Laparoscopic management of endometriomas using a combined technique of excisional (cystectomy) and ablative surgery

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Objective: To describe and evaluate a new technique of laparoscopic treatment of endometriomas that combines excisional and ablative surgery.
Design: Descriptive and prospective study.
Setting: Gynecology research unit in a university hospital.
Patient(s): Fifty-two women under 35 years of age presenting for infertility and/or pelvic pain with endometriomas larger than 3 cm were included in the study. None had undergone any surgery for endometriosis.
Intervention(s): A large part of the endometrioma wall was first excised according to the cystectomy technique. After this first step, CO_2 laser was used to vaporize the remaining 10%–20% of the endometrioma wall close to the hilus.
Main Outcome Measure(s): The feasibility of this new technique was assessed. Ovarian volume and antral follicle count (AFC) were compared between operated ovaries and nonoperated ovaries of patients with endometriosis and controls (women with male factor infertility).
Result(s): The combined technique was possible in all cases. The volume of the ovary after the combined technique was similar to that of the contralateral normal ovary, as well as to that observed in infertile women without endometriosis presenting for male factor infertility. The AFC on day 2–5 showed the same number of antral follicles in all subgroups. Histopathology of the excised part of the endometrioma revealed the presence of follicles in only one case (2%). The pregnancy rate was 41% at a mean follow-up of 8.3 months. Recurrence of a small endometrioma was observed in only one case (2%).
Conclusion(s): The combined technique (stripping and ablation) has proved not to be deleterious to the ovary. (Fertil Steril® 2010;94:28–32. ©2010 by American Society for Reproductive Medicine.)

Key Words: Ovarian endometriosis, endometriomas, laparoscopic management, cystectomy, vaporization, excisional surgery, ablative surgery

It is now widely accepted that endometriomas must be treated by laparoscopy. However, there are two main risks associated with the surgical treatment of endometriomas: [1] the risk of excessive surgery (removal or destruction of normal ovarian cortex together with the endometrioma) and [2] the risk of incomplete surgery (with subsequent early recurrence of endometriomas) (1, 2). Depending on the risk, one of two techniques is currently used, with both advantages and disadvantages: either cystectomy involving removal of the endometrioma wall or ablative surgery that entails opening the endometrioma and destroying the internal cyst wall by laser vaporization or bipolar coagulation. The depth of vaporization is shallow, as only the glandular epithelium and subjacent stroma need to be vaporized.

We previously demonstrated that ablative surgery (CO_2 laser vaporization) does not impair ovarian function, as evidenced by a normal ovarian response to gonadotropins and similar pregnancy rates after IVF in women undergoing endometrioma surgery according to our technique and control patients without endometriosis (3). However, ablative surgery may prove difficult because of the thickness and hypervascularization of the cyst wall. Recently, a Cochrane Review reported a higher rate of recurrence after ablative surgery than cystectomy (4).

On the other hand, recent data in the literature appear to indicate that excisional surgery of endometriomas may be deleterious for ovarian function, causing ovarian trauma and removal of follicles. A number of papers report that ovarian function is compromised by excisional surgery (5–12). According to Muzii et al. (12), recognizable ovarian tissue was inadvertently excised together with the endometriotic cyst wall in most cases during stripping for endometrioma excision. Close to the ovarian hilus, ovarian tissue removed along the endometrioma wall contained primordial, primary, and secondary follicles in 69% of cases. Away from the hilus,

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no follicles or only primordial follicles were found in 60% of specimens. There is obviously an absence of a clear plane of cleavage close to the ovarian hilus.

We consider endometriomas to be the consequence of coelomic metaplasia of invaginated epithelial inclusions (1, 2). For Brosens et al., endometriomas are "pseudocysts" and may be regarded as extraovarian hematomas (13). We do not fully agree with the Brosens-Hughesdon hypothesis, however. In our opinion, there is an endometrioma wall, but it is the consequence of a fibrotic reaction of the ovarian cortex to the presence of invaginated epithelium that has undergone metaplasia into endometrial tissue (glandular epithelium and stroma). Bleeding from this invaginated endometrial tissue induces cyst formation and a fibrotic reaction from the ovarian cortex surrounding the cyst. This is supported by the histological absence of a plane of cleavage, even if the first steps of cyst excision by stripping appear to be straightforward. Moreover, this hypothesis, based on the metaplastic potential of the pelvic mesothelium, is a widely accepted theory on the pathogenesis of common epithelial ovarian tumors (14). There is no reason why it could not also explain endometrioma formation.

