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Original Article

Timing for a Laparoscopic Myomectomy During the Menstrual Cycle

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ABSTRACT **Objective:** To determine whether the different phases (follicular phase, luteal phase, or menstruation) of the menstrual cycle could affect the operative blood loss during a laparoscopic myomectomy.
Design: Retrospective comparative study.
Setting: University hospital.
Patients: A total of 220 patients who underwent a laparoscopic myomectomy were classified into the follicular phase (n = 90), luteal phase (n = 93), and menstruation group (n = 37) on the basis of the adjusted day of the menstrual cycle.
Interventions: Laparoscopic myomectomy.
Measurements and Main Results: The operative blood loss during the laparoscopic myomectomy was measured. The baseline demographics (age, body mass index, and myoma characteristics) were similar among the 3 groups. No significant differences were observed in the operative blood loss (p = .231) and in the hemoglobin change (p = .526) among the 3 groups. In addition, no other statistical differences were found in terms of the other operative results, including the operative time, the length of hospital stay, and operative complications.
Conclusions: The different phase of the menstrual cycle had no effect in the operative blood loss during laparoscopic myomectomy. Therefore, the menstrual cycle is not an important factor to determine the optimal timing of a laparoscopic myomectomy.
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Keywords: Blood loss; Laparoscopy; Menstrual cycle; Myomectomy; Timing

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Uterine myomas, which are also referred to as leiomyomas or fibroids, are the most common benign tumors. These affect 40% to 70% of women of reproductive age, and myomectomy is the preferred surgical option for patients who want to preserve their fertility or uterus [1–3]. With technical improvements and an increase in demand for minimally invasive surgery, laparoscopic myomectomy has become the treatment of choice for patients with a symptomatic fibroid. However, the operative blood loss during laparoscopic myomectomy is a major concern for surgeons because it is 1 of the most important causes of perioperative morbidity. As a result, many strategies have been introduced to reduce the operative blood loss during laparoscopic myomectomy, such as vasopressin, gonadotropin-releasing hormone agonists, tourniquet, and uterine artery occlusion [4–6].

A hormonal variation during the menstrual cycle is known to affect hemostasis [7] and the blood flow of the genital organ [8,9]. Recent studies have also demonstrated that rhinoplasty and mammoplasty caused more bleeding during the luteal phase and menstruation than during the follicular phase [10,11]. Some surgeons hesitate to perform a laparoscopic myomectomy during the luteal phase or menstruation to reduce operative blood loss. However,

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there has been no study about the timing for a laparoscopic myomectomy during the menstrual cycle. Therefore, we performed this retrospective study to determine whether the different phases (follicular phase, luteal phase, or menstruation) of the menstrual cycle could affect operative blood loss during a laparoscopic myomectomy.

Materials and Methods

Study Design and Participants

After the institutional review board approval, we performed a retrospective review of patients who underwent laparoscopic myomectomy for symptomatic myomas at the Kangbuk Samsung Hospital between January 2012 and January 2015. Patients who had the following were excluded: abnormal menstrual cycle; any suspicious findings of gynecologic malignancies; pregnant or menopausal status; intrauterine device use; taking any medication (or injection) (e.g., oral contraceptive, gonadotropin-releasing hormone agonist, medroxyprogesterone acetate, or anticoagulants); and other disease that might affect the menstrual cycle or hemostasis.

The primary aim of the study was to evaluate whether the difference phases of the menstrual cycle could affect operative blood loss during laparoscopic myomectomy. The phase of the menstrual cycle was determined based on the operation date in the menstrual cycle. Patients who were menstruating on the day of the surgery were classified into the menstruation group. If patients were not menstruating, the menstrual dates of these women were normalized to a 28-day cycle by using the following formula: adjusted day of the menstrual cycle = (14 × day of the cycle at the time of surgery) ÷ (cycle length of the patient − 14) [12]. In light of this formula, the remaining patients were further classified into the follicular phase group (defined as <15 adjusted days) or the luteal phase group (defined as ≥ 15 adjusted days).

