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BRIEF COMMUNICATION

The Largest Uterine Leiomyoma Removed by Robotic-Assisted Laparoscopy in the Late Reproductive Age: A Case Report

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Uterine leiomyoma is a very common gynecological tumor in the reproductive years. Recent studies have shown that surgical treatment of uterine leiomyoma using robotic-assisted laparoscopic myomectomy (RALM) is associated with significantly fewer complications, lower estimated blood loss, fewer conversions, and less bleeding than conventional laparoscopic myomectomy. This study reports the case of a giant uterine leiomyoma treated using RALM. A 50-year-old woman was referred to our outpatient clinic with progressive abdominal distension. Ultrasonography and magnetic resonance imaging were performed and showed a markedly enlarged uterus containing a 28-cm uterine myoma. RALM confirmed the 28-cm subserosal myoma on the posterior wall of the uterus. The myoma was enucleated, and the myometrial and serosal defect was repaired with a continuous suture using barbed suture materials. The entire myoma was removed using an electric morcellator. The operation lasted for 190 minutes. The total weight of the removed myoma was 3,262 g, and uterine leiomyoma was pathologically diagnosed. There were no postoperative complications. Although the treatment of huge myomas using RALM is controversial and technically demanding, we successfully performed RALM in a patient with a large myoma. This case confirms the efficiency, reliability, and safety of a robotic-assisted laparoscopic approach for removing a huge myoma. In a well-selected case, RALM can be performed by experienced surgeons regardless of the size of fibroids.

Key Words: Leiomyoma, Morcellation, Myoma, Myomectomy, Robotic surgical procedures

INTRODUCTION

Uterine leiomyoma is a very common gynecological benign tumor in the reproductive age. Although most women with myomas are asymptomatic, but may cause symptoms, such as pain, abnormal uterine bleeding, menorrhagia, and dysmenorrhea. There are various treatment options for myoma. Recent studies have shown that surgical treatment of uterine leiomyoma with robotic-assisted laparoscopic myomectomy (RALM) has many advantages such as fewer complications and reduced length of hospitalization. Although using robotic-assisted laparoscopy to treat giant fibroids is still controversial and technically tricky, we have been able to successfully perform RALM on giant fibroids. The case report suggests that RALM may be an efficient, reliable and safe method for treating giant fibroids.

CASE REPORT

A 50-year-old, woman with parity 2 visited our outpatient clinic of the department of gynecology with progressive abdominal distension and dyspnea. Her past medical and gynecologic history was otherwise unremarkable. Familial history of any disease was not reported. Her menstrual cycle was regular and the last menstrual period was May 27, 2020. The 17.5-cm mass,

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as measured by transabdominal sonography, was extended to the xiphoid process. On magnetic resonance imaging (MRI) scan, a large, 28-cm solid mass originating from the uterus was found (Fig. 1); subserosal myoma was suspected rather than malignancy. The results of preoperative laboratory testing, including a complete blood count, serum electrolyte levels, biochemical tests, and tumor markers such as carbohydrate antigen 19-9 (CA 19-9), the risk of ovarian malignancy algorithm (ROMA) score, human epididymis protein 4 (HE4) were within normal limits, except for a slight increase in carbohydrate antigen 125 (CA 125; 69.3 U/mL). We did not check the level of lactate dehydrogenase (LDH) known to increase in uterine sarcoma. Based on these results, a giant subserosal myoma was suspected. It was decided to remove the myoma.

