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Original article

Effect of semisimultaneous morcellation *in situ* during laparoscopic myomectomy

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ABSTRACT

Objective: The conventional technique of laparoscopic myomectomy (LM) was performed by complete enucleation of the myoma followed by morcellation as described previously. However, the conventional technique of LM presented some inherent problems in the management of larger myomas. Our objective was to compare the surgical outcome of the semisimultaneous morcellation *in situ* (SSMI group) technique and conventional morcellation (Control group).

Materials and methods: In this prospective case–control study 122 patients with symptomatic uterine myomas treated with LM were recruited and divided into two groups. Patients in the Control group underwent LM using the conventional technique of completely enucleating the myoma followed by morcellation. In the SSMI group, morcellation was initiated from the upper half of the myoma and then the lower half was completely enucleated.

Results: Fifty-four women underwent SSMI, and 68 women served as controls. There was no difference in the baseline characteristics between the two groups. The SSMI technique significantly reduced surgical time (163.2 ± 46.8 minutes vs. 189.4 ± 56.7 minutes; $p = 0.007$), although the difference in the mean blood loss was not significant (178 ± 147 mL vs. 203 ± 185 mL; $p = 0.417$), compared with the control. Furthermore, SSMI technique and myoma weight contributed to longer surgical times in multivariate analysis.

Conclusion: The SSMI technique could shorten surgical time when a laparoscopic myomectomy is performed, but uterine size is also important.

Introduction

Laparoscopic myomectomy (LM) is one of the powerful surgical procedures for the treatment of uterine leiomyoma. Laparoscopic myomectomy is more advantageous than abdominal myomectomy with less postoperative pain, a shorter hospital stay and less postoperative adhesions.[1–5] However, LM is more technical, especially while dealing with the larger myomas.[6–8] In a limited space, the large dimension of the myoma makes the enucleation with the laparoscopy far more difficult.[9,10] It not only takes time, but also increases blood loss. Therefore, it is necessary to modify the LM technique, especially while dealing with the larger myomas.

The conventional technique of LM was performed by complete enucleation of the myoma first, followed by morcellation, which was pioneered by Kurt Semm in 1973.[11–13] Simultaneous morcellation *in situ* (SMI), a modified method proposed in recent studies, leveraged the morcellator to enucleate the myoma down to its base by performing morcellation directly on the uterine surface without prior enucleation (i.e., simultaneous enucleation and morcellation of the myoma *in situ*).[14] Although the SMI technique significantly

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shortened surgical time, it was noted to have a higher risk for inadvertent penetration of the endometrium with the morcellator, which has been a concern, especially in large, deep intramural myomas.[15,16] Furthermore, blood loss was slightly higher in the SMI group compared to the conventional LM group in previous studies.[14,15]

To avoid the risk of endometrial penetration, we modified the SMI technique and called it semisimultaneous morcellation *in situ* (SSMI). We performed the morcellation toward the upper half of the myoma first and enucleated the lower half of the myoma, followed by suture of the myometrial edges, and ending with the morcellation of the remaining myoma. We hypothesized that the SSMI technique would have a shorter surgical time without an increase in blood loss and also reduce the risk of endometrial penetration as compared to the conventional LM group.

Our objective was to compare the surgical outcome of the SSMI technique and conventional LM.

Materials and methods

Patients

This study was designed as a cohort study. The participants were recruited at a tertiary medical center in northern Taiwan from January 2009 through to June 2010. Approval for the study was obtained from the Taipei Veterans General Hospital's ethics committee, and informed consent was obtained from all patients (Veterans General Hospital Institutional Review Board (VGHIRB) No.: 98-01-20A; Clinical Trial Registration: NCT00860002). Based on a previous study of surgical time and our preliminary data for the SSMI operative time, we used mean ± standard deviation (SD) for the SSMI and conventional groups, respectively, as the primary criterion in our power analysis ($p = 0.85$, $\alpha = 0.05$, equal sizes for both groups and a two-tailed test) to calculate a minimum sample size of 50 patients for each group. Assuming a 10% dropout rate, the trial protocol specified a sample of patients.

A total of 132 patients scheduled for elective LM were screened in this study. The inclusion criteria were female, aged 30–45 years, and an American Society of Anesthesiologists physical status classification of I or II. Only intramural-type myomas >3 cm in diameter, as measured by ultrasound, were included in the study. Patients were excluded if their disease was malignant, if they needed additional adnexal surgery ($n = 8$) or if they were unwilling to participate ($n = 2$). Finally, data for 122 patients were analyzed. All the patients received routine preoperative preparation, which included the taking of a full history, a clinical examination, and laboratory testing. A review of the LM surgical records was performed, and the study population was classified into two groups: conventional LM ($n = 68$) was performed in the first 11 months of the study (January–November 2009), and the SSMI technique ($n = 54$) was applied in all cases after December 2009 (December 2009–June 2010).

