Excisional surgery versus ablative surgery for ovarian endometriomata: a Cochrane Review

Roger Hart¹,³, Martha Hickey¹, Panos Maouris¹, William Buckett² and Ray Garry¹

¹School of Women’s and Infants’ Health, University of Western Australia, King Edward Memorial Hospital, 374 Bagot Road, Subiaco, Perth, Western Australia, WA 6008, Australia and ²Division of Reproductive Endocrinology and Infertility, Department of Obstetrics and Gynaecology, McGill University, Canada
³To whom correspondence should be addressed. E-mail: rhart@obsgyn.uwa.edu.au

This paper is based on a Cochrane review published in The Cochrane Library, issue 3 (see www.CochraneLibrary.net for information) with permission from The Cochrane Collaboration and John Wiley & Sons. Cochrane reviews are regularly updated as new evidence emerges and in response to comments and criticisms, and The Cochrane Library should be consulted for the most recent version of the review

BACKGROUND: The objective of this review was to determine which is the most effective technique for treating an ovarian endometrioma; excision or ablation. METHODS: A systematic review employing the principles of the Cochrane Menstrual Disorders and Subfertility Group was undertaken. No randomized studies of the management of endometriomata by laparotomy were found. Two randomized studies of the laparoscopic management of ovarian endometriomata of >3 cm in size were included. RESULTS: Laparoscopic excision of the cyst wall of the endometrioma was associated with a reduced rate of recurrence of the endometrioma [odds ratio (OR) 0.41, confidence interval (CI) 0.18–0.93], reduced requirement for further surgery (OR 0.21, CI 0.05–0.79), reduced recurrence rate of the symptoms of dysmenorrhoea (OR 0.15, CI 0.06–0.38), dyspareunia (OR 0.08, CI 0.01–0.51) and non-menstrual pelvic pain (OR 0.10, CI 0.02–0.56). It was also associated with a subsequently increased rate of spontaneous pregnancy in women who had documented prior subfertility (OR 5.21, CI 2.04–13.29). CONCLUSIONS: There is some evidence that excisional surgery for endometriomata provides for a more favourable outcome than drainage and ablation, with regard to the recurrence of the endometrioma, recurrence of symptoms and subsequent spontaneous pregnancy in women who were previously subfertile. Consequently this should be the favoured surgical approach. However, we found no data to indicate the best surgical approach in women planning to undergo assisted reproductive techniques.

Key words: ablation/endometriomata/endometriosis/excision/meta-analysis

Introduction

Endometriosis is a common condition associated with pelvic pain and infertility in women. Endometriosis is defined as the presence of ectopic deposits of endometrial tissue usually, but not exclusively, limited to the pelvis, which may lead to infertility and pelvic pain. It may be present in up to 22% of asymptomatic women and up to 45% of women with pelvic pain (Ajossa et al., 1994; Farquhar, 2000). Endometriosis is commonly found in women who have experienced pain and dyspareunia (pain during or after sexual intercourse) (Vercellini et al., 1998). There is also a risk of malignant transformation (Nishida et al., 2000). The evidence suggests that, although medical treatment will result in a reduction in size of the endometrioma of up to 57%, the most effective approach to treatment is surgical (Farquhar and Sutton, 1998). Furthermore, if they are left, as with any ovarian cyst they have a risk of rupture and torsion.

In recent years, laparoscopy has become the gold standard for the treatment of ovarian endometriotic cysts (Daniell et al., 1991; Donnez et al., 1996; Sutton et al., 1997; Yuen et al., 1997). In women with non-menstrual pelvic pain (OR 0.10, CI 0.02–0.56). It was associated with a subsequently increased rate of spontaneous pregnancy in women who had documented prior subfertility (OR 5.21, CI 2.04–13.29). CONCLUSIONS: There is some evidence that excisional surgery for endometriomata provides for a more favourable outcome than drainage and ablation, with regard to the recurrence of the endometrioma, recurrence of symptoms and subsequent spontaneous pregnancy in women who were previously subfertile. Consequently this should be the favoured surgical approach. However, we found no data to indicate the best surgical approach in women planning to undergo assisted reproductive techniques.