She underwent a RALM. The operation was performed using the da Vinci Xi system (Intuitive Surgical, Sunnyvale, CA, USA). The patient was placed in a low dorsal lithotomy position with shoulder pads after general endotracheal anesthesia was administered. The bladder was drained with a Foley catheter, and a uterine manipulator (RUMI uterine manipulator; CooperSurgical, Trumbull, CT, USA) was placed. A vertical incision, about 2 cm in length, within the umbilicus was made under direct visualization to enter the abdominal cavity, and a wound retractor and a Tropian Single port RUS-300 (TROPIAN TECH, Seoul, Korea) was inserted. In general, Tropian Single port RUS-300 is used for single port laparoscopic surgery, but in our hospital, it is used to reduce the number of insertion sites by using the extra port of Tropian Single port RUS-300 on umbilical trocar as an assist port. Pneumoperitoneum was achieved through the umbilical trocar. Two instrumental trocars were placed after pneumoperitoneum was obtained. The umbilical trocar was used for the camera to provide view and allow for the operation of instruments. Two other trocars for use with the robotic arm were placed on either side of the umbilical trocar. In the pelvic cavity, the enlarged uterus was revealed, and the myoma was on the posterior wall of the uterus with a maximum diameter of 28 cm (Fig. 2). The myoma was enucleated totally and the myometrial and serosal defect was repaired with a continuous running suture using the barbed suture materials (Stratafix™; Ethicon, Somerville, NJ, USA). The entire myoma was removed using an electric morcellator (Morce Power Plus; Richard Wolf GmbH, Knittlingen, Germany) (Fig.

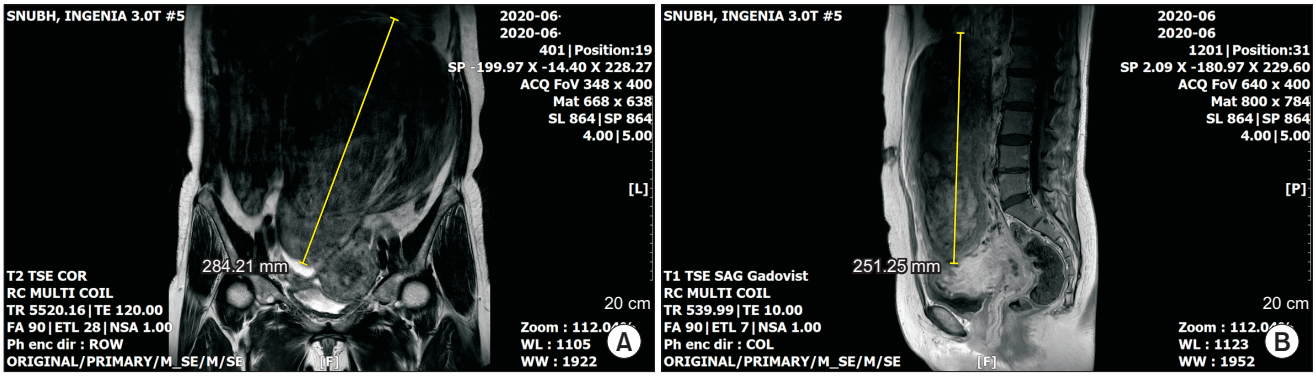

Fig. 1. Magnetic resonance imaging view of uterine myoma. (A) Coronal view. (B) Sagittal view.

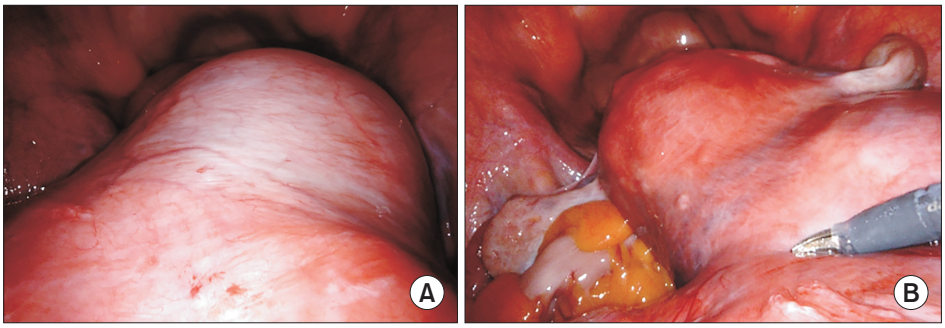

Fig. 2. (A, B) Robotic-assisted laparoscopic view of uterine myoma.