In view of these data, we set out to develop a new approach that combines the techniques of cystectomy and ablative surgery to take the best elements from both, while avoiding the corresponding risks (excessive surgery or incomplete surgery, respectively).

TECHNIQUE

We describe a mixed technique of excisional and ablative surgery (Fig. 1). A large part of the endometrioma is first excised according to the cystectomy technique. The endometrial cyst is opened and washed out with irrigation fluid. After identifying the plane of cleavage between the cyst wall and ovarian tissue by applying opposite bimanual traction and countertraction with two grasping forceps, providing strong but nontraumatic force, the inner lining of the cyst is stripped from the normal ovarian tissue. If the excision provokes bleeding or the plane of cleavage is not clearly visible, the cystectomy is stopped because of the risk of removing normal ovarian tissue containing primordial, primary, and secondary follicles along with the endometrioma. Thus, when approaching the hilus, where the ovarian tissue is more functional and the plane of cleavage less visible, resection of the dissected tissue (partial cystectomy) is performed. The stripping technique allows removal of 80%–90% of the cyst.

After this first step (partial cystectomy), CO_2 laser (Lumenis, London, United Kingdom) is used to vaporize the remaining 10%–20% of the endometrioma close to the hilus. Care must be taken to vaporize all the residual cyst wall to avoid recurrence. At the end of the procedure, the ovary is not sutured.

PATIENTS

Between May 2007 and July 2008, 52 women (mean age ± SD, 29.2 ± 3.7 years) presenting with endometriomas over 3 cm in size (mean ± SD, 4.6 ± 1.3 cm) and complaining of infertility and/or pelvic pain were included in the study. None of them had previously undergone surgery for endometriosis. The presence of multiple endometriomas was noted in six women (6/52; 11%). All of them underwent surgery according to the combined technique, and they all received GnRH agonist for 3 months postoperatively, according to the medicosurgical therapy described elsewhere (15). Six months after surgery, vaginal ultrasound was carried out in 31 women (after excluding those who were pregnant and those who had not yet achieved 6 months of follow-up) to evaluate the ovarian volume and antral follicle count (AFC) on days 2–5. Data were compared with those from women of similar age (29.6 ± 5.2 years) with normal ovaries and regular ovulatory cycles presenting for IVF because of male factor infertility. In the present study, 20 women had unilateral endometriomas, and a comparison was made with the contralateral healthy ovary.

RESULTS

The maximum duration of surgery was 20 minutes per ovary. No intraoperative bleeding was encountered. There was no need for coagulation of the ovarian medulla.

The endometrioma wall was histologically analyzed by the same pathologist who examined the tissue for follicles. Follicles were observed in only one case (2%).

Six months after surgery, the ovarian volume of the operated ovary and the AFC during the early follicular phase (days 2–5) were 7.64 ± 2.95 cm^3 and 6.1 ± 3.2, respectively (Table 1), in the 31 women (out of 52) who had already achieved 6 months of follow-up and were not pregnant. When compared with nonendometriotic ovaries of women of similar age, there was no difference, the values being 7.99 ± 5.33 cm^3 and 6.2 ± 4.8, respectively (Table 1).

Among the 20 women with unilateral endometriomas, ovarian volume and AFC were similar in the operated ovary (7.45 ± 2.93 cm^3 and 5.5 ± 2.4) and in the contralateral nonoperated ovary (7.82 ± 3.91 cm^3 and 5.6 ± 1.6; Table 2), respectively.

In the series of 52 women, 37 wished to become pregnant. At 6 months, 12 of them were pregnant. The pregnancy rate at 6 months was thus 32%, and all pregnancies but one are ongoing. At a mean follow-up of 8.3 months, 15 women (41%) were pregnant.

The recurrence rate at 6 months was 2%. Indeed, in one woman, an intraovarian cyst of 1 cm in size, suspected to be a small endometrioma, was diagnosed by vaginal ultrasound. As it did not disappear after 3 months of contraceptive pill treatment, it was considered very likely to be an endometrioma.

DISCUSSION

We previously demonstrated that vaporization of the internal wall of large endometriomas yields a high pregnancy rate

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