Instruments and Techniques

Hand-Assisted Approach to Laparoscopic Myomectomy and Hysterectomy

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ABSTRACT

In this series we discuss the feasibility of hand-assisted approach to laparoscopic myomectomy and hysterectomy. The hand-assisted approach is a useful technique bridging the benefits of minimally invasive surgery and an open approach. We present the largest series to date of 15 patients: 10 hand-assisted hysterectomies and 5 myomectomies. All 15 cases were performed by the team of surgeons at a large academic medical center in the northeastern United States. We provide a detailed description of the hand-assisted technique along with patient demographic data, surgical outcomes, and complications. Operating times ranged from 86 to 269 minutes, and estimated blood loss ranged from 30 to 4000 mL. On the basis of preliminary outcomes, the hand-assisted technique appears to be beneficial in challenging laparoscopic cases, yet careful patient selection and vigilance are required to ensure successful outcomes. Journal of Minimally Invasive Gynecology (2013) 20, 234–237 © 2013 AAGL. All rights reserved.

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DISCUSS
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Advances in the field of minimally invasive gynecology allow for endoscopic management of enlarged myomatous uteri. Laparoscopic surgery has been traditionally associated with shortened hospital stay, reduced postoperative pain, quicker recovery, and improved cosmetic outcomes. At the same time, certain challenges because of limited visualization or operative space may arise during complex laparoscopic procedures and prompt the surgeon to convert to laparotomy. Hand-assisted devices bridge the benefits of minimally invasive surgery and open approach by preserving improved surgical outcomes while providing the option of rapid access hand-assisted manipulation inside the abdomen in an air-sealed environment.

The relevance of a hand-assisted approach arises when, on preliminary examination or after laparoscopic port placement, the patient’s enlarged uterus significantly obstructs the surgical field, thus making the laparoscopic approach either not feasible or risky. In lieu of proceeding with conversion to laparotomy, the hand-assisted approach may be an invaluable tool providing the surgeon with improved navigation and manipulation in the field of obstructed vision, while at the same time preserving pneumoperitoneum. Additionally, this technique may aid an intact retrieval of a large specimen to avoid morcellation when there is a concern for malignancy. With this approach, the need for a large, likely vertical midline incision is obviated, thus reducing the morbidity rate associated with the traditional open approach.

The first hand-assisted laparoscopic hysterectomy was documented in 1999 by Pelosi et al[1]. A 3050-g leiomyomatous uterus occupying most of abdominal cavity was safely removed through a 7.5-cm transverse suprapubic incision used for hand-assisted access, along with a 1-cm laparoscopic incision. Total operating time was 150 minutes, blood loss was 220 mL, and the patient went home on a second
postoperative day followed by uneventful recovery. The same group later described a case of hand-assisted laparoscopic myomectomy in a 28-year-old nulliparous woman with the uterus reaching the level of the liver, which was nondisplaceable by uterine manipulator or external pressure. Introduction of the hand-assisted device allowed for digital enucleation of multiple myomas with layered suture repair. Additionally, hemostasis throughout surgery was effectively achieved with the help of digital pressure. The total weight of extracted myomas was 3120 g; excellent surgical and clinical outcomes were reported [2].

In this case series, we report surgical outcomes of 15 hand-assisted laparoscopic cases (10 hysterectomies and 5 myomectomies) performed by the Minimally Invasive Gynecology Surgery team at Brigham and Women’s Hospital in Boston, Massachusetts. Herein we present the largest series of hand-assisted gynecologic procedures published to date and aim to increase awareness of this technique.

Materials and Methods

This is a retrospective case series of 15 patients who underwent a hand-assisted myomectomy or hysterectomy from March 2009 to April 2012 at Brigham and Women’s Hospital. The patients were selected via review of surgical book-ings, and further information was abstracted from medical records.

Technique

The following is a detailed description of a hand-assisted approach to hysterectomy and myomectomy. Hand-assisted technique, applicable to both procedures, is discussed first, followed by description of the steps specific to hysterectomy and myomectomy, respectively. After induction of general endotracheal anesthesia, the patient is placed in a dorsal lithotomy position. A V-Care uterine manipulator (ConMed Corp., Utica, NY) is placed in the uterus, and a Foley catheter is inserted in the bladder. A 6- to 8-cm Pfannenstiel incision is made 2 cm above the pubis symphysis and carried down to the subcutaneous tissues. The fascia is opened by use of monopolar electrosurgery. The muscles are split in the midline, and the peritoneum is entered bluntly. Hand-assisted access is established with the GelPort Laparoscopic System (Applied Medical, Rancho Santa Margarita, CA). The main components of the GelPort Laparoscopic System include the GelSeal Cap and the Alexis Wound Retractor. Sterile lubricant (a greaseless, water-soluble jelly), an incision template, and a marking pen are also included in the package. One ring of the Alexis Wound Retractor is inserted into the abdomen, secured tightly against the peritoneal wall, and confirmed for the absence of bowel entrapment. The extraperitoneal ring is then rolled inward until the wound is completely retracted. The GelSeal Cap is placed over the Alexis Wound Retractor and secured with a side latch. Before inserting a hand through the GelPort, a lubricant is applied onto the glove and on the outside surface of the gel-cap.

