between the camera port and right accessory port.

Initially, the vesicouterine peritoneal reflection was dissected to the level of the fistula, and the bladder mucosa

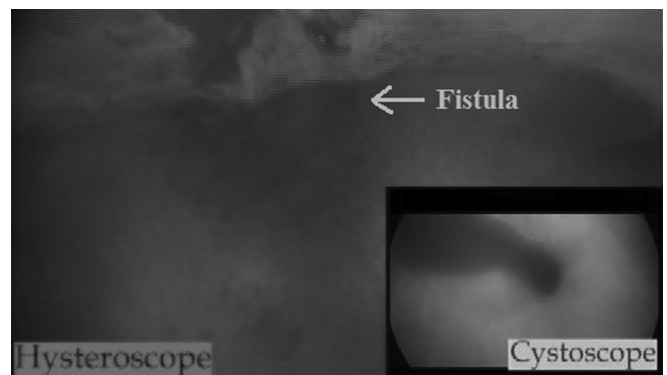


Figure 1. The vesicouterine fistula is visualized through hysteroscopy and cystoscopy. After instilling indigo carmine into the uterine cavity, extravasation of dye through the fistula into the bladder is seen.

was visualized. After venous infusion of indigo carmine, the ureteral outflow jets were seen bilaterally, distal to the fistulous tract. The epithelialized tissue surrounding the fistula was carefully excised until healthy tissue remained. The same procedure was performed on the uterine portion of the fistula. Minimal electrocautery was used to avoid subsequent damage to healthy tissue. Number 0 polyglactin suture was used in a running fashion to repair the bladder in 2 layers. Prior to placing the first stitch, the ureteral ridge was noted to be far from the area of repair. The small hysterotomy remaining after excision of the fistulous tract was reapproximated with 2 number 0 polyglactin figure of eight stitches. Bladder and uterine distention was performed with sterile water, and the closures were noted to be water tight. The patient was returned to the supine position after the robot was undocked and the omentum was brought down over the bladder. The operative time for the robotic-assisted laparoscopic vesicouterine fistula repair with hysteroscopy and cystoscopy was 190 minutes. Estimated blood loss was 100cc.

The plastic surgeon then completed the patient's abdominoplasty. The patient did well postoperatively and was discharged on the second postoperative day with an indwelling Foley catheter. Two weeks after the procedure, a CT cystogram revealed no evidence of bladder extravasation of contrast or a fistulous tract (Figure 2). The Foley catheter was discontinued. Three months after her surgery, the patient reported continence and resolution of menouria.

DISCUSSION

Vesicouterine fistulas are an uncommon occurrence, although with the rising numbers of cesarean deliveries

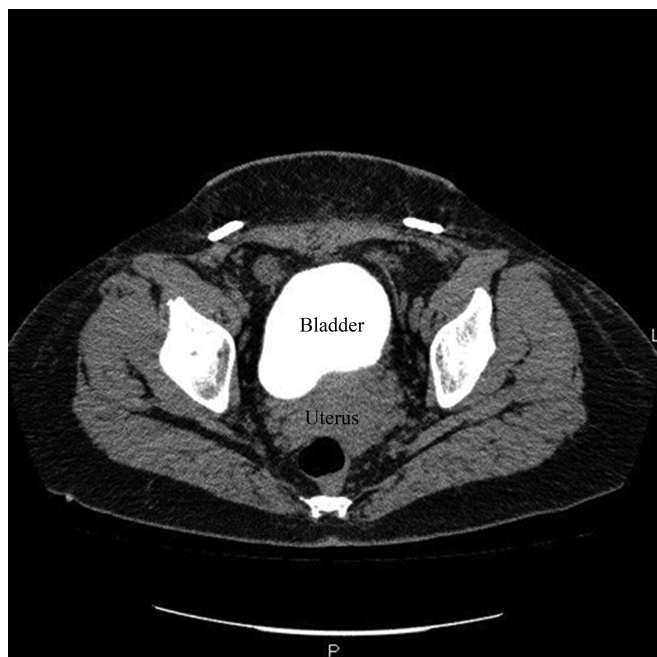


Figure 2. CT cystogram of the pelvis after infusing 300cc of Isovue-300 (Bracco Diagnostics, Princeton, NJ) shows no evidence of vesicouterine fistula 2 weeks after repair.

