Complications, pregnancy and recurrence in a prospective series of 500 patients operated on by the shaving technique for deep rectovaginal endometriotic nodules

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BACKGROUND: The debate continues between advocates of the shaving technique and supporters of bowel resection in case of deep endometriosis with rectal muscularis involvement, despite little evidence for better improvement with bowel resection.

METHODS: We analyzed complication, pregnancy and recurrence rates after deep endometriotic nodule excision by shaving surgery. This is a prospective analysis of 500 cases (<40 years old) of deep endometriotic nodules.

RESULTS: Laparoscopic nodule resection was performed successfully in all cases. Major complications included: (i) rectal perforation in seven cases (1.4%); (ii) ureteral injury in four cases (0.8%); (iii) blood loss >300 ml in one case (0.2%); and (iv) urinary retention in four cases (0.8%). The median follow-up duration was 3.1 years (range 2–6 years). In our prospective series of 500 women, 388 wished to conceive. Of this number, 221 (57%) became pregnant naturally and 107 by means of IVF. In total, 328 women (84%) conceived. The recurrence rate was 8% among these 500 women, and it was significantly lower (P < 0.05) in women who became pregnant (3.6%) than in those who did not (15%). In women who failed to conceive, or were not interested in conceiving, severe pelvic pain recurred in 16–20% of patients.

CONCLUSION: In young women, conservative surgery using the shaving technique preserves organs, nerves and the vascular blood supply, yielding a high pregnancy rate and low complication and recurrence rates. There is a need, however, for further strong and energetic debate to weigh up the benefits of shaving (debulking surgery) versus bowel resection (radical surgery).

Key words: deep endometriosis / nodules / shaving technique / bowel resection

Introduction

In the pelvis, three different forms of endometriosis must be considered: (i) peritoneal endometriosis; (ii) ovarian endometriosis; and (iii) deep rectovaginal endometriosis (Donnez et al., 1996; Nisolle and Donnez, 1997).

The deep rectovaginal form of endometriosis has been defined as deep endometriosis, rectovaginal endometriosis or adenomyosis of the rectovaginal septum. In the literature, it is also called deep-infiltrating endometriosis or posterior deep-infiltrating endometriosis. According to the magnetic resonance imaging (MRI) classification described by Squifflet et al. (2002), most of these lesions originate from the posterior part of the cervix and may infiltrate the anterior wall of the rectum.

Many different surgical techniques have been proposed and, surprisingly, the number of manuscripts advocating bowel resection has dramatically increased over recent years (Redwine and Wright, 2001; Chapron et al., 2004; Daraï et al., 2005a, b; Emmanuel and Davis, 2005; Fleisch et al., 2005; Ford et al., 2005; Keckstein and Wiesinger, 2006; Mereu et al., 2008; Meuleman et al., 2009), even if some authors (Roman et al., 2010) have now started to question the advantages of this approach.

Indeed, during meetings on this topic, the debate rages on between advocates of the shaving technique and supporters of bowel resection in case of deep endometriosis with rectal muscularis involvement.

The goal of this manuscript is to present data from a prospective series of 500 cases and discuss post-operative complications,
pregnancy and recurrence rates by analyzing the existing literature and our own data. Pregnancy rate is an important outcome because pelvic surgical procedures followed by complications (e.g. fistula, abscess) will often result in decreased fertility.

**Patients and methods**

Five hundred patients under 40 years of age operated on for deep endometriotic nodules were included in this study from 2004 to 2008. This was a prospective study, conducted with the approval of the Ethics Committee of the Catholic University of Louvain. Prospective evaluation is the only way to assess the recurrence rate, avoiding the bias of a retrospective analysis (Table I).

Inclusion criteria were: (i) palpation of a nodule plus at least one symptom of pain (dysmenorrhea, dyspareunia or rectal dyschezia) associated or not with infertility; (ii) type II or III nodules (Squifflet et al., 2002); (iii) no previous surgery for endometriosis; (iv) surgical procedure performed by one of the authors; and (v) consent to be followed every 6 months after surgery.