Depending on the uterine size and surgeon’s preference, a primary 5- or 10-mm port can be placed in the upper abdomen with guidance of the hand inside the abdomen, followed by insufflation (Fig. 1). The laparoscope is inserted next, and the abdominal cavity is evaluated. Two or three additional 5-mm ports are placed under direct visualization; although space for port placement may be limited because of the size of the pelvic pathologic condition, an attempt is made to position the operative ports in a manner to allow triangulation of operative instruments.

Supracervical Hysterectomy Technique

After the port placement, hysterectomy proceeds in standard fashion. After coagulation and transection of the uteroovarian ligaments, reflection of the vesicouterine peritoneum and skeletonization of the uterine vasculature, the uterus is amputated off the cervix at the level of the internal os. The hand port is then released, and the uterus is morcelated through the hand port site by use of a 10-blade knife and triple hooks, removing all pieces of the uterus and fibroids in this manner. The hand port is then reassembled, and the abdomen is reinsufflated. The final survey of the pelvis is performed. All instruments are then removed from the abdomen, and the abdomen is desufflated. The Pfannenstiel incision is then closed in standard fashion, including careful reapproximation of the fascial layer. The laparoscopic site incisions are closed, the uterine positioning system and the Foley are removed, and the patient is awakened and transferred to the recovery room.

Myomectomy Technique

After the trocar insertion, the uterus is infiltrated with dilute vasopressin to minimize bleeding. The authors prefer to use 20 U of vasopressin in 400 mL of saline and inject a total of 200 mL into the uterus. Each fibroid is visualized and resected by means of blunt dissection and the Harmonic scalpel, followed by extraction through the GelPort with the help of triple hooks and a 10-blade knife. The hand port is then reassembled, and the abdomen is reinsufflated. The hysterotomy is generally closed with 0 PDO barbed suture in as many layers as needed to close all dead space within the myometrium. The final serosal layer is closed in a baseball configuration in an effort to minimize suture exposure. The authors use laparoscopic suturing techniques for closure of the myomectomy defects, although suturing could also be accomplished via Pfannenstiel incision as appropriate. A final survey of the pelvis is performed followed by the placement of an adhesion barrier, instrument removal, desufflation of the abdomen, and closure of the incisions as described above.

Several technical aspects should be considered to optimize the hand-assisted technique [11]. The size of the lower
abdominal incision generally depends on the surgeon’s glove size; for example, a 7-cm incision is recommended for a 7½ glove size. The GelPort should be considered a functional operative port and placed according to the triangulation rule of port placement. Other important considerations for the incision placement include providing access to all necessary surgical fields, surgeon’s nondominant hand and assistant’s hand, and possibility of conversion to laparotomy. Finally, it is critical to ensure proper coagulation and transection of the uterine vessels and to confirm hemostasis before proceeding to the morcellation step. Limited view of the abdominal cavity may significantly delay the recognition of a bleeding vessel and result in a profound blood loss before the surgeon is aware of the situation.

Results

To date, 15 patients have undergone the hand-assisted myomectomy or hysterectomy at our institution. The primary indication for surgery in all patients was symptomatic uterine leiomyomata. Procedures performed included 5 hand-assisted laparoscopic myomectomies, 8 supracervical hysterectomies, and 2 total laparoscopic hysterectomies.

The demographic and surgical data are presented in Table 1. The median surgery duration was 119 minutes (86 to 269 minutes), and median estimated blood loss was 250 mL (30 to 4000 mL). Of note, there were 3 cases of extreme blood loss greater than 1000 mL, including estimated blood loss of 1000 mL, 2000 mL, and 4000 mL; range of the remaining cases was 30 to 600 mL.

