



Original Article

Comparison of three different hemostatic devices in laparoscopic myomectomy

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Abstract

Background: To compare conventional electrosurgery, LigaSure (Valleylab, Boulder, CO), and Harmonic scalpel (Ethicon Endosurgery, Cincinnati, OH) in terms of perioperative and postoperative outcomes during laparoscopic myomectomy (LM).

Methods: We retrospectively studied 817 women with symptomatic fibroids who underwent LM between January 1997 and September 2015. Three different instruments were used separately during surgery. The number and weight of removed fibroids, blood loss, operative time, postoperative decrease in the hemoglobin level, and length of hospital stay were measured for statistical analysis.

Results: No significant increase in complications was found in the three groups. Patients in the LigaSure and Harmonic scalpel groups had more numbers of removed fibroids, heavier fibroids removed, and higher rate of pretreatment with GnRH agonist ($p < 0.001$). These patients also had higher amount of intraoperative bleeding ($p = 0.003$) and longer operative time ($p < 0.001$) than those in the conventional electrosurgery group. However, no worse postoperative clinical outcome but shorter length of hospital stay was found in the LigaSure and Harmonic scalpel groups (2.1 ± 0.6 , 2.0 ± 0.4 vs 2.5 ± 0.8 days, $p < 0.001$).

Conclusion: The use of all three devices is feasible in LM. LigaSure and Harmonic scalpel can reduce the length of hospital stay without worse surgical outcomes.

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Keywords: Electrosurgery; Laparoscopy; Myomectomy; Ultracision vessel sealing

1. Introduction

Laparoscopic myomectomy (LM), which was first reported in 1979,¹ is a common surgery for the treatment of benign uterine fibroids. Based on the advantages of laparoscopy such as smaller incision wound or shorter length of hospital stay,² LM is an adequate intervention choice for women with symptomatic fibroids who want to preserve their fertility.

However, some problems still cannot be neglected in LM. Compared with abdominal myomectomy, difficulty in bleeding control, uterine defect closure, uterine fibroid extraction after myomectomy, or smaller operative visual field makes operation time longer.^{3–5}

Conventional electrosurgery was used during laparoscopic surgery since the 1970s.⁶ This instrument coagulates tissue with high-frequency electric energy between two electrodes and makes hemostasis during operation easier. Operative laparoscopy has widespread use since the introduction of electrosurgery. However, smoke generation, frequent instrumental changes during surgery, and complications attributed to thermal spread make surgeons and researchers look for safer and more efficient instruments.

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

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Bipolar sealing device (LigaSure; Valleylab, Boulder, CO) can help in tissue dissection and performing sealing with a combination of pressure, and electric energy is automatically adjusted. Ultrasonic device (Harmonic scalpel; Ethicon Endosurgery, Cincinnati, OH) coagulates and cuts tissue by denaturing tissue protein resulting from ultrasonic energy. Good efficiency in hemostasis and less time spent in changing different instruments make these advanced power devices become more popular in laparoscopic surgery. The use of both LigaSure and Harmonic scalpel has been reported in many kinds of gynecologic surgery, such as simple and radical hysterectomy, and they have shown good surgical outcomes.^{7–10}

A previous study comparing the use of Harmonic scalpel and conventional bipolar electrosurgery system in LM demonstrated that the use of Harmonic scalpel leads to better surgical outcome.^{11,12} However, to our knowledge, no study has shown the difference in LM performed using different kinds of advanced power devices. Hence, we tried to compare three different instruments, including LigaSure, Harmonic scalpel, and conventional electrosurgery, in LM and evaluated the differences in surgical outcomes and complications.