All of the menstrual data, including the date of their last menstruation, duration of the menstruation, duration of the menstrual cycle, and regularity of the menstrual cycle, were abstracted from the medical records. Demographic characteristic data, including age, body mass index, parity, abdominal operation history, characteristics of the myoma (number, largest diameter, and location), and endometrial thickness (measured by transvaginal sonography on the day before the surgery), were also obtained. The operation time was defined as the time from the first skin incision to skin closure, which was electronically recorded. The operative blood loss was calculated by the anesthesiology unit as the difference between the total amount of suction and irrigation plus the difference between the total gauze weight before and after the surgery. The hemoglobin change was defined as the difference between preoperative hemoglobin and hemoglobin at the first postoperative day. The failure of the intended operation was defined as the use of ≥ 1 additional ports or conversion to laparotomy. The additional procedures included ovarian cystectomy, salpingectomy, hysteroscopy, and cervical conization, which influence the operative time and the operative blood loss. The data on the length of postoperative hospital stay (from the operation day to the day of discharge), intraoperative complications (e.g., major vessel injury, bowel injury, urinary tract injury, etc.), and postoperative complications (e.g., postoperative febrile morbidity, gastrointestinal problems, urinary tract infection, wound infection, etc.) within 30 days of surgery were also collected.

Surgical Procedure

The attending gynecologic surgeons performed all of the surgeries at a single institution. All participating surgeons had comparable surgical skills and a preference for laparoscopic surgery. After administering general anesthesia, the patients were placed in the Trendelenburg position. The port placement system (single-port or multiport) was determined according to each surgeon's preference and the patient's condition. In the case of a single-port laparoscopic myomectomy, a single multichannel port was inserted through the umbilicus. In the multiport laparoscopic surgery, 2 5-mm trocars were inserted in the umbilicus and in the left upper quadrant, respectively, and a 12-mm trocar was used in the suprapubic area. The surgical methods for the port placement have been previously described in detail [13,14]. Before initiating the uterine incision, a local vasoconstrictor, such as dilute vasopressin, was injected into the serosal and/or overlying myometrium, and just around the myoma, to reduce blood loss. A Harmonic Scalpel (Ethicon Endo-surgery, Cincinnati, OH) was used to make a longitudinal myometrial incision over the myoma. After the cleavage plane was identified, the myoma was enucleated by adequate traction with a laparoscopic myoma screw or forceps. Coagulation of significant bleeding was achieved with bipolar forceps. The defect in the myometrial and serosal layers was repaired with Vicryl 1-0 (Ethicon, Somerville, NJ) [15] or V-Loc 180 (Covidien, Mansfield, MA) sutures [13], in the same manner as previously reported, in a single or a double layer, depending on the size and depth. For the single-port laparoscopic myomectomy, the enucleated myomas were placed into the specimen retrieval endopouch and were transumbilically removed with a knife morcellation that was protected with a wound retractor connected to a single-port system. For the multiport laparoscopic myomectomy, the enucleated myomas were removed with a power morcellator (Gynecare Morcellex tissue morcellator; Ethicon) through the 12-mm trocar site. The procedure was completed by establishing control over the uterine hemostasis, washing the pelvic cavity, and absorbing any clots that had formed. The peritoneum, fascia, and subcutaneous tissue were then approximated and closed layer-by-layer using the 2-0 Vicryl suture (Ethicon). Skin adhesive (Dermabond; Ethicon) was then used to close the incision.

Statistical Analysis

Statistical analyses were performed using SPSS (version 20.0, IBM, Armonk, NY). Mean ± SD or median (range) was used to describe the distribution of data after the normality of the data was checked. The baseline demographic characteristics and surgical results in the study groups were compared using the Kruskal-Wallis test or the analysis of variance for continuous variables and the χ^2 test or Fisher's exact test for categorical variables, as appropriate. Statistical significance was set at $p < .05$, and all reported p values were 2-sided.

Results

During the study, a total of 239 patients who underwent laparoscopic myomectomy were identified. Among them, 19 patients were excluded from the study primarily because of irregular menstruation (n = 1), prolonged menstrual cycle (n = 8), prolonged menstruation (n = 3), the presence of an intrauterine device (n = 1), disseminated myoma in the