In this series of 500 patients, the main symptoms were pelvic pain and/or dysmenorrhea observed in 95% of cases, deep dyspareunia in 86% of cases and rectal dyschezia in 48% of cases (Table I).

Three hundred and twenty-four patients (64.8%) were suffering from pelvic pain associated with infertility. In all cases of infertility, evaluation of ovulation, cervical mucus–sperm interaction (postcoital test) and male factor (defined as <15 million sperm/ml using a Makler counting chamber) were undertaken. Six patients with ovulatory problems were treated after surgery by clomiphene citrate or gonadotropins.

Careful clinical examination (Koninckx et al., 1996), transrectal ultrasonography (TRUS) (Ohba et al., 1992), rectal endoscopic sonography (Abrah et al., 2007), transvaginal sonography (TVS), barium enema and MRI (Squifflet et al., 2002; Donnez and Squifflet, 2004) have all been recommended to identify deep rectovaginal endometriotic lesions. All patients in this prospective study underwent clinical examination, TVS, TRUS, barium enema and MRI. In our series, examination with a speculum revealed either a normal vaginal mucosa or a protruded bluish nodule in the posterior fornix. By palpation, the diameter of the lesion could be evaluated. Palpation is very often painful and the presence of a nodule accounts for symptoms like deep dyspareunia and dysmenorrhea.

Preoperative radiography of the colon (barium enema) was systematically carried out in order to assess the involvement of the rectal surface and its length. Profile radiography allows the best evaluation of infiltration of the anterior rectal wall (Fig. 1; Squifflet et al., 2002).

According to Squifflet et al. (2002), there are three types of deep endometriotic nodules (Fig. 2): (i) type I: rectovaginal septum lesions; (ii) type II: posterior vaginal fornix lesions; and (iii) type III: hourglass-shaped lesions. Their prevalence is, respectively, 10, 58 and 32% of all deep nodular lesions.

Type I nodules are pure rectovaginal septum lesions, situated far from the cervix. They are more commonly considered as vaginal lesions and their prevalence was only 10% in a previous study (Squifflet et al., 2002; Donnez and Squifflet, 2004). These lesions were not included in the present study, because they are never adherent to the rectum and do not require the shaving technique.

Only patients with type II and III nodules according to the classification of Squifflet et al. (2002) were included in this series.

Type II nodules are lesions situated in the posterior vaginal fornix and behind the cervix. Adamyan (1993) also clearly described, in her classification, endometriotic nodular lesions attached to the cervix and extending to the rectovaginal septum and anterior part of the rectum.

Type III (hourglass-shaped) lesions (Fig. 3) occur when posterior fornix lesions extend cranially to the anterior rectal wall. Clinical evaluation usually reveals a larger lesion (more than 3 cm) and barium enema always shows infiltration and retraction of the rectal muscularis, known as perivisceritis. This continuum between the rectal muscularis and the cervix is found to obliterate the rectovaginal septum cranially. Type III lesions always occur under the peritoneal fold of the recto-uterine pouch of Douglas. Infiltration of the rectal muscularis is consistently observed in this subtype, as demonstrated by barium enema (profile image; Fig. 1) and TRUS, but infiltration is generally limited to the muscularis without mucosal involvement. These lesions may also extend laterally and involve the uterine cervix systematically (deviation, stricture, substenosis or stenosis) was observed in 66 cases (13.2%).

In the present study, type II and III nodules were observed, respectively, 59.2 and 40.8% of cases (Table I).