There were 3 cases of intraoperative complications, each involving significant blood loss as noted above. In one case, blood loss of 1000 mL occurred during meticulous lysis of severe adhesions between the uterus and ovaries despite best efforts to control the bleeding. Another case of 2000-mL blood loss was significant for an extreme distortion of the normal uterine anatomy because of a large lower uterine segment and cervical myomas. The myomectomy was performed before controlling uterine vascular supply to increase visualization and a large amount of bleeding was encountered in this process. Finally, 4000 mL of blood was lost during the case of multiple myomectomy with additional parasitic fibroid attached to the omentum. Significant bleeding was initially noted during enucleation of a large 12-cm posterior fibroid. Following the standard defect repair with barbed suture in multiple layers, a significant degree of blood loss was noted, and the decision was made to end the case. The hemostasis of all surgical sites was confirmed before closure, yet clinical deterioration in the recovery area led to repeat operation with midline vertical incision and clinical correction of coagulopathy. No overt bleeding was identified on repeat operation aside from diffuse oozing believed to be due to consumptive coagulopathy.

Discussion

The minimally invasive approach has been successfully adopted in a variety of gynecologic procedures. Both laparoscopic hysterectomy and myomectomy are associated with improved postoperative outcomes as compared with the approach via laparotomy [3,4]. The focus of this study was to report the feasibility and surgical outcomes of a hand-assisted approach to these procedures.

Since the introduction of a first hand-assisted device in 1997, the hand-assisted technique has been successfully applied to a variety of surgical procedures, including colectomy [5], nephrectomy [6], liver resection [7], abdominal aortic aneurism repair [8], splenectomy [9], hysterectomy, and myomectomy [1,2]. In particular, adaptation of the hand-assisted technique allows for efficient kidney exchange during laparoscopic live donor nephrectomy [10–12]. Advantages associated with the hand-assisted approach include palpation of lesions that are difficult to visualize, rapid hemostasis, organ retraction, blunt dissection, potential resection in the number of trocars needed, and rapid specimen removal without mechanical morcellation [13]. Potential
disadvantages may include the loss of pneumoperitoneum, reduced surgical field taken up by the hand, as well as increased pain and morbidity associated with the additional abdominal incision [14].

The hand-assisted approach to laparoscopy is best suited for difficult gynecologic cases with enlarged uteri that pose significant risk of subsequent conversion to laparotomy. Examples of such cases may include a large and bulky myomatous uterus significantly obstructing the surgical field or presence of intrabdominal adhesions. Another potential advantage of hand-assisted approach in myomectomy is the ability to palpate the uterus to identify all myomas present. The surgical technique for the hand-assisted approach is simple and allows the surgeon to promptly establish hand access at the beginning of surgery or at any point during surgery. The choice of the GelPort Laparoscopic System was based on its ability to continuously maintain pneumoperitoneum despite numerous hand exchanges, ease of adjustment to varying thickness of the abdominal wall, double functioning as a combined retractor and wound protector, and the reported decrease in hand fatigue during use [15], although other options for hand-assisted access may be equally as effective.

In our case series, the major benefits of hand-assisted approach were mobilization of a large fibroid uterus significantly obstructing the surgical field and significantly faster specimen extraction times with the laparotomy incision. Another indication for a hand-assisted hysterectomy in 2 patients was intact specimen removal to avoid morcellation when risk factors for uterine malignancy were present and could not be definitively ruled out before surgery (such as inability to obtain an adequate sample). In 3 cases, a decision to use the hand-assisted approach was made in the operating room after the detailed physical examination with patient under anesthesia. In other cases, the hand-assisted approach was chosen in advance on the basis of significantly enlarged uterine size and in efforts to reduce operative time and associated comorbidities in patients with additional risk factors.

Three cases of complications involving significant blood loss in this series emphasize the importance of careful patient selection and vigilance when attempting the hand-assisted approach. Because of disease extent and complexity, it is sometimes not possible to completely avoid serious blood loss. Despite staying committed to improved postoperative outcomes with the minimally invasive approach, it is important to maintain high index of suspicion for the possibility of unidentified bleeding and be prepared to convert to laparotomy if in doubt. Earlier decision to convert to an open approach could have potentially prevented an exploratory laparotomy and reduce the 4000-mL blood loss in the third case of intraoperative complications described in this series.

In conclusion, the hand-assisted approach may be beneficial in challenging laparoscopic cases with significantly obstructed surgical field caused by a large fibroid uterus, when introduction of a hand into the abdomen allows for improved tactile feedback and overall increases the surgeon’s control of the situation with the goal to prevent potential intraoperative complications or conversion to laparotomy. At the same time, complexity of these cases by itself predisposes to unexpected intraoperative complications such as severe blood loss, of which the surgeon should be well aware and prepared to manage. For this reason, the hand-assisted approach may be best suited in the hands of an experienced laparoscopic surgeon looking for increased control of the operative site during procedure while attempting to improve postoperative outcomes for the patient. This case series demonstrates the feasibility of a hand-assisted approach, yet additional studies are needed to further investigate potential advantages and outcomes of the technique.

References