

# Laparoscopic Myomectomy for Very Large Myomas Using an Isobaric (Gasless) Technique

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## ABSTRACT

**Objectives:** Laparoscopic myomectomy using pneumoperitoneum for large myomas ( $\geq 8$  cm) is hindered by several factors, such as the increased operative time, the risk of perioperative bleeding, and the risk of conversion to laparotomy. With the introduction of isobaric laparoscopy using abdominal wall lifting, this procedure can be performed using conventional surgical instruments introduced through small abdominal incisions. The aim of this study was to evaluate the feasibility, reproducibility, and safety of isobaric laparoscopic myomectomy for very large myomas  $\geq 10$  cm using a subcutaneous abdominal wall-lifting device.

**Methods:** A series of 24 consecutive patients with at least 1 symptomatic myoma  $\geq 10$  cm underwent a gasless laparoscopic myomectomy with the Laparotenser device. Conventional long laparotomy instruments were used.

**Results:** Gasless laparoscopic myomectomy was successful in all 24 consecutive patients. The size of the dominant myoma varied from 10 cm to 20 cm. The median operating time was 93 minutes. The median postoperative drop in hemoglobin was 2.8 g/dL. No surgical complications occurred. The median hospital stay was 2.8 days.

**Conclusion:** Gasless laparoscopic myomectomy is feasible, reproducible, and safe for removing very large myomas. Therefore, it can represent an excellent option for the minimally invasive removal of very large myomas.

**Key Words:** Very large myomas, Isobaric gasless laparoscopy, Myomectomy, Subcutaneous abdominal wall lifting device.

## INTRODUCTION

Uterine myomectomy is the preferred treatment for women who desire to preserve their reproductive apparatus. It has been documented that the laparoscopic approach offers several advantages in opposition to laparotomy, such as shorter hospitalization, reduced postoperative pain, and lower risk of postoperative adhesions.<sup>1,2</sup> However, it has been reported that laparoscopic myomectomy for large myomas ( $\geq 8$  cm) is hindered by several factors, such as their more difficult cleavage, the increase in operative time, the risk of perioperative bleeding, the risk of conversion to laparotomy.<sup>3</sup>

Generally, an analysis of the main reports about laparoscopic myomectomy demonstrates that the procedure is used more frequently for small- and medium-sized myomas (average diameter, 5 cm).<sup>4–11</sup> Reports of only a few series on laparoscopic removal of large myomas have been published.<sup>7,12,13</sup>

Since the more recent introduction of isobaric laparoscopy using abdominal wall lifting, the first reports on gasless laparoscopic myomectomy have been published.<sup>14,15</sup> This procedure, which can also be performed with the patient under local and regional (epidural or spinal) rather than general anesthesia, can be performed using conventional surgical instruments introduced through small abdominal incisions. This opportunity can allow removal of uterine myomas more rapidly and safely, as in laparotomy.

The aim of this study was to evaluate the feasibility, reproducibility, and safety of isobaric laparoscopic myomectomy for very large myomas  $\geq 10$  cm using a subcutaneous abdominal wall-lifting device.

## METHODS

A series of 24 consecutive women with at least 1 large symptomatic subserosal or intramural uterine myoma  $\geq 10$  cm underwent an isobaric laparoscopic myomectomy. The indications for surgery included pelvic pain, lower abdominal discomfort, abnormal uterine bleeding, menometrorrhagia, infertility, and pressure symptoms from a pelvic mass. Some women exhibited more than 1 indication. Fifteen women wished to preserve fertility be-

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cause they wanted a child; the remaining 11 preferred in any case to preserve the uterus. Preoperative evaluation comprised obtaining hemoglobin and hematocrit levels, bimanual examination, abdominal and transvaginal sonography, and hysteroscopic examination of the uterine cavity. Gonadotropin releasing hormones agonists (GnRH-a) were prescribed only in those cases where anemia and low hematocrit due to excessive uterine bleeding were present. Treatment consisted of intramuscular administration of depot triptorelin every 4 weeks for 3 months.