**Table I Characteristics of patients and incidence of associated lesions.**

<table>
<thead>
<tr>
<th>Age (mean, range)</th>
<th>26.1 (18–39 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodules (n patients; %)</td>
<td></td>
</tr>
<tr>
<td>Type II</td>
<td>296 (59.2%)</td>
</tr>
<tr>
<td>Type III</td>
<td>204 (40.8%)</td>
</tr>
<tr>
<td>Symptoms (n patients; %)</td>
<td></td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>476 (95.2%)</td>
</tr>
<tr>
<td>Deep dyspareunia</td>
<td>432 (86.4%)</td>
</tr>
<tr>
<td>Rectal dyschezia</td>
<td>241 (48.2%)</td>
</tr>
<tr>
<td>Associated infertility (n patients; %)</td>
<td>324 (64.8%)</td>
</tr>
<tr>
<td>Associated endometriotic lesions (n patients; %)</td>
<td></td>
</tr>
<tr>
<td>None or minimal (one or two spots)</td>
<td>152 (30.4%)</td>
</tr>
<tr>
<td>Peritoneal (mild/moderate)</td>
<td>146 (29.2%)</td>
</tr>
<tr>
<td>Ovarian endometriosis (cyst &gt; 2 cm)</td>
<td>352 (70.4%)</td>
</tr>
<tr>
<td>Bladder nodules</td>
<td>38 (7.6%)</td>
</tr>
<tr>
<td>Ureteral lesions (substenosis/stenosis)</td>
<td>66 (13.2%)</td>
</tr>
</tbody>
</table>

Patients underwent surgery for deep rectovaginal endometriotic nodules using the shaving technique.

**Surgery: the shaving technique**

There is no doubt that we should operate in case of symptomatic deep nodular lesions, but surgical techniques have taken some considerable time to evolve. However, all of them involve (i) separation of the anterior rectum from the posterior vagina, (ii) excision or ablation of deep endometriosis after complete dissection of the nodule from the posterior part of the cervix, systematically removing the posterior vaginal fornix (Fig. 4) and (iii) vaginal closure.

**Surgical procedure**

In our department, all laparoscopic procedures are performed under general anesthesia. A 12-mm operative laparoscope is inserted through a vertical infraumbilical incision. Three other puncture sites are used: 2–3 cm above the pubis in the midline and in areas adjacent to the deep inferior epigastric vessels, which are visualized directly.

Deep endometriotic nodules involving the cul-de-sac require excision of the nodular tissue from the posterior vagina, rectum, posterior cervix and uterosacral ligaments.
To determine the diagnosis of cul-de-sac obliteration during laparoscopy, a sponge on a ring forceps is inserted into the posterior vaginal fornix. A dilator (Hegar 25) or rectal probe is systematically inserted into the rectum (Donnez et al., 2007). In addition, a cannula is inserted into the uterine cavity to markedly antevert the uterus. Complete obliteration is diagnosed when the outline of the posterior fornix cannot be seen through the laparoscope.

Cul-de-sac obliteration is considered partial when rectal tenting is visible, but a protrusion of the sponge into the posterior vaginal fornix is identified between the rectum and the inverted U of the uterosacral ligaments. Sometimes, however, deep lesions of the rectovaginal septum are only barely visible by laparoscopy.

As previously mentioned, surgical techniques all involve separation of the anterior rectum from the posterior vagina and excision of the nodule in that area. Aquadissection and CO2 laser are used.

In case of nodules with possible ureteral involvement [suspected by MRI or IVP in 66 cases (13.2%) in our study], a JJ stent is inserted before starting the laparoscopic procedure and ureterolysis is then performed (Donnez et al., 2002). The usefulness of JJ stents in preventing subsequent complications was recently confirmed by Weingartner et al. (2008). The group of Koninckx also published a large series of ureteral injuries (De Cicco et al., 2009). They demonstrated that ureteral repair was often possible by laparoscopy with excellent outcomes. Moreover, in case of lateral extension, the uterine artery is often included in the fibrotic process and needs to be clipped to prevent severe blood loss, whereas associated bladder nodules require partial cystectomy (n = 38; 7.6% in our series) according to a previously described technique (Donnez et al., 2000).

The follow-up duration in our series was 3.1 years (median, range 2–6 years).

Statistical analysis
The \( \chi^2 \) test was used for statistical analysis. Values of at least \( P < 0.05 \) were considered statistically significant.

