

Laparoscopic-ultraminilaparotomic myomectomy (LUM)-laparoscopic-ultraminilaparotomic embolized myomectomy (LUEM). Surgical techniques

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Summary

Laparoscopic myomectomy has been performed for more than 20 years. More recently other techniques such as laparoscopically assisted vaginal myomectomy (LAVM) and laparoscopically assisted myomectomy (LAM) have also been introduced.

Laparoscopic-ultraminilaparotomic myomectomy (LUM) and laparoscopic-ultraminilaparotomic embolized myomectomy (LUEM), a new surgical technique which integrates laparoscopy and ultraminilaparotomy and embolization, laparoscopy and ultraminilaparotomy has been created by our group and has been found to be superior to the conventional laparoscopy for the treatment of uterine fibromas especially in large myomas > 9 cm.

This technique allows us to apply a suture on the uterine incision totally similar to the suture of a conventional laparotomy, by using the small breach of the cutaneous incision of the uterine morcellator (25 mm) and drawing the uterus below this abdominal aperture. This kind of surgical procedure is associated with presurgical embolization, that we call LUEM (laparoscopic ultraminilaparotomic embolized myomectomy) of the afferent vessels to the myoma in myomas with diameters equal or superior to 14 cm to avoid blood loss during the surgical procedure. Between June 1999 and March 2002, a total of 62 patients wishing to become pregnant were treated with this method. LUM allows us to increase the feasibility and safety of the operation, while assuring a better stability of the uterine suture and reduction of surgical time. LUEM has the advantages of LUM but permits in an absolutely hemostatic situation the application of laparoscopy in the surgery of large myomas superior to 14 cm.

Key words: Laparoscopy; Myomectomy; Laparoscopic myomectomy; Embolization; Minilaparotomy; Uterine suture; Rupture of uterus; Pregnancy; Hemostasis; Morcellation.

Introduction

Laparoscopic-ultraminilaparotomic myomectomy (LUM) is an integrated surgical technique which allows two main aims in the laparoscopic treatment of uterine fibromas to be achieved:

- a) reduction in operative time;
- b) increase in the feasibility and safety of the operation through an easier performance of the uterine suture.

This second aspect is very important when patients who wish to become pregnant undergo myomectomy.

Laparoscopic-ultraminilaparotomic embolized myomectomy (LUEM) dedicated to large myomas > 14 cm, combines LUM plus presurgical embolization of the vessels of the myoma and opens an enormous scenario in the utilization of embolic techniques in the preparation of a safe selective surgical procedure. Moreover, LUEM decreases the operative time.

In this study 62 patients wishing to become pregnant were selected. All of them were properly informed of the details of the operation and provided with an accurate informed consent.

Methods and Materials

Sixty-two patients wishing to become pregnant were enrolled and after giving an informed consent they underwent LUM and LUEM.

The median age was 32 years (range, 24-43 years); 68 fibromas were removed: the median diameter was 9.8 cm (range, 6-18 cm).

A 10 mm optic was used in 49 cases, a 3 mm optic in 11 cases and a 2 mm optic in two cases.

Three access routes, including the optic one, were used in all the operations.

The trochar of the morcellator, 25 mm or 12 mm in diameter, was inserted in the access area closer to the uterine incision which was performed in order to enucleate the fibroma or fibromas.

We used two catgut 0 sutures to anchor the parietal peritoneum to the skin, and one Vycril no. 0 or 1 suture (endoscopic or conventional).

A morcellator, 25 mm in diameter or 12 mm (both manual and electric), was used for the uterine morcellation.

The disposable retractor Lone Star Retractor System (Lone Star Medical Products Inc., Houston, TX, USA) was used to visualize the uterine wall.

Antibiotic treatment was performed as an intraoperative short-term therapy by using 2 g of third generation cephalosporin.

Four cases with fibromas 14-16 cm in diameter and another four (eight in total) cases with fibromas larger than 16 cm in

diameter were treated with presurgical embolization of the uterine vessels with excellent results.

The same day of the surgical procedure, the day before and also in the first case that was treated one week before surgery we performed selective embolization of the arterial afferent vessels to the myomas by inserting a microcatheter (3 Fr) with local anesthesia into the femoral artery. Microspheres of acrylic polymer covered with a pigis jelly with a diameter between 500-700 μ and 700-900 μ were placed in the catheter.

Digital angiography was used to perform fluoroscopy and X-ray images.

Embolization was preceded with a RMN of the uterus and myoma.

Surgical Technique

LUM is an integrated surgical technique which aims at the reduction, if not the elimination, of main drawbacks of both laparotomy and laparoscopy.