Procedures were performed with the patients in the Trendelenburg position up to 30 degrees. Uterine cannulation was always used to achieve optimal exposure of the myoma. The surgical technique was always the same. Initially, subcutaneous lifting of the anterior abdominal wall was obtained by using the Laparotenser device (Lucini Surgical Concept, Milan, Italy). Two curved "pluriplan" needles with blunt tips were introduced subcutaneously through 2 very small (2 mm) pubic skin incisions. They were suspended from a mechanical arm attached to a rigid pillar, and the arm was then elevated as far as necessary to obtain optimal exposure. Successively, primary access was achieved by insertion of a 10-mm to 11-mm trocar through a vertical intraumbilical incision after lifting the abdominal wall with the Laparotenser. Under direct visualization, 2 lower incisions lateral to the rectus muscles were made without using trocars. On the right side, the lower incision was 15 mm (at most, up to 20 mm); on the left, it was 10 mm. Conventional long laparotomy instruments were used. The sole laparoscopic instruments used were the irrigation-suction cannula and the bipolar cautery. The ancillary right access permitted the insertion of  $\leq 3$  instruments; the left permitted insertion of 2 instruments.

Hysterotomy was performed transversally on the prominent part of the principal myoma along its maximum diameter using a low voltage electrode (monopolar scissors or hook). Hemostasis of the smallest intramyometrial vessels was achieved progressively using precise bipolar coagulation. Sharp dissection with Metzenbaum scissors allowed creation of the avascular cleavage plane separating the tumor and the surrounding myometrium. Enucleation was then executed by traction on the myoma with 2 strong Tenaculum clamps, associated with countertraction on the uterus with narrow ring forceps that facilitated dissection. The grasped myoma was then pulled hard toward the anterior abdominal wall or upward. The connective tracts adhering to the myoma were coagulated and sectioned with conventional scissors. Similarly, the major

vessels afferent to the myoma were clamped with conventional instruments and coagulated. The bed of the myomectomy was usually free of bleeding because great care had been taken in achieving hemostasis.

The uterine defect was repaired, using a conventional long needle holder, in 2 continuous layers with poligle-caprone 25, a synthetic adsorbable, monofilament suture, 135-cm long, mounted on a 39-mm curved needle with atraumatic tip. The suturing was begun at the right superior edge of the hysterotomy area and was pushed into the myometrium towards the opposite side. In succession, the level of the left inferior edge was arrived at, and the second continuous serosa-to-serosa suturing was completed from the left side toward the right one up to the apex. At the level of the right apex, intracorporeal knot tying was used to secure the suture ends with the aid of the index finger, introduced through the ancillary right access.

The myomas were extracted from the abdominal cavity by morcellation with scissors or a scalpel. The myoma was grasped by 2 opposite Tenaculum clamps and converted into thin strips of tissue by using conventional scissors or knives. The myoma strips were removed through the ancillary right port.

## RESULTS

Isobaric laparoscopic myomectomy using the Laparotenser device was successful in all 24 consecutive patients. The mean age of the women was 41 years (range, 30 to 49). The number of myomas removed from each patient ranged from 1 to 4 (average, 2.3). In 5 cases (20.8%), multiple myomectomies were performed. The location of the principal myoma was intramural in 10 patients (41.6%) and subserosal in 14 (58.3%). The size of the dominant myoma varied from 10 cm to 20 cm (average, 11.0 cm). The site of the major myoma was anterior in 8 patients, fundal in 9, and posterior in 7. The median postoperative drop in hemoglobin was 2.8 g/dL (range, 2.3 to 4.3 g/dL). No transfusions were required. The mean operating time was 93 minutes (range, 55 to 150). The mean inserting Laparotenser time was 3.5 minutes (range, 2 to 5). The hospital stay was 1 day to 3 days (average, 1.9).