Key words: ablation/endometriomata/endometriosis/excision/meta-analysis

Introduction

Endometriosis is a common condition associated with pelvic pain and infertility in women. Endometriosis is defined as the presence of ectopic deposits of endometrial tissue usually, but not exclusively, limited to the pelvis, which may lead to infertility and pelvic pain. It may be present in up to 22% of asymptomatic women and up to 45% of women with pelvic pain (Ajossa et al., 1994; Farquhar, 2000). It has been believed for almost a century by the majority of academic opinion that endometriosis is a disease caused by shedding of menstrual endometrium and its dissemination throughout the pelvis (Cullen, 1920; Sampson, 1927a,b).

Endometriomata are endometriotic deposits within the ovary. The origin of ovarian endometriomata is unknown; however, most authors believe that they result initially from a deposit of endometrium passed through the Fallopian tube (the transplantation theory: Sampson, 1927a), causing adherence of the ovary to the pelvic peritoneum and progressive invagination (folding inwards) of the ovary (Hughesdon, 1957; Brosens et al., 1994, 1996; Nisolle and Donnez, 1997). If this is true, an endometrioma would be a pseudocyst (false cyst), the wall of which is the inverted ovarian cortex (centre) and hence the removal of this cyst wall might involve removal of normal ovarian tissue, with possible adverse implications for future fertility (Vercellini et al., 2003).

The primary indications for treatment of ovarian endometriomata are the symptoms of pelvic pain and dyspareunia (pain during or after sexual intercourse) (Vercellini, 1997) and may impair the outcome of fertility treatment (Yanushpolsky et al., 1998). There is also a small risk of malignant (cancerous) transformation (Nishida et al., 2000). The evidence suggests that, although medical treatment will result in a reduction in size of the endometrioma of up to 57%, the most effective approach to treatment is surgical (Farquhar and Sutton, 1998). Furthermore, if they are left, as with any ovarian cyst they have a risk of rupture and torsion.

In recent years, laparoscopy has become the gold standard for the treatment of ovarian endometriotic cysts (Daniell et al., 1991; Donnez et al., 1996; Sutton et al., 1997; Yuen et al., 1997). When compared to traditional surgery by laparotomy, operative
laparoscopy is associated with shorter hospital stay, faster patient recovery, decreased costs (Luciano et al., 1992) and lower incidence of de novo adhesion formation (Luciano et al., 1989, 1992; Lundorff et al., 1991; Operative Laparoscopy Study Group, 1991). The pregnancy rates, monthly fecundity and cyst recurrence rates after laparoscopic surgery are comparable (Adamson et al., 1992; Bateman et al., 1994; Catalano et al., 1996; Crosignani et al., 1996; Busacca et al., 1998; Milingsos et al., 1999; Sawada et al., 1999; Canis et al., 2003). Laparoscopic surgery for endometrioma does carry a risk of conversion to laparotomy, and this is associated with the experience of the surgeon, the complexity of the surgery as well as patient factors, such as body mass index (Sokol et al., 2003). A prospective randomized trial of laparotomy or laparoscopy for the management of endometrioma demonstrated benefits to the patient with regard to less analgesic requirement, earlier discharge and post-operative recovery in those women operated by laparoscopic ovarian cystectomy (Mais et al., 1996).

The procedure of drainage of the endometrioma alone is not recommended due to the high rate of recurrence (Vercellini et al., 1992; Donnez et al., 1996). However, the most effective method of laparoscopic surgery (excisional or ablative) remains controversial.

