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IUJ VIDEO

Robot-assisted vesicovaginal fistula repair via a transvesical approach

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Abstract

Objective The objective of this video is to demonstrate a technique for robot-assisted vesicovaginal fistula (VVF) repair utilizing a mini cystotomy with a transvesical approach.

Methods A 53-year-old female developed a VVF after she underwent an abdominal hysterectomy for uterine fibroids at an outside facility. She was referred to us following two failed VVF repairs (one vaginal, one abdominal with bladder bivalving and omental flap). After discussing options, she underwent a robotic VVF repair via a transvesical approach. Following port placement, the space of Retzius was mobilized. An intentional cystotomy was made and the camera and working arms advanced into the bladder. The fistula was identified and circumferentially mobilized. The fistula was closed in three layers using absorbable sutures, and care was taken to avoid the ureters.

Results The patient's postoperative recovery was uncomplicated. Follow-up imaging was performed via cystogram at 4 weeks and showed resolution of the fistula.

Conclusions A robot-assisted transvesical approach using a mini cystotomy to VVF repair is a useful technique especially when previous surgical planes have been used in prior repairs and failed. It maintains a minimally invasive approach and may avoid complications associated with an open abdominal approach.

Keywords Fistula · Robot · Vesicovaginal · Urinary incontinence

Introduction

The incidence of urinary tract injury at the time of pelvic surgery ranges from 0.3–0.8%, and intraoperative detection can be increased when routine cystoscopy is utilized [1–3]. Development of a vesicovaginal fistula (VVF) is a rare, unfortunate complication following gynecologic surgery [4]. Hysterectomy, especially when done for gynecologic malignancy, is the most common gynecologic surgery associated with VVF development [5, 6]. The incidence of VVF after hysterectomy varies from 1/87 to 1/3800 based on surgical indication and route of hysterectomy [6].

Vesicovaginal fistula typically presents with symptoms of continuous urinary leakage from the vagina. This may be as early as 5–7 days after surgery or may be delayed weeks. Evaluation of patients with a suspected VVF should include a thorough history and physical examination. Cystoscopy and radiologic imaging may be helpful in surgical planning and ruling out other concomitant injuries.

Surgical treatment for VVF is often necessary when prolonged bladder drainage fails. Surgical approaches include vaginal, open abdominal and endoscopic, with more recent studies focusing on a robotic approach [7]. Surgeon preference, fistula size and location are all considered when selecting a surgical approach [8].

The objective of this video is to illustrate a minimally invasive, transvesical approach to the treatment of a recurrent VVF.

Materials and methods

Our patient is a 53-year-old para 3 who was referred for management of a vesicovaginal fistula (VVF), having failed two

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00192-018-3843-8) contains supplementary material. This video is also available to watch on http://link.springer.com/. Please search for this article by the article title or DOI number, and on the article page click on 'Supplementary Material'.

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prior attempts at repair. Her medical history was significant for hypertension, and her surgical history was significant for three prior cesarean deliveries. At an outside institution, she underwent a total abdominal hysterectomy with bilateral salpingectomy and cystoscopy for menorrhagia and uterine fibroids. Operative reports noted dense adhesions to the bladder, but no evidence of bladder injury on intraoperative cystoscopy. Postoperatively, she presented with continuous urinary leakage and was found to have a VVF, which was managed conservatively with catheter placement. Approximately 4 weeks later, cystoscopy revealed two small posterior bladder wall vesicovaginal fistulae, and she underwent cystoscopic bilateral ureteral stent placement and a transvaginal VVF repair. The fistula recurred, and 6 weeks later she underwent a laparotomy, bivalve of the bladder and excision and closure of the VVF and placement of an omental flap. Unfortunately, the fistula recurred, despite prolonged bladder drainage, and she was sent to our institution for further evaluation and treatment.