The laparoscopic part of LUM is utilized to visualize and locate the myoma(s) which have to be removed and to estimate the relationship of the uterus and the myoma(s) with the adjacent organs, and the relationship between the uterus and myoma. Then, the uterine fibroma(s) are enucleated by laparoscopy: we must try to incise the uterus where the myometrium covering the fibroma is thinnest. The operation proceeds with the enucleation of the fibroma, which has to be performed in the most bevelled way and with the least use of coagulation or mono or bipolar cuts. Morcellation of the enucleated fibromas follows. By means of a ligation needle, circle, a non-traumatic thread is introduced through the access route which is at the opposite side of the access route of the morcellator. Then application of a stitch which includes the edges of the uterine incision in the apex closer to the hole for the introduction of the morcellator is performed so that the two ends of the thread are extracted from this hole.

The stitch is not knotted, the needle is removed and the patient is put in the horizontal position removing the Trendelenburg and the pneumoperitoneum.

Applying a moderate traction on the heads of the stitch and, if necessary, with the help of a uterine manipulator, the uterine incision where the stitch has been applied is led below the aperture of the abdominal wall, after which a Lone Star retractor is positioned.

Then, we start to suture the uterine incision. The assistant, by applying traction on the last stitch made, alternately points out the right and the left edge of the incision which must be sutured. We use separate stitches or a running suture and, if necessary, a double layer suture or separate stitches with an introflexing knot. The quantity of tissue to be treated can vary according to the digital palpation of the uterine wall near the suture in order to reduce the possible dead space due to enucleation of the fibroma.

A good suture of the uterine incision is easily feasible with a small learning curve even in cases of rear, deep myomas.

Once the suture has been performed, the Trendelenburg is replaced and pneumoperitoneum restored in order to carry out the cleansing of the abdominal cavity and pelvis followed by an accurate and complete hemostasis and a check of the uterine suture.

During LUEM blood loss is practically absent and in cases with large myomas; an important detail is that the endoscopist has to look after the introduction of the trochar in the cranial part of the myoma.

The strategy of the surgical technique is to morcellate the myoma in utero and this is the gold standard of presurgical embolization of myomas.

Results

LUM is a new surgical technique for the enucleation of uterine fibromas which we performed in June 1999 for the first time. LUEM was introduced in March 2000. The cases included in this study were treated between June 1999 and March 2002.

If compared with other laparoscopic techniques for the enucleation of uterine fibromas, such as LM (laparoscopic myomectomy), LAVM (laparoscopic-assisted vaginal myomectomy) and LAM (laparoscopic-assisted myomectomy), LUM is safe and allows greater surgical accuracy in performing a uterine incision, it enables a valuable tension of the stitches and a digital evaluation of the uterine wall which must be sutured.

LUEM allows laparoscopic surgery of large (> 14 cm) myomas. The uterine incision is easier to perform and there is a wide range of choices as far as the type of suture and the type and size of suture thread are concerned.

All the operations which started with the application of the LUM technique finished with the same method, without any conversion to an abdominal procedure. No patient had fever in the postoperative period.

No uterotonic drugs were used either during the operation or after. No drainage system was used and the median hospital stay was 2.3 days (range, 2-5 days).

There were not retromyometrial hematomas (Table 1).

The median operation time for 9.1 cm median diameter fibromas was 73 min. This result shows a good correlation between the operation time and the feasibility of the surgery (Table 2).

LUEM incorporates all the advantages of LUM and has the revolutionary concept of utilizing pre-hemostasis to the surgical procedure.

Surgery obviously is the first hemostasis.

Table 1. — *LUM-LUEM (laparoscopic-ultramini-laparotomic myomectomy) safety related to performing the suture.*

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|--|
| Absence of myometrial hematomas |
| No conversion to other surgical techniques |
| Short-term antibiotic therapy |
| No use of uterotonic or antihaemorrhagic drugs |
| No blood transfusions |

Table 2. — *LUM-LUEM (laparoscopic-ultramini-laparotomic myomectomy) operating time.*

| | | |
|-----------------|------|---------------------------------|
| Signorile P.G.* | 2001 | 45-143 (median range 73 min.) |
| Signorile P.G.* | 2000 | 45-145 (median range 77 min.) |
| Nezhat C. | 1994 | 40-285 (median range 127 min.) |
| Dubuisson J.B. | 1995 | 40-330 (median range 130 min.) |
| Ostrzenski A. | 1997 | 127-246 (median range 163 min.) |
| Pelosi M.A. | 1997 | 49-170 (median range 92 min.) |
| Shushan A. | 1999 | 25-400 (median range 113 min.) |
| Silva B.A. | 2000 | 192-270 (median range 222 min.) |

*LUM-LUEM

Shorter surgical time allows a reduction in cost and anesthesia, of pneumoperitoneum time and the Trendelenburg position, with a relative reduction of CO₂ hypoxemia.