Several alternative laparoscopic techniques have been described for the treatment of ovarian endometrioma: cyst wall laser vaporization (destruction by burning) preceded or not by medical therapy (Brosens et al., 1996; Donnez et al., 1996; Sutton et al., 1997), drainage and coagulation, and stripping (Reich and McGlynn, 1986; Martin, 1991; Canis et al., 1992). Excision of the cyst involves the opening of the endometrioma either with or without the use of electrosurgical or laser energy. The wall of the endometrioma is then excised or ‘stripped away’ from the underlying cortex using a combination of scissors (or monopolar hook) and grasping forceps. Ablation of the endometrioma also involves opening and draining of the endometrioma or fenestration (making a window in the wall of the cyst), followed by the destruction of the cyst wall using either cutting or coagulating current, or using a form of laser energy (Jones and Sutton, 2000). Whatever the surgical modality employed to treat the cyst, a sample of the endometrioma must be sent for histological assessment as there is a need to confirm the clinical diagnosis, to exclude the presence of malignancy as the risk of malignant transformation of the cyst is ∼0.7% (Brinton et al., 1997; Nishida et al., 2000; Del Carmen et al., 2003).

The recurrence rate of ovarian endometrioma following surgery has been previously reviewed by Vercellini et al. (2003). In this study, endometrioma recurrence was observed in 39 of 212 (18.4%) women treated with coagulation or laser vaporization and in 19 of 295 (6.4%) who underwent excision. This meta-analysis also reported that the pregnancy rates following surgery were 24–60%, with conflicting data regarding the most favourable surgical approach (Vercellini et al., 2003). The effect of an ovarian endometrioma on fertility is unclear, as it is rare to have a solitary endometrioma without surrounding pelvic endometriotic disease; indeed even minimal endometriosis is associated with subfertility (Pritts and Taylor, 2003) and its treatment has been demonstrated to improve fertility outcome (Jacobson et al., 2002). The presence of an endometrioma during IVF cycles has been associated with the need for greater ovarian stimulation and the production of fewer follicles following stimulation, suggesting that the endometrioma may be compromising ovarian function (Al-Azemi et al., 2000). However, the impact of endometrioma on the outcome of fertility treatment is controversial as some studies have failed to demonstrate an adverse effect of endometrioma on IVF outcome (Garcia-Velasco et al., 2004).

It has been suggested that the technique of ovarian endometrioma capsule excision may lead to removal of normal ovarian tissue (Hachisuga and Kawarabayashi, 2002) and that the procedure of capsule ablation may lead to thermal (heat) damage to the underlying ovarian cortex and a risk of incomplete destruction of the endometriotic tissue (Maouris and Brett, 2002). Thus both interventions may lead ovarian cortical damage and hence a functional loss in the ovarian reserve. Hence there is a need to review the existing literature to determine the optimum surgical management of ovarian endometriomas with regard to the recurrence rate of the endometrioma, the pain relief afforded by the surgery, the effect on ovarian function, the effect on subsequent fertility and the impact on the patient’s quality of life.

The aim of this systematic review of the published literature is to critically appraise the literature describing these techniques with regard to the pain relief afforded by the surgery and the effect on subsequent fertility. Recurrence rates and the impact on the patient’s quality of life will also be assessed.

Materials and methods

Our objective was to determine whether laparoscopic surgical excision or ablation is the optimum surgical management of ovarian endometrioma with respect to pain and fertility outcomes. The patient population were women with ovarian endometrioma who were undergoing surgery for the indication of pain or infertility, and endometrioma were defined as cysts of endometriosis within the ovary. Women with gynaecological cancer were excluded. Primary outcome measures were the relief from pelvic pain as measured by visual analogue scores (VAS) or dichotomous data and subsequent fertility, including biochemical and clinical pregnancy and the live birth rate, either spontaneous or as a result of fertility treatment. Secondary outcome measures were the recurrence of endometrioma, conversion from planned laparoscopic procedure to laparotomy, ovarian function as measured by changes in FSH or onset of menopausal symptoms after surgery and quality of life as measured by patient satisfaction or objective quality of life scales.

All randomized controlled trials comparing excision and ablation of ovarian endometrioma were reviewed. Non-randomized controlled trials and quasi-randomized trials were excluded. Randomized trials comparing surgical with expectant management of endometriomata were also sought.