No significant operative benefit (reduced blood loss during surgery, lower operative time) was found in those cases where gonadotropin therapy was administered. No intraoperative complication occurred, and no repeat operation was necessary. The only postoperative complication observed was fever  $>38^{\circ}\text{C}$  in 5 cases. Fever regressed

in 1 day to 3 days through antibiotic and NSAID administration. No infectious complications (urinary tract, endometritis, pelvi-peritonitis) occurred. No injury to epigastric vessels was observed. No conversion to laparotomy or hysterectomy was necessary. No anesthesia complications occurred. No patient complained of significant abdominal postoperative discomfort, secondary to the abdominal lifting. Right shoulder pain, a common finding after pneumoperitoneum, was observed in no patient. No postoperative herniation was found.

At the 12-month postoperative follow-up, the main symptoms before surgery had disappeared.

## DISCUSSION

Disagreement still exists concerning the usefulness of laparoscopic myomectomy in treating patients with large symptomatic leiomyoma. Actually, laparoscopic myomectomy using pneumoperitoneum for large intramural myomas is considered a difficult and time-consuming procedure, requiring great skill to move a large uterus; to locate, grasp, enucleate, and remove a bulky myoma from the abdominal cavity; to achieve adequate hemostasis; and to repair the ample uterine defect.<sup>16</sup>

In the literature, a few reports are available on removal of large myomas by laparoscopy with pneumoperitoneum. Malzoni et al<sup>17</sup> reported average sized 7.8-cm myomas with a range of 5 cm to 18cm, a 1.39% laparotomy conversion rate, an operating time ranging from 58 minutes to 180 minutes with an average of 95 minutes, and 2.08% overall complication rate. Sinha et al<sup>18</sup> reported on 51 women with at least 1 myoma larger than 9cm. The largest myoma removed was 21 cm. Mean myoma weight was 698.47 g (range, 210 to 3400). Mean operating time was 136.67 minutes (range, 80 to 270). Mean blood loss was 322.16 mL (range, 100 to 2000). One patient developed a broad ligament hematoma, 2 developed postoperative fever, and 1 underwent open subtotal hysterectomy 9 hours after surgery for dilutional coagulopathy. The authors concluded that myomectomy by laparoscopy is a safe alternative to laparotomy for very large myomas. Takeuchi and Kuwatsuru<sup>19</sup> found that when the myomas were larger than 10 cm, the blood loss and operating time were increased. However, the number of myomas did not correlate with blood loss. They concluded that laparoscopic myomectomy appears to offer a number of advantages if the myoma is not larger than 10 cm.

Therefore, it was suggested that myomas should not exceed 8 cm maximum in diameter, because their cleavage is more difficult, the operating time increases, and the risk

of perioperative bleeding is elevated.<sup>3</sup> Hence, large intramural myomas >8 cm are usually removed by laparotomy.

To overcome the limits associated with laparoscopic myomectomy using pneumoperitoneum and to preserve the advantages of the minimally invasive surgery, isobaric (gasless) laparoscopic myomectomy was developed. Chang et al<sup>4</sup> reported preliminary results on a small series of patients. The size of the myomas ranged from 6.5cm to 12 cm (mean, 7.96). Mean operative time was 104 minutes (range, 78 to 165). The average blood loss was 201 mL (range, 90 to 580). No major complication occurred during the operation or follow-up.<sup>5</sup> Conversion to laparotomy was necessary in 1 patient because of moderate pelvic adhesions following previous abdominal surgery. They concluded that gasless laparoscopy might be useful in treating large symptomatic leiomyomas that would otherwise require more extensive surgery.

In accordance with our previous article,<sup>15</sup> the present study has confirmed that gasless laparoscopic myomectomy also allows the removal of very large myomas >10 cm through a minimally invasive procedure. Surgery was completed in all 24 consecutive patients. No conversion to laparotomy or hysterectomy was necessary. All parameters analyzed (operating time, blood loss, hospital stay) were optimal, despite sometimes having to deal with extremely large myomas (one myoma was 20 cm). Because we have found no significant operative benefit (reduced blood loss during surgery, lower operative time) in those patients preoperatively treated with GnRH agonists, and their use may increase the difficulty of fibroid enucleation, gonadotropin therapy should not be routinely used except in cases of preoperative anemia.