Results
All 500 patients were treated by laparoscopy. No conversion to laparotomy was required. Median lesion size was 3.4 cm (range 2–6 cm). Median operating time (including laparoscopy) was 78 min (range 50–218 min). Surgery only exceeds 3 h when nodules are removed from the bladder, ureter and bowel, sometimes including
laparoscopic nephrectomy \( (n = 4 \text{ cases in this study}) \) during the same procedure, as described by Jadoul et al. (2007). In some cases, type II nodules (<2 cm) could be removed in <10 min, particularly when they were not adherent to the rectum, the vagina being sutured in 3 min. This explains why, in some cases, the duration of surgery was so short.

**Peri- and post-operative complications**

In our series of 500 cases, laparoscopic rectal perforation occurred in seven cases (1.4%) (Fig. 5A). In all these cases, barium enema had detected muscularis involvement of more than 3 cm in length (profile radiography; Table II). The rectum was always repaired by laparoscopy (Fig. 5B and C).

Laparoscopic suture was carried out through a full-thickness layer using Vicryl 2.0 (Ethicon, Johnson and Johnson, USA) with separate stitches. The area was finally covered with fibrin glue (Tissucol, Johnson and Johnson, USA; Fig. 5D). Among the seven cases, neither fistulas nor any other complications were observed. Rectal muscle defects frequently arise during the shaving procedure and are repaired by suturing. If the rectal lumen is not entered, it is not considered a complication, just part of the procedure.
Four cases (0.8%) of ureteral injury were noted in our patients. One case was diagnosed on the first post-operative day by the presence of abundant fluid in the peritoneal cavity. High levels of urea and creatinine in the peritoneal fluid and IVP confirmed the diagnosis of a lateral ureteral lesion. A JJ catheter was immediately inserted and remained in place for 3 months. Hydronephrosis was detected 1 month after removal of the JJ stent, and this woman needed vesico-ureteral reimplantation for hydronephrosis owing to fibrotic stenosis of the lower ureteral segment and nephrostomy.

The remaining three cases of ureteral injury were the result of thermal damage (bipolar coagulation). The patients presented 6–8 days after their initial surgery with diffuse abdominal pain and liquid in the lower abdomen. Pyelography revealed lateral ureteral lesions. They were treated by insertion of a JJ stent, which was removed 3 months later and the patients made a full recovery.

Temporary urinary retention was observed in four cases (0.8%), but normal micturition resumed within 2 weeks of surgery.

Pregnancy rates and recurrence

The duration of follow-up was 2–6 years (median 3.1 years) (Fig. 6). Among the 500 women, 388 (78%) wished to conceive (Fig. 6). Of this number, 221 (57%) became pregnant naturally during follow-up. After delivery, progestogens were administered, consistent with the findings of Vercellini et al. (2003, 2005), who proved that continuous oral contraceptives and progestogens were effective at preventing recurrence of symptoms. Progestogens [Primolut-Nor 5 mg (norethisterone), Bayer, Berlin, Germany] were continued until patients wished to become pregnant again. In this subgroup of 221 women, recurrence was noted in only four cases (2%).

Among the 388 women who wished to conceive, 167 (43%) underwent IVF procedures (from 1 to 6 attempts) because they failed to fall pregnant naturally (after 1 year of regular sexual intercourse), or because of severe male factor infertility (n = 42; 25%), requiring immediate IVF. In this subgroup, 107 patients became pregnant (64%). The overall pregnancy rate (obtained naturally or after IVF) was thus 84% (328 among 388 women wishing to conceive). Six women experienced recurrence of pelvic pain during IVF and two after delivery. Among these 107 women, the recurrence rate of pelvic pain was therefore 7.4% (n = 8). Among the 60 women who failed to conceive, recurrence of severe pelvic pain was reported in 12 (20%), the majority of whom were then successfully treated with progestogens [Primolut-Nor 5 mg (norethisterone), Bayer, Berlin, Germany].