The Cochrane Menstrual Disorders & Subfertility Group’s Specialised Register of controlled trials was searched for any trials that met the search criteria (searched November 15, 2004). The following electronic databases were searched using OVID Software: MEDLINE (1966–November 2004), EMBASE (1980–November 2004) and Biological Abstracts (1980–Nov 2004). The Cochrane Central Register of Controlled Trials (CENTRAL) on the current issue of the Cochrane Library was searched, November 15, 2004. Online databases of ongoing
trials, the National Research Register (NRR) and Clinical Trials register were also searched in all fields using the following words: ovarian cyst, laparotomy, laparoscopy, ovarian surgery. The citation list of relevant publications, abstracts of scientific meetings and list of included studies were all checked through hand searching and >20 experts in the field of endoscopic surgery were contacted to identify further reported trials; Professors Arici, Beretta, Chapron, Donnez and Vercellini responded to the enquiry. Planned surgical excision (stripping) of endometrioma was compared with planned ablation of endometrioma capsule. Because of the risk of conversion from laparoscopy to laparotomy (open surgery), both laparotomy and laparoscopic approaches were included. Analysis of endometrioma ablation data were to be stratified according to the modality used. No language or other limitations were imposed. The authors attempted to identify unpublished data. Randomized controlled trials addressing these secondary outcome measures were also to be included.

**Study selection**

All eligible studies were assessed for their methodological quality and relevance to the review objectives. Study selection was undertaken by three reviewers (R.H., P.M. and M.H.). Reviewers extracted data independently and assessed whether the studies met the inclusion criteria. Any discrepancies were resolved by a co-reviewer (R.G.). Further information was sought from the authors where papers contained insufficient information to make a decision about eligibility.

The quality of allocation concealment was graded as adequate (A), unclear (B), or inadequate (C), following the detailed descriptions of these categories provided by the Menstrual Disorders and Subfertility Review Group.

No randomized studies of ovarian cyst excision versus ablation of the endometrioma capsule by a laparotomy approach were found. Laparoscopic ovarian cyst excision versus drainage of the endometrioma and ablation of cyst wall was compared in two studies (Beretta et al., 1998; Alborzi et al., 2004) (see Table I); excluded studies are listed in Table II. One trial was performed at two centres, although a sole operator performed in both centres (Alborzi et al., 2004). There were two prospective randomized controlled trials of the laparoscopic approach where the method of randomization was at the time of surgery by computer randomization, after surgery both patient and surgeon were aware of the procedure performed (Beretta et al., 1998; Alborzi et al., 2004).

In both randomized controlled trials of the laparoscopic approach the indication for surgery was the presence of an endometrioma of $>3$ cm in size as assessed by ultrasound examination. Patients were excluded if they had had previous operative intervention for endometriosis, hormonal or suppressive therapy for the preceding 6 months (Beretta et al., 1998; Alborzi et al., 2004). In one study patients were aged between 20 and 40 years of age (Beretta et al., 1998) and in the other study the mean age of participants was 28 years in both groups (Alborzi et al., 2004).

**Description and quality assessment of included studies**

Of the two studies that met the inclusion criteria, both used computer-generated randomization sequences (Beretta et al., 1998; Alborzi et al., 2004). Both of the two studies that met the inclusion criteria did not conceal the allocation of the patients after randomization (Beretta et al., 1998; Alborzi et al., 2004). Both studies performed the randomization at the time of operation (Beretta et al., 1998; Alborzi et al., 2004). In both studies the patients, operators and examining doctors at