All procedures were performed by a single surgeon at a single institute during the study period. The surgeon is familiar with LM surgery and since January 2007 has performed >300 cases. The postoperative assessment was performed by independent investigators.

Surgical procedures

All surgical procedures were performed under general endotracheal anesthesia with the patient in the Trendelenburg position and the bladder catheterized. The Kronner uterine manipulator (Kronner Medical Manufacturing, Roseburg, Oregon, USA) was inserted through the cervix and into the uterus.

SSMI group

Pneumoperitoneum by insufflation with carbon dioxide was established either with the use of a Veress needle, for patients without prior surgery, or by the open method with a 1.2-cm umbilical incision, for patients with history of surgery. A primary 10-mm trocar was inserted through the umbilicus to introduce the videolaparoscopic system (Karl Storz). Three other accessory 0.5-cm trocars were inserted; two were 2 cm above the anterosuperior iliac spines and lateral to the rectus abdominis muscle, and the third was placed at the suprapubic area, to facilitate insertion of laparoscopic operative instruments. A panoramic 360° evaluation of the pelvis was performed to check for adhesions and other pelvic pathology, which could complicate the procedure. Vasoconstrictive solution (vasopressin 20 μ/mL diluted in 60 mL of saline solution) was injected at various points over the dome of the uterus and at the uterine attachment to the myoma. The left lower quadrant port was then converted to a 1.2-cm incision for insertion of the morcellator (Karl Storz). The SSMI group underwent three steps: (1) the upper half of the myoma was enucleated by morcellation (Figure 1A–C); (2) the residual lower half was enucleated by sharp dissection down to the myoma base (Figure 1D); and (3) myometrial edges were reapproximated in two layers with interrupted figure-of-8 intracorporeal knots (Polysorb 0) prior to morcellation of the isolated lower half of the myoma (Figure 1E and F). Hemostasis was assured. A closed wound vacuum reservoir (CWV) drain was inserted and placed in the cul-de-sac. The 1.2-cm abdominal incisions were closed in two layers (Polysorb 2-0,

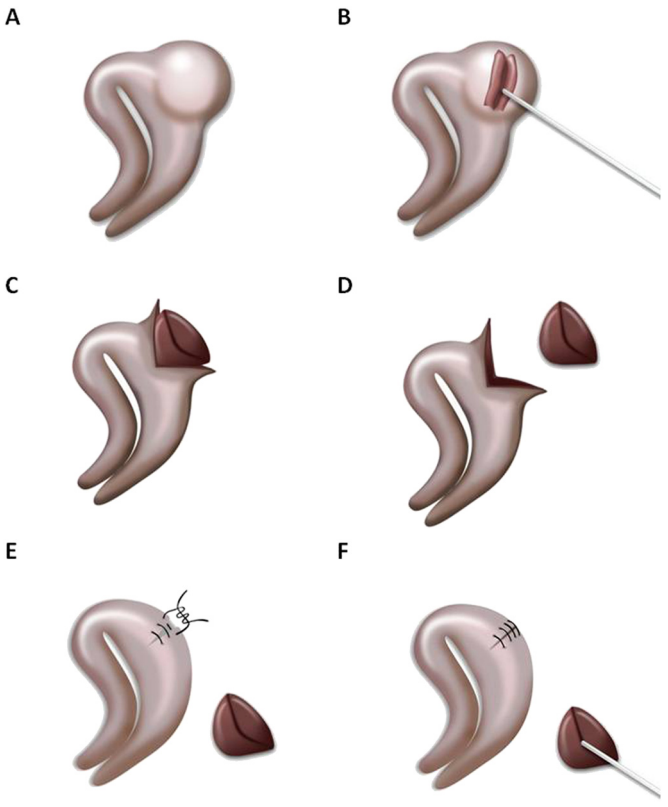

Figure 1. Illustration of laparoscopic myomectomy with semisimultaneous morcellation *in situ* in three steps. Step 1: (A) Identification of location of intramural myoma. (B) Enucleation of the upper one half of the myoma by morcellation. Step 2: (C and D) Enucleation of the lower half of the myoma from its attachment to the myometrium by sharp dissection. Step 3: (E and F) Reapproximation of myometrial edges with interrupted figure-of-8 sutures and then morcellation of the enucleated lower half of the myoma.