Of the 500 women in our series, 112 (22%) did not wish to conceive. Continuous progestogens or oral contraceptives (containing 20 μg of ethinylestradiol) were administered to all of these patients. Recurrence of severe pelvic pain (severe dysmenorrhea and severe deep dyspareunia according to Biberoglu and Berhman, 1981) was noted in 15 cases (13%).

Repeat surgery was carried out for recurrence of severe pelvic pain resistant to medical therapy in 12 women. Seven of them underwent nodule resection, three underwent anterior segmental bowel resection, and two underwent large discoid resection (Fig. 7) because recurrence was associated with bowel involvement, including the mucosa, as confirmed by colonoscopy and biopsy. Surgery was performed by laparoscopy in all cases. Discoid bowel resection remains a possibility (Fig. 7A–D), even after the shaving technique.

Recurrence of pelvic pain was thus found to be significantly lower (P < 0.05) in women who became pregnant after surgery (12/328; 3.6%) than those who did not (27/172, 15.7%). If we analyze the recurrence rate among all 500 women, it gives a figure of 7.8% (39/500).

Discussion

Surgery for deep rectovaginal endometriosis was first described by Reich et al. (1991), and the first two large series including 231 and 500 women, respectively, were published in 1995 and 1997 (Donnez et al., 1995, 1997).

Although these papers concluded that it is prudent to curtail rather than encourage the widespread use of an aggressive and potentially morbid procedure, increasingly aggressive surgery, including bowel
resection, is still systematically proposed in case of deep endometriosis with muscularis involvement, even in the absence of mucosal involvement (Redwine and Wright, 2001; Chapron et al., 2002; 2004; 2006; Daraï et al., 2005a; Emmanuel and Davis, 2005; Fleisch et al., 2005; Ford et al., 2005; Seracchioli et al., 2005; Keckstein and Wiesinger, 2006; Mereu et al., 2008; Meuleman et al., 2009). Unfortunately, much of the recent literature appears to encourage very invasive techniques, including bowel resection in case of rectal muscularis involvement. Our review of recent publications (see above) reporting the results and complications of laparoscopy-assisted bowel resection for deep endometriotic nodules reveals a relatively high complication rate compared with the shaving technique. Indeed, rates of urinary retention (3–5%), ureteral lesions (2–4%), fecal peritonitis (3–5%), severe anastomotic stenosis (3%), rectovaginal fistulas (6–9%) and pelvic abscesses (2–4%) were found to be higher than with the shaving technique. A possible bias could have been the relatively small number of patients involved in some series (Seracchioli et al., 2005), but it should be pointed out that, even in very experienced hands (Daraï et al., 2005b; Keckstein and Wiesinger, 2006), the rate of severe complications (rectovaginal fistulas, abscesses, stenosis, fecal peritonitis) can be more than 10%.

Very recently, Meuleman et al. (2009) reported an 11% rate of severe complications, some of which resulted from the duration of surgery (mean over 7 h). Indeed, lower leg compartment syndrome was observed in three cases (3/56), requiring fasciotomy. It is important to note that there was no mucosal infiltration of the rectum in this series. This relatively high rate of severe complications was encountered despite a multidisciplinary approach including a urologist and digestive surgeon. In this series, the median operating time was 7 h 16 min (range 180–780 min). The duration is also related to costs for the hospital (operating room, nurses, anesthetist, etc.).

It should also be pointed out that colorectal segmental resection is a complex procedure, sometimes resulting in pelvic nerve damage and unpleasant urinary and digestive symptoms (Slack et al., 2007; Roman and Bourdel, 2009; Vercellini et al., 2009; Roman et al., 2010).

