CASE REPORT

Robot-assisted laparoscopic trachelectomy after supracervical hysterectomy

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Objective: To present a case of successful robotic assisted laparoscopic trachelectomy.
Design: Case report.
Setting: Tertiary care facility.
Patient(s): A 40-year-old female with history of severe endometriosis and adhesions presented with persistent pain and bleeding after abdominal supracervical hysterectomy after failed attempt for laparoscopic-assisted vaginal hysterectomy and total abdominal hysterectomy.
Intervention(s): Robot-assisted laparoscopic trachelectomy and treatment of associated pelvic disease.
Main Outcome Measure(s): Successful completion of robot-assisted trachelectomy.
Result(s): There were no intraoperative or postoperative complications and minimal blood loss. At 10 months’ follow-up the patient was doing well with resolution of her symptoms.
Conclusion(s): Robotic surgery may bridge the gap between laparotomy and laparoscopy for trachelectomy in complicated cases. (Fertil Steril® 2008;90:850.e1–e3. ©2008 by American Society for Reproductive Medicine.)
Key Words: Trachelectomy, supracervical hysterectomy, complications, robotic surgery, laparoscopy, cervical stump

The primary indication for abdominal subtotal hysterectomy is intraoperative difficulty in performing total abdominal hysterectomy owing to distortion of the anatomy due to adhesions, endometriosis, pelvic infection, or other conditions in which anatomic relationships around the cervix are not clearly defined. Also, the procedure may be performed when removal of the cervix can increase the risk of damage to the surrounding structures and present the patient with a higher risk of morbidity (1). In these circumstances the cervix is left behind with the understanding of potential need for future removal.

Sheth (2) clearly states that if the cervix left behind after subtotal hysterectomy requires removal, the vaginal route is probably the safest and least traumatic method: “Abdominal dissection is often difficult, and a laparoscopic approach is hazardous because the anatomic landmarks are not clear.” In 1996 we reported a series of laparoscopic trachelectomies for persistent pelvic pain and endometriosis after abdominal supracervical hysterectomy and stated that, in severe cases of endometriosis, leaving the cervix behind increases the chances of persistent pain and the risk of additional surgery. Also, we concluded that cervical stump removal can be accomplished laparoscopically by an experienced surgeon (3). Despite advancements in technology and the development of centers with experience in minimally invasive surgery, laparoscopic removal of the retained cervix in high-risk patients has not been widely accepted. Since our report, there have been only isolated cases of successful laparoscopic trachelectomies, even in centers with experience in advanced operative laparoscopy. Okaro et al. (4) reported nine cases of successful laparoscopically assisted trachelectomy and two patients by laparotomy because of bowel adhesions to the cervical stump. Also, in a report by Hilger et al. in 2005 (5), in a series of patients who required trachelectomy from 1994 to 2003, 18 procedures were done abdominally and only four by laparoscopy.

We believe that in spite of the advantages of minimally invasive surgery by laparoscopy this technique has not become popular owing to two-dimensional views and requirements for hand-eye coordination as well as extreme dexterity needed for tissue manipulation. Also, suturing with laparoscopy involves a steep learning curve in transitioning from an abdominal to a laparoscopic approach. The purpose of the present report is to point out the advantages of robot-assisted technology to bridge the gap between an open abdominal procedure and a minimally invasive procedure by eliminating the drawbacks of operative laparoscopy. Experience with laparoscopic removal of the cervical stump via a robot-assisted method in one patient is presented here.

The patient is a 40-year-old multigravid woman with a history of severe endometriosis, pelvic pain, dyspareunia, and...
intermittent vaginal bleeding 2 years after an abdominal subtotal hysterectomy with bilateral salpingo-oophorectomy for pain. Her history was significant for multiple laparoscopies as well as GnRH analog therapy for pain and endometriosis. One of her operations was very extensive and required ureteralysis and treatment of paraureteral endometriosis. She also has a history of infertility but conceived after Clomid stimulation in one cycle and had a spontaneous pregnancy for the second. Both pregnancies required cesarean section for delivery. Owing to intractable pelvic pain, she was intended to undergo a laparoscopic-assisted vaginal hysterectomy, but it was converted to a laparotomy and subtotal hysterectomy because of extensive adhesions and fibrosis throughout the pelvis, most notably around the bladder and cervix, which resulted in difficulty dissecting the bladder and creating a vesicouterine fold. Although her postoperative recovery was uneventful, the patient continued to have symptoms and subsequently was referred to our center for evaluation and treatment.

Her preoperative physical exam revealed an essentially healthy female. However, she was concerned and distressed by pain and postcoital bleeding contributing to reduced quality of life. She had a normal Pap smear within 1 month of the procedure and no history of abnormal Pap. Her physical exam was negative for any obvious cervical lesions or active bleeding; however, the cervix was fixed and immobile with thickening and tenderness of the uterosacral ligaments. Transvaginal ultrasound revealed a 3.4 cm × 4.3 cm × 3.94 cm cervical stump with a slight area of endocervical thickening up to 7 mm. Her preoperative laboratory studies were essentially in the normal range, and hormonal evaluation was in the postmenopausal range. A preoperative intravenous pyelogram was unremarkable. The patient was counseled regarding options and alternatives and desired to proceed with surgical exploration and trachelectomy. Our experience with operative laparoscopy as well as the role of robotically assisted surgery as an initial approach was discussed with the patient. It was also addressed that the chances of conversion to laparotomy did still exist. Routine informed consent was obtained. Institutional Review Board approval was not required, because this was new instrumentation for an established procedure.