Follow-up is still insufficient in the evaluation of the other two aspects of this technique: post-surgical adhesions (only three re-operations were performed in patients due to relapsing fibromas) and pregnancy rate (three patients are pregnant at the moment) related to the problem of uterine rupture during the last three months of pregnancy.

Discussion

Today, many different techniques are employed in the treatment of uterine myomas: hysterectomy, sub-total, laparoscopic and abdominal hysterectomy, hysteroscopic techniques, artery embolization and myolysis, but few data exist to discern the optimum treatment [1].

Notwithstanding that hundreds of laparoscopic myomectomy operations have been described in the literature, this method is technically too demanding and the operative time is too long [2].

As Miller points out in his study, LM results depend on the individual capacities of surgeons to face the difficulties of the endoscopic technique [3].

The main drawbacks of laparoscopic myomectomy are the excessive length of surgical time and the difficulty in accurately performing the uterine suture. Furthermore, the cases of uterine rupture in the last three months of pregnancy apparently do not seem to be inferior in number to the traditional abdominal surgical techniques. This debated question is a central issue in the discussion of LM.

Regarding the size limits of the myomas which can be enucleated by laparoscopy, our cases treated with preoperative embolization preliminarily show that there are no longer limits related to the dimensions of myomas, even though supplementary case histories are necessary to support this thesis.

In comparison with LM, LUM allows an easier performing of the uterine suture and requires less operative time to perform whereas LUEM allows absolute safety in eradicating myomas that must be done by traditional surgery.

In comparison with LAVM, LUM spares the patient vaginal traumatism, the related incision and a change of the operating field [4, 5].

LAVM has the same limits as LM regarding large myomas where there is an absolute contraindication to laparoscopic surgery; LUEM permits laparoscopic surgery of large myomas (> 14 cm).

In accordance with Silva, there is no increase in the blood loss if we compare LM with abdominal myomectomy [6].

If we compare LM and LUM the blood loss is lower in LUM (-10%).

LUEM determines an exanguinous laparoscopic surgery.

A reduction of the operative time is due to the speed in the execution of the uterine suture and in the reduced blood loss.

If compared with abdominal myomectomy, LUM has the same advantages of LM, e.g. reduction of perioperative morbidity, shorter hospital stay (2.3 days), rapid return to normal activity, but a better feasibility of the operation.

LUEM compared to abdominal myomectomy has more advantages because LUEM allows endoscopy to be carried out and determines the effects of embolization on the myomas (exanguinous extraction).

LUM reduces the learning curve during laparoscopic myomectomy, giving a strong, positive impulse to the laparoscopic technique. Furthermore, LUM facilitates the enucleation of large fibromas more than 9 cm in diameter, a size which represents a theoretical limit for the laparoscopic technique [7].

LUEM removes this limit and opens the treatment of all sizes of myomas to the endoscopy.

As Stringer [8] points out, LM, LUM and LUEM have reduced morbidity, a shorter hospital stay and a reduction of the operative costs if compared with abdominal surgery (Table 3).

Table 3. — *LUM-LUEM (laparoscopic-ultraminilaparotomic myomectomy-laparoscopic ultraminilaparotomic embolized myomectomy) advantages in comparison with LM.*

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|---|
| Reduction of surgical time |
| Increased safety of the uterine suture |
| Technical easiness in the performance of the uterine suture |
| 10% reduction of blood loss (LUM) |
| Exsanguinous myomectomy (LUEM) |
| Reduction of anesthesia time |
| Reduction of operative costs |

The use of a manual or electric morcellator reduces the surgical time and costs [9].

Conclusion

The technique which integrates laparoscopy and ultraminilaparotomy (LUM) by using the access of a morcellator trochar presents some advantages if compared with laparoscopic myomectomy (LM).

LUM requires less surgical time to perform, allows greater control and safety of the uterine suture together with a great easiness in its performance, thus enabling a multiple myomectomy even in cases of large fibromas.

LUEM increases the safety of the conventional laparoscopic myomectomy.

LUEM associates the selective embolization to the LUM, removes the theoretical limits of using laparoscopy in the treatment of large myomas, is safer for the patient and assures an exanguinous surgical procedure to remove myomas > 14 cm of diameter. This innovative and original procedure opens new perspectives to endoscopic and minimally invasive surgery.

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