### Table II

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Value</th>
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<tbody>
<tr>
<td>Laparoscopic shaving surgery (n = 500)</td>
<td>3.4 (2–6)</td>
</tr>
<tr>
<td>Duration of surgery (min)</td>
<td>78 (50–218)</td>
</tr>
<tr>
<td>Post-operative hospitalization (days)</td>
<td>1.5 (1–7)</td>
</tr>
<tr>
<td>Complications, n (%)</td>
<td></td>
</tr>
<tr>
<td>Rectal perforation</td>
<td>7 (1.4%)</td>
</tr>
<tr>
<td>Ureteral injury</td>
<td>4 (0.8%)</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>4 (0.8%)</td>
</tr>
<tr>
<td>Blood loss &gt; 300 ml</td>
<td>1 (0.2%)</td>
</tr>
</tbody>
</table>

**Complications**

We conducted a review of complication rates encountered after bowel resection for deep nodular endometriosis (Table III) (Redwine and Wright, 2001; Duepree et al., 2002; Chapron et al., 2004; Daraï et al., 2005a, b; Emmanuel and Davis, 2005; Fleisch et al., 2005; Ford et al., 2005; Seracchioli et al., 2005; Keckstein and Wiesinger, 2006; Mereu et al., 2008; Meuleman et al., 2009). We conducted a review of complication rates encountered after bowel resection for deep nodular endometriosis (Table III)

**Figure 5** (A) Laparoscopic rectal perforation occurring during the shaving procedure. (B and C) The defect is sutured using one layer of separate stitches of 2.0 Vicryl (Ethicon, USA). (D) Once the suture is complete, it is covered with fibrin glue (Tissucol).
Care must always be taken to preserve the pelvic autonomic nerves, as they are the pathway for the neurogenic control of rectal, bladder and sexual arousal function (Maas et al., 1999; Possover et al., 2000; Landi et al., 2006). The shaving technique allows preservation of the nerves by avoiding deep lateral rectal dissection (necessary for rectosigmoid resection). Indeed, lateral dissection is mandatory only in case of lateral extension of the disease with ureteral involvement (Donnez et al., 2002) and, even in this case, it rarely involves dissection of the posterolateral compartment of the rectum.

Removing part of the rectum increases the risk of complications. Furthermore, no randomized studies performed to date have been able to prove that it is any more effective than the shaving technique. Very recently, Landi et al. (2006) reported that full-thickness disc excision using a circular stapler could prevent the potential morbidity associated with low anastomosis. As only a few months earlier the same group (Mereu et al., 2008) reported a major complication rate that required repeat operations in 20 among 192 cases (10.4%), they are now probably evaluating a less aggressive surgical technique than bowel resection (Landi et al., 2006). The same trend away from bowel resection toward a less aggressive approach has recently been described by Slack et al. (2007) and Roman et al. (2010).

In our hands, the shaving approach has proved to be adequate. In most cases, muscularis infiltration observed in all cases of type III lesions may be left in place, at least partially, since the shaving technique already removes what is necessary. Residual lesions in the muscularis of the rectum do not evolve and remain constant for a long time (Donnez and Squifflet, 2004). The argument used by some gynecologists and surgeons to defend bowel resection is that this procedure is more 'radical'. This is simply not true. Indeed, even with bowel resection, the margins are not free of disease in more than 10% of cases (Anaf et al., 2009; Roman et al., 2010), so their argument is not borne out.

Recurrence and pregnancy rates
In our series, the recurrence rate of symptoms (severe dysmenorrhea, severe dyspareunia and severe pelvic pain) evaluated prospectively was 7% after shaving surgery. The rate of recurrent pain observed in this large series is therefore no higher than the rate encountered after more aggressive surgery, including bowel resection. In the majority of series reporting data on bowel resection, the recurrence rate of severe pelvic pain is evaluated to be between 6 and 20%.

Figure 6 A series of 500 cases of type II and III nodules.
Analysis at 3 years of follow-up.
However, in these studies, it is difficult to gauge the proportion of women suffering from pelvic pain linked to a genuine recurrence of endometriosis, and those with post-operative adhesions related to severe complications, such as pelvic abscesses or peritonitis.