Physical examination and office cystoscopy and were performed. Physical examination with methylene blue-stained fluid in the bladder revealed evidence of a VVF at the vaginal apex with spillage of fluid into the vagina. Office cystoscopy revealed a small VVF just above the trigone at the inferior portion of her prior cystotomy site. Of note, the location of the left ureteral orifice was distorted and located medial toward the midline scar, likely secondary to her prior VVF repairs. A CT urogram was obtained and revealed no evidence of upper tract disease or ureteral involvement.

The patient desired an attempt at surgical correction. Vaginal and abdominal approaches were considered, however, the VVF location, the proximity to the left ureter with possible need for reimplantation, and the prior omental flap supported the plan for an abdominal approach to VVF repair. A robotic approach was planned because of the increased magnification, fine instrumentation and minimally invasive nature. Consideration was given to fully bivalving the bladder as had been done in her prior surgery; however, after consideration we planned to repair the VVF with a transvesical approach through a mini cystotomy at the bladder dome. This would allow robotic instrumentation access to the fistula without disrupting the entire prior cystotomy scar.

The procedure was begun with cystoscopy, retrograde pyelography and bilateral double-J ureteral stent placement. Attempts may be made to cannulate the fistula tract with a ureteral guidewire at the time of cystoscopy for fistula tract identification, though this may be technically challenging because of the location and trajectory of the fistula tract. Robotic ports were placed, the robot docked and intrabdominal and pelvic adhesions taken down. The space of Retzius was dissected to increase bladder mobility. The bladder was filled in a retrograde fashion, and an intentional cystotomy was made at the dome of the bladder to accommodate the robotic instrumentation. Though not utilized in this case, suspension sutures from the bladder to the abdominal wall may be utilized to assist with bladder retraction in challenging cases. A vaginal dilator was placed to assist with fistula dissection. Due to the small size of the fistula and our desire for better identification of the tract, a 0.035-mm ureteral guidewire was introduced though the assistant port and inserted though the fistula tract and out the vagina. This helped to guide dissection of the fistula tract. Additional mobilization of the peri-fistula tissue was performed to allow for a multilayer, tension-free closure. Minimal cautery was used during dissection to decrease the tissue devascularization.

The vaginal mucosal layer is closed using an absorbable suture in a running fashion, and the ureteral stent guidewire is removed just prior to placement of the final suture in this layer. Attempts should be made to avoid overlapping suture lines during fistula repair; however, due to fistula location and size, this was not technically feasible in this case. The bladder muscularis layer is further mobilized and closed using a delayed absorbable suture. Further mobilization of the bladder mucosa occurs, and the vaginal dilator is removed to relax tension and allow reapproximation of the bladder epithelium using a delayed absorbable suture. Upon completion, bilateral ureter function is visualized. A suprapubic catheter is placed for postoperative bladder drainage, and the cystotomy is closed in a two-layer fashion using absorbable suture.

Results

Technical considerations emphasized in the video include:

1. A robotic, transvesical approach to VVF repair is feasible and may decrease surgical morbidity compared with laparotomy.
2. Adequate mobilization of each layer of the repair and limited use of cautery are of premier importance.
3. All attempts should be made for a multi-layer, hemostatic, tension-free closure.
4. Ureteral patency must be verified after fistula closure.
5. Postoperatively, prolonged bladder drainage should occur using a suprapubic or transurethral catheter.

The patient had an uncomplicated postoperative course and was discharged the day after surgery. Four weeks after surgery, a CT cystogram was obtained and revealed no recurrence of her fistula, and her suprapubic catheter was removed. At 6 weeks, cystoscopy revealed a well-healed fistula site, and ureteral stents were removed. The patient remains fistula free at 12 months post repair.

Conclusions

When an abdominal approach to VVF repair is chosen, consideration should be given to minimally invasive options (laparoscopic or robotic). We illustrate pertinent technical considerations for a robotic, transvesical approach to VVF repair.

Compliance with ethical standards

Conflicts of interest None.

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

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