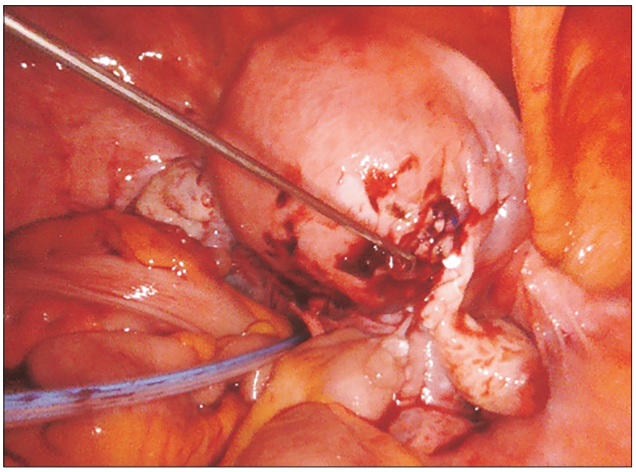

Fig. 3. After the removal of huge myoma, the myometrial and serosal defects were repaired by a barbed suture (Stratafix; Ethicon, USA), Jackson-Pratt drain was inserted in the pelvic cavity for monitoring of bleeding.

3). The total operative time was 190 minutes, and the total weight of the removed myoma was 3,262 g. The final pathological diagnosis was uterine leiomyoma. Preoperative hemoglobin level was 12.8 g/dL and the estimated blood loss during surgery was 500 mL. There was no blood transfusion during the operation. Postoperative hemoglobin level was 8.9 g/dL at the first day after operation; therefore, 1 pack of red blood cell was transfused. The hemoglobin level of 1 hour after transfusion was 9.9 g/dL. There were no postoperative complications, except the need for a transfusion of red blood cells. The patient was discharged on the second postoperative day.

DISCUSSION

Uterine leiomyoma is a very common gynecological benign tumor that arises from the smooth muscle and connective tissue in the myometrium [1]. Although most women with myomas are asymptomatic, but may cause symptoms, such as pain, abnormal uterine bleeding, menorrhagia, and dysmenorrhea [2], and cause various clinical manifestations depending on the size, location, and number of the myomas.

There are various treatment options for myoma. The appropriate treatment option of myoma depends on multiple factors, including age, fertility wishes, severity of symptoms and clinical presentation, type and size of the myomas, and patient's overall health, with an emphasis on the medical and surgical history of ongoing treatments [2]. According to a series of recently published papers, there has been a decreasing trend in hysterectomies as a treatment for myoma. On the other hand, there has been an increasing trend in surgeries or procedures to preserve the uterus, such as myomectomy, especially laparoscopic or RALM [3]. Myomectomy, which can be carried out using hysteroscopy, laparoscopy, laparotomy, or robotic-assisted technique, is the treatment of choice and gold standard for these patients [1,2].

The da Vinci robotic surgical system (Intuitive Surgical) was approved by the U.S. Food and Drug Administration (FDA) in 2000 [4], and subsequently in 2005, the FDA approved the use of da Vinci robotic surgical system in gynecologic surgery [5]. Since then, interest in robotic-assisted surgery has been increasing, and in our institution, the number of cases of RALM has increased by more than 3 folds in 2019 compared with 2018 (56 cases vs. 189 cases).

In this case, the entire myoma was successfully removed with robotic-assisted laparoscopic surgery. The use of robotic-assisted laparoscopy to treat huge myoma still remains controversial and a challenge. According to a literature search, the use of laparoscopic or robotic-assisted laparoscopic myomectomy (RALM) to treat huge myoma is very rare. In a case report published in 2015, a 17-cm myoma was successfully removed with laparoscopic myomectomy [1]. In addition, Takmaz et al. [6] also reported a case of successful removal of a 16-cm-sized myoma using RALM in 2019. In a previous retrospective study [7], it was asserted that the size of myoma that can be excised by laparoscopy may be limited to less than 8 cm or 10 cm. However, a recent case report suggests that the indication may vary depending on the location or type of myomas rather than the size of myomas.