The favorable results observed in our study in terms of pelvic pain recurrence may be explained by the almost complete resection of deep nodular endometriosis, which is innervated abundantly by sensory C cholinergic and adrenergic nerve fibers, as recently demonstrated by Wang (2009). Even if some residual endometriotic foci remain in the bowel muscularis, they are not related to pelvic pain persistence. On the other hand, as stated above, even when bowel resection is carried out, the margins are not free of disease in around 10% of cases (Roman et al., 2007, 2010; Anaf et al., 2009).

The high pregnancy rate observed after surgery for deep lesions in our study could be explained by three possible factors:

(i) Lesions are resected without extension or lateral dissection, frequently associated with subsequent adhesions in case of bowel resection (Pachler and Wille-Jørgensen, 2005).

(ii) In almost 30% of cases, as described both previously (Nisolle and Donnez, 1997) and in the present study, nodules are not associated with severe peritoneal endometriosis or ovarian endometriomas.

(iii) When ovarian endometriotic lesions are present, use of the combined technique (Donnez et al., 2010) avoids removal of primordial follicles together with the endometrioma capsule, as demonstrated by Muzii et al. (2005).

As vigorously discussed at the last World Endometriosis Society Congress in Melbourne (Donnez, 2008), it is time to discourage very aggressive surgery under the false pretenses that a more radical

**Figure 7** A case of recurrence with bowel involvement, including the rectal mucosa, operated on by large discoid resection.

(A) Preoperative barium enema. (B) Laparoscopic rectal discoid resection. A rectal dilator (yellow) is introduced into the rectum. (C) Laparoscopic closure. (D) Postoperative barium enema confirms complete healing.
Deep endometriotic nodules

Table III Complication rate after surgery for deep rectovaginal endometriotic nodules using the shaving technique compared with bowel resection (selected systematic review).

<table>
<thead>
<tr>
<th></th>
<th>Shaving technique (data from present study) (n = 500)</th>
<th>Rectal resection (selected systematic review; Redwine and Wright, 2001; Duepree et al., 2002; Chapron et al., 2004; Darai et al., 2005a, b; Emmanuel and Davis, 2005; Fleisch et al., 2005; Ford et al., 2005; Seracchioli et al., 2005; Keckstein et al., 2006; Mereu et al., 2008; Meuleman et al., 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparocversion</td>
<td>0%</td>
<td>5–11%</td>
</tr>
<tr>
<td>Repeat surgery</td>
<td>&lt;0.1%</td>
<td>10%</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>0.8% (n = 4)</td>
<td>3–5%</td>
</tr>
<tr>
<td>Ureteral lesions (uroperitoneum)</td>
<td>0.8% (n = 4)</td>
<td>2–4%</td>
</tr>
<tr>
<td>Fecal peritonitis, anastomotic leakage</td>
<td>0%</td>
<td>3–5%</td>
</tr>
<tr>
<td>Severe anastomotic stenosis</td>
<td>–</td>
<td>3%</td>
</tr>
<tr>
<td>Occlusion</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Sepsis (pelvic abscess)</td>
<td>0%</td>
<td>2–4%</td>
</tr>
<tr>
<td>Rectovaginal fistula</td>
<td>0%</td>
<td>6–9%</td>
</tr>
<tr>
<td>Rectal perforation upon shaving (diagnosed and repaired during surgery, no further complications)</td>
<td>1.4% (n = 7)</td>
<td></td>
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</table>

References


Conclusion

Endometriosis is not cancer and does not require the same treatment approach. Conservative surgery of deep endometriosis in young women means preservation of organs, nerves and the vascular blood supply. There is therefore a need for further strong and energetic debate to weigh up the benefits of shaving (debulking surgery) versus rectal resection (radical surgery). Feasibility is not always synonymous with efficacy.

Authors’ roles

J.D. first described the shaving technique in 1995, performed surgery in a large number of cases and wrote the manuscript. J.S. performed surgery, established the MRI classification and participated in discussions about the manuscript.