The patient received a standard mechanical and chemical bowel preparation and prophylactic antibiotic preoperatively (6).

The patient was placed in a modified dorsal lithotomy position. A Foley catheter was inserted into the bladder. An examination under anesthesia was performed with cervical thickening palpated at the cervicovaginal junction. Under general endotracheal anesthesia a standard multipuncture operative laparoscopy technique was used for initial assessment. Evaluation of the cervix and pelvis was performed, which revealed adhesions of loops of bowel to the cervical stump as well as severe adherence of the bladder and thickening of the parametria and uterosacral ligaments surrounding the cervix. There was thickening of the cervicovaginal junction, mostly noted anteriorly. There was adherence of the sigmoid colon along the pelvic sidewall to the bladder as well as adhesions to the vaginal apex and cervical stump. Multiple bands of adhesions from the small bowel to the pelvic sidewall and the para-appendiceal region were also noted. There was a site of previously treated endometriosis along the pelvic sidewall on the right side and slight retraction of the right ureter toward the cervix and uterosacral ligament. There was no obvious evidence of invasive disease involving any of these organs.

The patient’s position was changed to a slight Trendelenburg, and the da Vinci (Intuitive Surgical, Sunnyvale, CA) robotic system was mounted. Da Vinci sharp scissor dissection was used, and all of the adhesions of the bowel were freed with adequate exposure of the stump and restoration of the anatomy. A cervical manipulator was placed, and approximately 20 mL lactated Ringer solution was injected into the paravesical region, which created a plane for hydrodissection in the vesicocervical area. The da Vinci sharp scissors were used for gradual dissection of the area and mobilization of the bladder. There was an area of severe fibrosis and adhesion at the junction of the cervix and paravesical region, which was sharply dissected, resulting in the safe isolation of the bladder off of the cervical stump. The vesicovaginal space was easily dissected with the bladder safely mobilized off of the cervix. The right ureter was distally unroofed, and cervical vessels were isolated, electrodesiccated, and cut using the da Vinci bipolar grasper and scissors. There were adhesions in the posterior cul-de-sac but no invasion into the rectovaginal space. This area was dissected sharply with scissors. Assessment of the cervix revealed adequate anterior and posterior dissection and mobilization. A right-angle retractor was placed in the vagina, and anterior and posterior colpotomies were performed over the right-angle retractor. The cervical stump was sharply excised in an extrafascial manner, incorporating the thickened and fibrotic area that involved the uterosacral ligament and paracolpium to a healthy margin. The vaginal cuff was then closed with multiple figures-of-eight sutures using 0 Vicryl and the da Vinci system and anchored to the remnant of the uterosacral cardinal complex for further support of the vagina. Intravenous injection of indigo carmine was given, and inspection of the bladder and ureters was performed, revealing no evidence of trauma to these organs. Preappendiceal adhesions were freed and an appendectomy was performed as has been described before (7). The procedure was terminated in a routine laparoscopic manner. All port sites were closed using 0 Vicryl in routine fashion.

The patient did well postoperatively and was discharged on postoperative day one. She had an appropriate recovery with resolution of pain at 2- and 8-week follow-ups. At 10 months’ follow-up, the patient was doing well with resolution of her symptoms.

There are many valid concerns involving the resection of an adherent cervix after previous subtotal hysterectomy. Careful attention to the surrounding structures is important,
because injury to the bowel, bladder, ureters, and rectum is a distinct possibility. Minimally invasive surgery has many obvious advantages over laparotomy and several benefits to the patient, including smaller incisions, faster recovery, less pain, and potentially less chance of infection and adhesion formation. However, it is technically demanding and is associated with a steep learning curve. Laparoscopic suturing requires extreme dexterity and is limited by a two-dimensional view and the need for hand-eye coordination and counterintuitive movements. Robot-assisted laparoscopy currently is used in a number of gynecologic procedures, including hysterectomy, tubal reanastomosis, and myomectomy. The increased magnification of the anatomy, three-dimensional views, and increased ranges of motion and dexterity allow for a more precise and less invasive procedure. The computerized interface between the surgeon’s hand and the instrument is associated with several advantages. Tremor is eliminated and the surgeon’s movements can be downscaled to a 5:1 or 3:1 ratio, which means for every 5 cm or 3 cm of hand movement of the surgeon the instrument moves 1 cm, respectively. This increases surgical accuracy. The articulated tips of robotic instruments would give seven ranges of motion as opposed to the normal four ranges of motion in the surgeon’s hand, resulting in more degrees of freedom and subsequent gentle and precise tissue dissection. This higher range of motion in addition to a three-dimensional view results in near-effortless suturing and intracorporeal knot tying.

Advanced laparoscopic surgeons can perform complex cases and suturing laparoscopically without the use of robotics. But the adoption of robotic technology will allow more surgeons to choose a laparoscopic approach over laparotomy in difficult cases, which ultimately benefits the patient. It is true that robotic equipment is costly and not all hospitals can incur the expense. But robotics is a new and developing technology, and with increased adoption and enhancement the initial cost should decrease.

The transition from open procedures to laparoscopy may be bridged by advances in technology. We believe operative laparoscopy remains less expensive and faster than robot-assisted procedures, but it is technically challenging. Robot-assisted trachelectomy appears to make the transition from laparotomy to laparoscopy easier, with the associated advantages of minimally invasive surgery.

REFERENCES