

Original Article

Comparison of the efficacy of the pulsed bipolar system and conventional electrosurgery in laparoscopic myomectomy – A retrospective matched control study

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Abstract

Objective: Comparing the safety and effectiveness of the pulsed bipolar (PK) system and conventional electrosurgery in laparoscopic myomectomy (LM).

Materials and Methods: Retrospective chart review of 194 women with symptomatic uterine fibroids undertaken LM was performed. Cases of LMs with PK cutting forceps were compared with a matched control group of standard LMs with conventional electrosurgery. Outcome measures for both groups were studied comparatively in terms of the length of operative time, amount of blood loss, requirement of blood transfusion and length of hospital stay.

Results: The two groups were matched by age, body mass index, parity, previous cesarean delivery, size, number, and weight of fibroids. Amount of blood loss was significantly greater in electrosurgery group than in PK group at 243.8 ± 150.4 mL versus 190.4 ± 178.5 mL ($p = 0.025$). Length of operation, hospitalization time, hemoglobin decrease, and requirement of blood transfusion were not significantly different.

Conclusion: Our findings indicate that PK system is more effective in LM when compared with conventional electrosurgery. PK system has advantage over conventional electrosurgery in less blood loss and may offer an alternative option for patients undergoing LM.

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Introduction

The surgical methods to deal with symptomatic uterine fibroids are hysterectomy for permanent resolution purpose and myomectomy for women with preserving uterus or fertility desire. After two decades' improvements in laparoscopic techniques and instruments, laparoscopic myomectomy (LM) is now a safe, efficacious alternative of open method in well-selected

patients [1–4]. However, it is still considered as a time-consuming and bloody procedure.

The operative bleeding of LM mainly occurs during myometrium incision and extraction of the fibroid(s). Traditionally unipolar and bipolar electrocautery are widely used in laparoscopic procedures. Unipolar diathermy provides good cutting ability with much plume generation, while bipolar owns satisfying coagulation but relatively extensive thermal damage, and the jaws tend to stick to the tissue [5,6]. These phenomena plus the complexity of uterine defect repair with laparoscopic suturing technique make the LM to be a thorny procedure comparing with open myomectomy. Therefore, searching an ideal energy source which can provide cutting and hemostasis

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equal to that of a conventional electrocautery without the above-mentioned drawbacks is necessary for laparoscopists to perform LM.

The PlasmaKinetic (PK) tissue management system (Gyrus Medical, Maple Grove, MN, USA) uses pulsed bipolar energy for coagulation. Our prior study reported that PK system is as safe and effective as conventional electrosurgery using in laparoscopically assisted vaginal hysterectomy [7]; therefore it would be interesting to evaluate the effect of using this system in LM.

A search of the literature showed few published studies discussing the pulsed bipolar energy although it had already been used in laparoscopic and open surgeries [7–9]. The purpose of our study was to compare the results of LM by using PK tissue management system to a matched control standard LM via conventional electrosurgery.

Materials and methods

In this retrospective case-control study, we reviewed 97 consecutive cases of LM by using PK cutting forceps that were performed from April 2002 through December 2008 at endoscopic center of Chang Gung Memorial Hospital. These data were compared with a matched control group of 97 LMs performed at the same institution and during the same period. All surgeries were performed by one of the authors (C.J. Wang). We introduced PK system for LM since 2002. But we did not routinely use this system as daily practice because this needed extra charge for a patient according to the insurance policy in our country. The indications for LM in these patients included menorrhagia, abdominal pain, bulk-related symptoms (urine frequency or rectosigmoid compression), and infertility. Before the operation, the patients were informed of the risks and benefits of LM, including the potential need to switch to laparotomy during the operation and the risks of intra-operative bleeding, transfusion, and adhesion. Written informed consent forms were obtained from all subjects.

Thirty-five patients had menometrorrhagia and underwent diagnostic hysteroscopy to exclude pathologic lesion in the uterine cavity. GnRH agonist was not administered preoperatively. All women had bowel preparation in the morning of surgery. Intravenous cephalosporin prophylaxis was given just before surgery.

The procedure was conducted with the patient in the dorsolithotomy Trendelenburg position with both legs protected by elastic bandages; a Foley catheter was inserted for constant urinary drainage. A uterine manipulator was placed into the uterus (for women with prior sexual activity). Video-laparoscopy was performed with a 5-mm principal trocar introduced through the umbilicus. Three ancillary 5-mm cannulas were placed under laparoscopic visualization, two in the left lower quadrant lateral to inferior epigastric arteries, and the other in the right lower quadrant. For the patients with uterine size greater than 14 weeks' gestation, a 0.5 cm vertical skin incision was made with a number 11 blade at midpoint between umbilicus and xiphoid process (Lee-Huang point) where a 5-mm cannula was inserted [10]. Two punctured sites,

one 5 mm and the other 5 mm were made in the bilateral lower abdomen at the paramedian line at the level of the umbilicus. The other cannula was introduced at the paramedian line, just above the pubic hairline. Once cannula placement was complete, adhesions were lysed as necessary.

After identifying the location of all fibroids, a transverse incision was made on the serosa overlying the largest tumor using conventional unipolar electrosurgery or PK cutting forceps. The incision was extended into the pseudocapsule down to the characteristically pearly white substance of the tumor. Additional fibroids located at the same area were removed through the same incision. However, for nonadjacent fibroids, creating a new incision was necessary. A myoma screw or second puncture was then inserted into the fibroid to apply traction while a probe (or any instrument that functions as a probe) was used to bluntly dissect in the cleavage plane to leverage the tumor against the uterine wall and pry it out of its bed. The unipolar electrode or PK cutting forceps were used to dissect pseudocapsule attachments further. After fibroid removal, the uterine defect was irrigated. Bleeding points were identified and controlled with electrocoagulation (Bipolar diathermy or PK system).

The uterine surgical defect was closed in a one-layer suturing attempt. If excessive myometrium and serosa were present, these were trimmed off. A zero monofilament polyglactone 25 (Monocryl, Ethicon Inc., Somerville, NJ, USA) on a large curved needle was used to make a deep and wide (1 cm from the cut edge of the incision) bite. A continuous nonrunning-lock suture at 1-cm increments was then carried out, with each suture penetrating the full thickness of the myometrium.

Specimens were removed through posterior colpotomy. Medium and large fibroids were morcellated with a scalpel or scissors first. After removal of all fibroids, the colpotomy incision was closed with 2-O polyglycolic acid suture. Pneumoperitoneum was reestablished at this time, and the peritoneal cavity was irrigated and lavaged until fluid was ran clear. A Jackson-Pratt drain was introduced through a 5-mm access site if complete hemostasis could not be achieved. If the specimen had to be removed from the abdominal wall, a 12-mm electromechanical morcellator (Storz, Tuttlingen, Germany) was used to ease extraction of the specimen. All port sites were sutured with 3-0 polyglycolic acid suture at the level of the fascia to prevent herniation. The skin was approximated by sterile adhesive tape.

Statistics

A retrospective chart review of all LMs with PK cutting forceps was performed. All cases were compared by age, body mass index, parity, number, located, and size of the removed fibroids to a matched control group of LMs with conventional electrosurgery, which were performed by the same surgeon. Continuous variables were compared with Student *t* test and categorical values with Pearson χ^2 analysis. All probability values were two-sided. Significance was accepted at probability below 5%. SPSS for Windows version 13.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical calculations.

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