In a study published in 2010, the mean duration of surgery was significantly increased in RALM than in open myomectomy when the number of myomas was 3 or less; however, blood loss, change in hematocrit after surgery, and length of stay were significantly reduced. There was no significant difference in the number of complications [8].

In this case, we performed power morcellation when the leiomyoma was removed from the pelvic cavity. Uterine morcellation is a technique performed to remove a uterus or leiomyoma through a small incision, allowing minimally invasive surgery [9]. An electric morcellator was introduced in 1993 and was approved

by the FDA in 1995 [10]. In November 2014, the FDA issued a warning about the safety of power morcellators because of the risk of unsuspected leiomyosarcoma or disseminated peritoneal leiomyomas in the patients undergoing hysterectomy or myomectomy to treat the leiomyomas [9].

However, uterine sarcomas are very rare tumors accounting for only 3% of uterine malignancies. According to a systematic review that included 160 studies of the Agency for Healthcare Research and Quality in 2017, the prevalence of leiomyosarcoma was reported < 1/10,000 to 1/770 in women who were presumed leiomyoma before surgery [11].

In 2019, the American College of Obstetricians and Gynecologists (ACOG) Committee Opinion recommends a minimally invasive approach when performing surgery on presumed leiomyoma, taking into account the risks and benefits of the minimally invasive and abdominal approach [9]. This is because the abdominal approach is associated with venous thromboembolic complications, blood transfusions, intestinal perforation, fever, wound infection, increased hospital stay, decreased quality of life, and increased mortality compared to the minimally invasive approach.

In 2016, Cho et al. [12] suggested that the independent preoperative predictive factors of uterine sarcoma. As a result of multivariate analysis, lower body mass index (BMI ≤ 20), increased neutrophil-to-lymphocyte ratio (NLR > 2.1), and increased sized of leiomyoma (largest-lesion diameter > 8 cm) were independent predictive factors of uterine sarcoma [12]. In the present case, although the size of leiomyoma was very large on MRI and ultrasonography, the patient's BMI was 27.96 kg/m^2 and NLR was 1.13 (lymphocyte: 3,358.3 cells/μL, neutrophil: 3,787.85 cells/μL). And the uterine lesion was presumed subserosal myoma that was separated from the endometrium on MRI. Tumor markers were within normal limits, except for a slight increase in CA 125 (69.3 U/mL). In patients with leiomyomas, CA 125 could be slightly increased, so when the imaging and other factors were combined, it was presumed to be leiomyoma rather than malignant leiomyosarcoma. Previous studies showed that preoperative serum LDH may be elevated in leiomyosarcoma, but it was difficult to detect leiomyosarcoma only by measuring LDH [13].

As recommended by the FDA and ACOG, leiomyomas are removed from the pelvic cavity by power morcellation should ensure that there is no possibility of malignancy, and the risk and benefit should be assessed. And the risk of leiomyosarcoma and disseminated peritoneal leiomyomas are explained to patients and the surgeon should efforts to minimize that risk [9,14].

RALM is becoming a more popular surgical approach for the management of uterine myomas. Principal limitations of RALM include increased operative time, resultant cost, and absence of haptic sense [4]. These limitations appear to be overcome with technological advances and improved surgical skills of a surgeon. RALM is often evaluated as overcoming the limitations of the laparoscopic myomectomy due to increased freedom, reduced effect of instrument fulcrum, and three-dimensional visualization [15].

Although the use of robotic-assisted laparoscopy to treat huge myomas remains controversial and technically demanding, we were able to successfully perform RALM in a patient with giant myoma. The case presented here suggests that RALM could be efficient, reliable, and safe method to treat a giant uterine myoma. Therefore, RALM can be considered a feasible alternative to traditional abdominal myomectomy in patients with huge myoma. RALM can be performed by experienced surgeons regardless of the size of myoma after careful preoperative evaluation of the location and type.

CONFLICT OF INTEREST

Jung Ryeol Lee has been an editor-in-chief of *Journal of Menopausal Medicine* since 2019; however, he was not involved in the peer reviewer selection, evaluation, or decision process of this article. No other potential conflict of interest relevant to this article was reported.

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