---

**Table I. Characteristics of included studies**

<table>
<thead>
<tr>
<th>Study</th>
<th>Methods</th>
<th>Participants</th>
<th>Interventions</th>
<th>Outcomes</th>
<th>Notes</th>
<th>Allocation concealment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alborzi (2004)</td>
<td>Prospective randomized controlled trial</td>
<td>Women from two tertiary centres with an endometrioma $\geq 3$ cm in diameter. Women were excluded if they had previous surgery for endometriosis or had taken hormonal or suppressive therapy in the last 6 months</td>
<td>Excision of the endometrioma versus drainage and ablation of the endometrioma</td>
<td>Excisional surgery offered advantage over drainage and ablation with respect to the recurrence of the endometrioma, recurrence of symptoms of pain and dysmenorrhea, need for re-operation and spontaneous conception. There were no intra-operative conversions from a laparoscopic approach to a laparotomy. There were no drop-outs from the study</td>
<td>Additional information provided by first author. Although this was a multicentre study, the surgery was performed by the same surgeon in two separate sites. Power calculation: not stated. Histological examination of the ovarian cyst confirmed the presence of endometriosis in 100% of cases</td>
<td>A</td>
</tr>
<tr>
<td>Beretta (1998)</td>
<td>Prospective randomized controlled trial</td>
<td>Women aged 20–40 years with an endometrioma $\geq 3$ cm in diameter. Women were excluded if they had previous surgery for endometriosis or had taken hormonal or suppressive therapy in the last 6 months</td>
<td>Excision of the endometrioma versus drainage and bipolar ablation of the endometrioma</td>
<td>Excisional surgery offered advantage over drainage and ablation with respect to the recurrence of the symptoms of dysmenorrhea, deep dyspareunia, non-menstrual pelvic pain and spontaneous conception. There were no intra-operative conversions from a laparoscopic approach to a laparotomy. There were no drop-outs from the study. Other outcomes: there was no difference between the two surgical modalities performed with regard to operative time, blood loss and post-operative stay</td>
<td>Additional information provided by third author. Histological examination of the ovarian cyst confirmed the presence of endometriosis in 89% of cases, there being no difference between the two groups</td>
<td>A</td>
</tr>
</tbody>
</table>
the time of follow-up were all aware of the operative procedure performed (Beretta et al., 1998; Alborzi et al., 2004). In both studies that met the inclusion criteria there were no drop-outs and all patients were accounted for (Beretta et al., 1998; Alborzi et al., 2004). One group included a power calculation in their publication; however, the power of this study to detect a difference in the rate of disease recurrence was only 20% and the power calculation was performed after completion of the study (Beretta et al., 1998). In both studies that met the inclusion criteria both groups were comparable. Patients in the excisional surgery group and the drainage and ablation group were similar with regard to the incidence and severity of pre-operative pelvic pain, size of the endometrioma, stage of endometriosis and age at the time of surgery (Beretta et al., 1998; Alborzi et al., 2004). Neither of the studies included in this review stated a funding or sponsorship source (Beretta et al., 1998; Alborzi et al., 2004).

Additional information was sought from both lead authors of the two studies that met the inclusion criteria for assessment (Beretta et al., 1998; Alborzi et al., 2004). In one group the lead author responded and provided additional information (Alborzi et al., 2004); in the other group the third author responded and provided additional information (Beretta et al., 1998).

Statistical analysis
Statistical analysis was performed in accordance with the guidelines for statistical analysis developed by Menstrual Disorders and Subfertility Group. All trials were initially included in one analysis of surgical laparoscopy for endometriomata. Subgroup analysis by looking at the indication for ovarian endometrioma surgery (pain or infertility) was not possible for the papers meeting the inclusion criteria. Statistical heterogeneity between the results of different studies was examined by inspecting the scatter in the data points on the graphs and the overlap in their confidence intervals (CI). The outcomes were pooled statistically when no clinical heterogeneity was apparent.

Continuous data were combined for meta-analysis. Using RevMan software, mean and SD were used to derive a weighted mean difference (WMD) with 95% CI and fixed effects model. A fixed effects model was used for calculations of summary estimates and their 95% CI.

For categorical outcomes the numbers reporting an outcome to each group were related. Results for each study were expressed as an odds ratio (OR) with 95% CI and combined for meta-analysis with RevMan software.

Results
No randomized studies of ovarian cystectomy versus ablation of the endometrioma by bipolar coagulation of the capsule. Neither of the two randomized studies of the laparoscopic management of endometriomata employed adjuvants to surgery to reduce the incidence of adhesions (Beretta et al., 1998; Alborzi et al., 2004).