2. Methods

We retrospectively studied 817 patients who underwent LM performed by one of the authors (CJW) at Chang Gung Memorial Hospital at Linkou for symptomatic uterine fibroids (e.g., menorrhagia, abdominal pain, and bulk-related symptoms) between January 1997 and September 2015. We introduced LigaSure and Harmonic scalpel for LM in 2010. However, we did not routinely use this system as daily practice because this needed extra fee for a patient based on the insurance policy in our country. The indications for surgery in these patients included menorrhagia, abdominal pain, bulk-related symptoms (urine frequency or rectosigmoid compression), and infertility. All patients underwent preoperative assessments before surgery, including detailed medical history, pelvic examination, and ultrasonography. Patients with sexual experience were screened for the absence of cervical malignancy. Diagnostic hysteroscopy was performed to exclude pathologic lesions in the uterine cavity for patients with menometrorrhagia and anemia. The surgical risks were explained to the patients, including the potential need to switch to laparotomy during the procedure and the risks of intraoperative bleeding, transfusion, and adhesion. Gonadotropin-releasing hormone (GnRH) agonist was not routinely administered preoperatively. For premenopausal women with main fibroid size ≥ 9 cm or presence of more than 3 fibroids ≥ 5 cm, the surgeon will consider pretreatment with 3 intramuscular injections of leuprolide acetate 3.75 mg (Leuplin; Takeda, Rome, Italy) 4 weeks apart and operation was performed 4–5 weeks after the final administration. Written informed consent was obtained from all subjects. All women had bowel preparation in the morning of surgery. Intravenous cephalosporin prophylaxis was administered just before surgery.

Preoperative clinical and demographic characteristics including age, body mass index (BMI), weight of excised fibroids in grams, number of cesarean deliveries, and pretreatment with GnRH agonist were summarized. Similarly, operating time, number of fibroids removed, main fibroid size, estimated blood loss, decreased hemoglobin level, length of postoperative stay, blood transfusion requirement, and any perioperative complications (fever, bowel injury, or genitourinary tract injury) were recorded. The study was approved by the Institutional Review Board of Chang Gung Memorial Hospital (201600374B0).

2.1. Operative procedures

The patient was placed in the dorsolithotomy Trendelenburg position, with both legs protected by elastic bandages, and a Foley catheter was inserted for constant urine drainage. After induction of general anesthesia, 1-g intravenous cephalothin was administered as prophylaxis. LM was performed following the procedures described by Wang et al.¹³ In brief, laparoscopic examination of the pelvis and lower abdomen was performed first to determine accessibility of the surgical field and spaces between the rectum and cervix and the parametrium and ureter. Four trocars were routinely used.

After identifying the location of all fibroids, a conventional unipolar electrode was used to incise transversely on the serosa overlying the largest tumor until its pseudocapsule was reached. A myoma screw or second puncture was then inserted into the fibroid to apply traction and countertraction movements after the identification of the cleavage plane. The unipolar electrode and bipolar forceps, harmonic scalpel (5 mm), or LigaSure (5 mm) was used to dissect the pseudocapsule attachment further. Additional fibroids located at the same area were removed through the same incision. However, creating a new incision was necessary for nonadjacent fibroids. The uterine defect was irrigated after fibroid removal. Bleeding points were identified and controlled with bipolar diathermy, harmonic scalpel, or LigaSure.

The uterine surgical defect was closed in two layers with a zero monofilament polyglecaprone 25 (Monocryl, Ethicon Inc., Somerville, NJ, USA), continuous nonrunning-lock suture, and intracorporeal knots. Specimens were extracted through posterior colpotomy routinely. The colpotomy incision was closed with a 2-0 polyglycolic acid suture after removal of all fibroids. If the specimen had to be removed from the abdominal wall (for women with no prior sexual activity), a 15-mm electromechanical morcellator (Ethicon Endosurgery, Cincinnati, OH, USA) was used to ease extraction of the specimen. Pneumoperitoneum was reestablished at this time, and the peritoneal cavity was irrigated and lavaged until the fluid was clear. After achieving complete hemostasis, all port sites were sutured with a 3-0 polyglycolic acid suture at the level of the fascia to prevent herniation. The skin was approximated by a sterile adhesive tape.

2.2. Statistical analysis

Statistical evaluation of the three groups was performed by one-way analysis of variance (ANOVA) with Bonferroni test

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