being performed, the frequency of these genitourinary fistulas may increase. Bladder injury during cesarean delivery has been frequently reported as a cause of vesicouterine fistulas. This may involve inadequate downward mobilization of the bladder, direct injury to the portion directly adherent to the lower uterine segment or anterior vaginal wall, aberrant suture placement or excessive devascularization or infection from cauterization, clamping, or hematoma formation.⁹ Prior uterine scars may also play a role in the formation of vesicouterine fistulas. During labor, the thinning of the lower uterine segment may cause uterine scar dehiscence. This shearing force during uterine rupture may be transmitted to the bladder, causing subsequent development of a fistula.¹⁰ Other less common causes of vesicouterine fistula include uterine rupture, manual removal of the placenta, placenta percreta, local tumor invasion or radiation injury, and contraceptive intrauterine device causing uterine injury. Rarely, congenital anomalies, pelvic infections, such as tuberculosis or actinomycosis, and uterine artery embolization have been implicated as causes of these fistulas.^{9,11,12}

Diagnosis of vesicouterine fistulas is often accomplished with a combination of patient symptoms and clinical examination. A tampon test may be performed after the patient ingests medication containing a dye excreted in

the urine, such as phenazopyridine or Prosed (Ferring Pharmaceutical, Parsippany, NJ). The clinician may also instill saline combined with methylene blue or indigo carmine into the bladder and monitor extravasation through the cervical os. Simple radiological methods, such as an intravenous urogram or cystometrogram can confirm and identify the exact location of the fistula. Sonohysterography, transvaginal ultrasound, computed tomography, and magnetic resonance imaging have also been utilized to diagnose vesicouterine fistulas.¹²⁻¹⁴

Management of vesicouterine fistulas can either be approached conservatively or through surgery. If the fistula occurs soon after delivery, bladder decompression with a Foley catheter for at least 3 weeks has been shown to be effective in aiding spontaneous closure.¹⁵ Others have advocated hormonal suppression of menstruation with bladder decompression to allow the tract to close without the continuous flow of menstrual blood. Oral contraceptives, progestational agents, and gonadotropin releasing hormone analogs have been used to induce amenorrhea.⁹ Józwick and Józwick¹⁶ discovered that when hormonal suppression was utilized, the likelihood of spontaneous resolution of the fistula was 89% as opposed to <5% without suppression. Cystoscopic fulguration of the vesicular portion of the fistula has also been proven to be effective in specific cases of vesicouterine fistula.^{17,18}

When conservative management fails, surgical treatment has been the mainstay of therapy. The basic surgical principles for repair of a genitourinary fistula are wide exposure with liberal excision of scar tissue around the fistula; tension-free closure of the wound in multiple layers with absorbable suture; and possible transposition of an omental or myouterine flap to obliterate dead space and prevent hematoma formation.⁹ The method of performing the repair has traditionally been approached through a laparotomy incision, but recently, laparoscopic and robotic repair have been accomplished.⁵⁻⁸

To date, there has only been one published report of 3 robotic-assisted laparoscopic vesicouterine fistula repairs by Hemal et al.⁸ This procedure differed from the previously published report, because only one accessory port was necessary to perform the procedure, as opposed to the 2 to 3 accessory ports reported by Hemal et al. The estimated blood loss was similar at an average of 120mL, as was the hospital stay where the patients were discharged on postoperative days 2 and 3. Although the operative times reported by Hemal et al ranged from 60 minutes to 115 minutes, the operative time of this procedure was longer at 190 minutes. Attributing factors to the

increased operative time could be the addition of hysteroscopy and cystoscopy to the procedure and the patient's obesity. They also reported discontinuing the Foley catheter at 10 days, and their 3 patients were asymptomatic and continent at 3 months, which was consistent with this patient's outcome. Laparoscopic repair of vesicouterine fistulas has also been reported, but the data are limited.⁵⁻⁷

Robotic-assisted laparoscopy offers the advantages of fine tissue manipulation and dissection and improved visualization of the operative field. The advantages of laparoscopic surgery also apply to robotic surgery, such as faster postoperative recuperation, shorter hospitalization course, cosmetic benefits, and decreased blood loss.¹⁹ Fistula prevention by sound surgical technique and early identification of risk factors for fistula formation is of paramount importance. However, in the presence of a fistula refractory to conservative management, surgical intervention may be accomplished by robotic-assisted laparoscopy.

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