These satisfactory results can be explained by the advantages of the gasless laparoscopy over the conventional laparoscopy using pneumoperitoneum. First, the adverse effects and potential risks of CO<sub>2</sub> insufflation are eliminated. Second, because the peritoneal cavity does not need to be sealed airtight, conventional long laparotomy instruments, such as tissue clamps, Tenaculum clamps, needle holders, knives, and scissors can be utilized. This facilitates several steps of the procedure. For example, enucleation of the myoma with Tenaculum clamps exerting countertraction on the uterine edge with narrow ring forceps is simple and quick. One of the main advantages is the uterine repair, which in laparoscopy with pneumoperitoneum is usually bothersome and protracted for the difficulties associated with intracorporeal suture techniques. Instead, applying the conventional curved needle

deeply into the myometrium of the hysterotomy area with the laparotomy needle holder is trouble-free and fast. In this manner, we have quickly performed a double-layer continuous, not intersecting, closure. The first layer was passed deeply through the myometrium; the second was a continuous introflexing serosa-to-serosa suturing. Intra-corporeal knot tying was used to secure the suture ends with the aid of the index finger, introduced through the ancillary right access. Therefore, this closure warranted an optimal hemostasis and strength of the uterine scar.

A third advantage is the reduction in operative costs. Expensive, specialized laparoscopic instruments are not needed. In addition, the operating times are decreased because an optimal view can be maintained during irrigation-suction, the repair of the uterine defect is less time consuming and myoma morcellation by scissors or knives is faster.

Therefore, this procedure associates the advantages of laparoscopy and minimal access surgery with those of using the laparotomic instruments that are more reliable for uterine closure. In fact, when performing laparoscopic myomectomy, particular care must be given to the uterine closure, because a meticulous repair of the myometrium is essential to minimize the risk of uterine rupture during a subsequent pregnancy, labor, and delivery. So, myomectomy is just the gynecological surgery that can benefit more from this technique.

However, some criticisms have been made of the gasless laparoscopy. Many laparoscopists are worried about the increased postoperative pain, the need for additional abdominal incisions, the time required for the assemblage of the abdominal lifting system. But in the present series, no patient complained of significant abdominal postoperative discomfort, secondary to the abdominal lifting. The additional suprapubic skin incisions required for the subcutaneous introduction of the 2 curved needles with the blunt tips of the Laparotenser were very small (2 mm) and needed no suturing. Lastly, the Laparotenser can be effortlessly assembled. In our series, its mean inserting time was 3.5 minutes.

Other reports have been published on the use of abdominal lifting devices for gasless laparoscopic surgery.<sup>14,20–24</sup> Problems inherent in their use included suboptimal exposure in pelvic surgery because of a “tenting” effect and possible ischemic injury to the abdominal wall muscles from the retractor. Another kind of device consisted of subcutaneous long wires.<sup>25–27</sup> The Laparotenser utilizes this concept and provides subcutaneous lifting, which avoids muscle injury and has less “tenting” effect. In our

study, operative exposure was always as optimal as that achieved by pneumoperitoneum, in contrast to that observed by Chang et al<sup>14</sup> using an intraperitoneal lifting system. Therefore, the Laparotenser appears to be a reliable, effective, and safe device, achieving a larger internal operation theatre and avoiding local microtrauma and tissue overtension.

## CONCLUSION

Our results show that gasless laparoscopic myomectomy for removal of very large myomas using the subcutaneous lifting system Laparotenser is feasible, reproducible, and safe. It appears to offer several advantages over laparoscopy with pneumoperitoneum, such as elimination of the adverse effects and potential risks associated with CO<sub>2</sub> insufflation, use of conventional long laparotomy instruments that facilitate several steps of the procedure, reduction of the operative times and costs. Therefore, it can represent an excellent option for the minimally invasive removal of very large myomas, as an alternative to more aggressive surgery. However, further controlled studies on more extensive series are needed to better define its indications and long-term results.

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