CLINICAL ARTICLE

Clinical outcomes associated with surgical treatment of endometrioma coupled with resection of the posterior broad ligament

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ABSTRACT

Objective: To evaluate clinical outcomes associated with the resection of both endometrioma and posterior broad ligament (PBL) among women with PBL adhesion associated with endometrioma. *Methods:* Between January 2007 and December 2009 at the Villanova Hospital, Florence, Italy, a prospective trial was conducted on 99 consecutive patients with unilateral or bilateral endometrioma who underwent laparoscopic ovarian cystectomy by a stripping technique and homolateral PBL resection where PBL adhesion was associated with endometrioma. The prevalence of PBL adhesion and endometriosis, the association between PBL endometriosis and pain, and the recurrence of endometrioma and pain were evaluated. All data were analyzed with Prism software. *Results:* Among 124 endometriomas treated by concomitant PBL resection, the PBL was not affected by adhesions in only 2% of patients. PBL endometriosis was superficial in 36 (29.5%) and deep in 86 (70.5%) of the histologic preparations; deep endometriosis correlated with preoperative pain. At 1-year follow-up, endometrioma had recurred in 7 patients; the main symptom reported was mid-cycle pain (24 patients, 24%; $P=0.0007$). *Conclusion:* Ovarian endometriosis was often (98%) associated with PBL endometriosis; deep endometriosis of PBL correlated with pain symptoms. Although PBL resection increased the incidence of mid-cycle pain, it was associated with low recurrence of endometrioma.

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1. Introduction

Endometriosis is a chronic gynecologic condition that affects women of reproductive age, causing infertility and pelvic pain. The most commonly affected sites are the pelvic organs and peritoneum [1], and the extent of the disease varies from a few small lesions on otherwise normal pelvic organs to large ovarian endometriotic cysts (endometriomas) and/or extensive fibrosis and adhesion formation causing marked distortion of pelvic anatomy.

Ovarian endometriosis accounts for 35% of benign cysts and, even though the ovary is not the most common location of pelvic endometriosis [1,2], it occurs in 17%–44% of patients with this disease [3,4]. Excisional surgery for endometriomas should be considered the preferential surgical approach because it provides a more favorable outcome than drainage and ablation with regard to recurrence of the ovarian localization, recurrence of symptoms, and subsequent spontaneous pregnancy in infertile woman [5].

Among a population of 1785 patients with surgically treated endometriosis, only 19 (1%) of patients had exclusively ovarian involvement, findings that support the concept that adequate surgical treatment of ovarian endometrioma requires surgical treatment of all of the pelvic areas involved, especially of deep endometriotic lesions [1]. It has been well demonstrated that, to decrease the risk of recurrence (or possible persistence) of endometriosis, the best surgical approach should be one that completely removes all of the visible disease [6]. Therefore, if improvement in patient symptoms, reduction of recurrence, enhancement of fertility, and patient satisfaction are intended, the complete eradication of endometriosis is mandatory [7–10]. At laparoscopy, deeply infiltrating endometriosis may have the appearance of minimal disease [11]; thus, the isolated identification of ovarian endometriosis and its single excision can lead to under-diagnosis and under-treatment.

The aim of the present study was to evaluate prospectively clinical outcomes associated with the resection of both endometrioma and posterior broad ligament (PBL) among women with PBL adhesion associated with endometrioma and without other evident localization of disease. Specifically, the study aimed to evaluate whether concomitant resection of the PBL can help to determine (1) the prevalence of PBL endometriosis among dense adhesions between endometrioma and ovarian fossa; (2) the degree of endometriosis invasion in the

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peritoneum of the PBL; (3) the putative association between PBL endometriosis and pain symptoms; and (4) the recurrence rate of pain and endometriotic cysts at 1-year follow-up from surgery.

2. Materials and methods

In a prospective study conducted at the Villanova Hospital of Florence, Florence, Italy, 104 fertile women with suspected ovarian endometriosis were consecutively enrolled from January 8, 2007, to December 18, 2009. The inclusion criteria were 18 years or older, signed written informed consent, and the presence of at least 1 sign of endometrioma by instrumental exam (ultrasound and/or magnetic resonance imaging). The exclusion criteria were absence of written informed consent, preoperative suspicion of extraovarian endometriotic localization, previous surgery for endometriosis, and hormonal treatment for endometriosis in the 6 months before current surgery. Ethics approval for the study was obtained from the Institutional Review Board.

Data on patient age, body mass index, parity, infertility status, intraoperative disease localizations, disease stage according to r-AFS score [12], histopathologic findings, total operative time, intra- and post-operative complications, and discharge from hospital were prospectively recorded in a database.

Before surgery, the participants underwent a routine examination, including rectovaginal examination, abdominal and pelvic ultrasound scanning, and double-contrast barium enema in cases of suspected bowel localization. Each patient was individually counseled with regard to the potential risks and benefits of the intervention before signing written informed consent. Pre-operative pain symptoms (dysmenorrhea, dyspareunia, dysuria, dyschezia, and mid-cycle pain) were evaluated by a visual analog scale (VAS) with a 10-point rating from 1 (lack of pain) to 10 (unbearable pain) [13].

The day before surgery, all patients underwent mechanical bowel preparation. Antithrombotic prophylaxis with low molecular-weight heparin was administered from the evening before the operation until mobilization, and prophylactic antibiotic therapy with cefazolin was given at the beginning of the operation. The laparoscopic procedure was performed in the modified dorsolithotomic position under endotracheal general anesthesia. After pneumoperitoneum induction with a Veress needle and introduction of a 10-mm laparoscope in the standard umbilical position, three 5-mm trocars were placed in the following positions: sovrapubic, left iliac fossa, and right iliac fossa.

For each participant, the intraoperative endometriotic localizations and adnexal adhesions were noted. First, the pelvis, abdomen, and external surface of the cyst were inspected for possible evidence of malignancy. Peritoneal fluid was aspirated for cytologic examination. If necessary, lysis of the adhesion was performed. After mobilization of the adnexa, followed by opening of the cyst and drainage of its content, the cleavage plane was found and the cyst pseudo-capsule was separated from the ovarian parenchyma by means of repeated diverging traction applied with atraumatic forceps.

In the case of an adhesion between the endometrioma cyst and homolateral PBL, a pair of 5-mm bipolar scissors was used to excise the PBL completely. The dissection started retroperitoneally from healthy tissue at the level of the pelvic brim. The peritoneum covering the ureter was opened with the bipolar scissors, blunt dissection progressed in the direction of the uterosacral ligament, and the ureter was freed at the level of the uterine artery. All surgical specimens were sent for histologic examination, and PBL involvement was classified as superficial when infiltration of the peritoneal surface was less than 4 mm and deep when it was 5 mm or more.

The operation time was calculated from anesthesia induction to patient awakening, including the surgeon's change time. Blood loss during surgery was estimated by measuring the aspirated blood volume. Surgery was performed with an indwelling Foley catheter in

situ that was removed as soon as the patient could independently reach the toilet.

All patients were clinically evaluated 1 month and 12 months after surgery. Follow-up consisted of pelvic examination, transvaginal ultrasound evaluation, and rating of pain symptoms.

All data were analyzed with Prism software (GraphPad Software, San Diego, CA, USA) and were expressed as mean ± SD (range) or as number (percentage) of patients. The Kolgomorov–Smirnos test was used to evaluate whether values had a Gaussian distribution in order to choose between parametric and non-parametric statistical tests. Comparisons of proportions and means between groups were assessed via χ^2 test and an independent t test, respectively. For 2 groups, statistical differences between repeated measurements were calculated by the paired t-test or the Wilcoxon matched pairs test for non-parametric values. For more than 2 groups, analysis of variance for repeated measures and Friedman test were used for parametric and non-parametric data, respectively. The level of significance was set at a P value of less than 0.05.

3. Results

The clinical and anthropometric details of the study population are given in Table 1. Surgical indications for laparoscopy were radiologic evidence of endometrioma in 1 or both ovaries, associated with infertility or with pelvic pain. A total of 124 endometriomas were laparoscopically removed from 99 patients: 27 patients had bilateral endometriomas, and 70 had monolateral endometriomas.

The laparoscopic findings are given in Table 2. The mean operative time was 100 minutes (range 43–137 minutes), the mean blood loss was 103 mL (range 10–180 mL), no intra-operative or postoperative complications were detected, and the mean time to hospital discharge was 1 day (range 1–3 days). There was no involvement of the PBL in only 2 of the 124 of endometriomas (1.6%); by contrast, there was dense adhesion involving the homolateral PBL in the remaining 122 endometriomas. Histopathologic examination of the PBL revealed endometriosis in all cases; according to a previous

Table 1
Clinical and anthropometric details of the study population.[a]

Characteristic	Data [a]
Total number of patients	99 (100)
Age, years	33.2 ± 6.5 (19–47)
Body mass index	21.8 ± 1.6 (27.3–15.2)
Height, cm	165.0 ± 5.3 (182–156)
Parity, number	
0	79 (80)
1	16 (16)
2	4 (4)
Infertility	26 (26)
Chief symptoms [b]	
Dysmenorrhea	57 (58); VAS score 6.4 ± 1.9
Dyschezia	9 (9); VAS score 5.6 ± 1.5
Dyspareunia	16 (16); VAS score 5.5 ± 1.2
Dysuria	12 (12); VAS score 5.2 ± 1.2
Mid-cycle pain	43 (43); VAS score 5.5 ± 1.4
Stage	
I	2 (2)
II	15 (15)
III	49 (50)
IV	33 (33)
Laterality	
Monolateral endometrioma	71 (72)
Bilateral endometrioma	28 (28)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters); VAS, visual analog scale (a simple 10-point list: no pain, 0; severe pain, 10; significant pain was rated as VAS ≥ 4 [13]).
[a] Values are given as mean ± SD (range) or number (percentage) unless stated otherwise.