In one study follow-up was 2 years (Alborzi et al., 2004) and the other study followed patients for up to 26 months, median follow-up 20 months in the excisional group and 19.5 months in the drainage and ablation group. Of the studied outcomes the percentage of patients with significant pelvic pain remaining after surgery was derived from the publications and from contacting the authors for clarification of this information. Due to the discomfort of the operative procedures themselves a formal comparison of the two operative techniques immediately post-operatively is problematic (Beretta et al., 1998; Alborzi et al., 2004). The recurrence of pelvic pain was assessed by VAS in one publication (Beretta et al., 1998) and by dichotomous data recording in the other (Alborzi et al., 2004). One paper reported the effect on pain by dividing the general term ‘pain’ into the symptoms of dysmenorrhea, deep dyspareunia and pelvic pain and by recording on a VAS and reporting pain classed as moderate or severe (Beretta et al., 1998).

The effect on fertility of laparoscopic surgery excision or ablation of ovarian endometriomata was recorded by the time taken to spontaneous conception and the percentage of patients conceiving naturally. In one paper follow-up was limited to 12 months to allow patients to seek assisted reproduction (Alborzi et al., 2004), in the other paper follow-up was extended to 24 months (Beretta et al., 1998). One study recorded the pregnancy rate (Beretta et al., 1998) without specifying the method of confirmation of pregnancy and one paper confirmed pregnancy by the presence of a gestational sac on ultrasound examination (Alborzi et al., 2004).

In both studies of either laparoscopic excision or ablation of ovarian endometriomata the recurrence rate of an ovarian endometrioma was recorded by ultrasound examination every 3 months for the first year and then either 6 monthly (Alborzi et al., 2004) or annually (Beretta et al., 1998). Both studies of the laparoscopic approach to the management of endometriomata reported the conversion rate as an outcome variable although in neither group was a conversion performed (Beretta et al., 1998; Alborzi et al., 2004). Both studies reported the requirement for further surgery after the initial laparoscopic procedure as an outcome variable (Beretta et al., 1998; Alborzi et al., 2004).

Primary outcome measures

Relief from pelvic pain
The two studies that met the inclusion criteria for the laparoscopic approach to the management of endometriomas reported results that suggest that both excision, and drainage and coagulation, of endometriomata treated the symptoms related to the endometrioma and endometriosis 100% effectively in all cases. Both lead authors were contacted for further clarification (Beretta et al., 1998; Alborzi et al., 2004). The authors do not report immediate post-operative relief from pain but recurrence of pain over time.
The recurrence of dysmenorrhea, dyspareunia and non-menstrual pelvic pain was significantly greater in the drainage and ablation group and the time to the recurrence of the pain was significantly shorter in the Beretta study (Figure 1). The recurrence of pelvic pain and dysmenorrhea was also significantly greater in the drainage and ablation group in the Alborzi (2004) study. After contacting the authors of this study directly they were unable to differentiate between those patients with recurrence of pain and recurrence of dysmenorrhea alone. Consequently these patients are analysed as recurrence of dysmenorrhea only in the analysis and are excluded from the analysis of non-menstrual pain and dyspareunia. The laparoscopic excision of endometrioma was significantly associated with a benefit from the recurrence of dysmenorrhea (OR 0.15, CI 0.06–0.38), recurrence of dyspareunia (OR 0.14, CI 0.05–0.44) and recurrence of non-menstrual pelvic pain (OR 0.10, CI 0.02–0.56).

Subsequent spontaneous conception

In one of the studies patients were followed up for 1 year and at this time the spontaneous pregnancy was significantly greater in the excision group (Alborzi et al., 2004) and the other study follow-up was performed for 24 months and the spontaneous conception rate observed (Beretta et al., 1998) (Figure 2). The Beretta paper was analysed and the 12 month spontaneous fecundity derived and plotted. After combining with the data from Alborzi et al. (2004) the chance of a spontaneous pregnancy at up to 12 months significantly favoured laparoscopic excision of endometrioma (OR 5.24, CI 1.92–14.27) (Figure 3). The overall subsequent spontaneous conception rate also favoured laparoscopic excision (OR 5.21, CI 2.04–13.29; Figure 2).

Secondary outcome measures

Recurrence of endometrioma

The two studies that met the inclusion criteria for the laparoscopic approach to the management of endometriomas reported that excision of endometrioma, as compared to drainage and coagulation, leads to a significant reduction in the rate of recurrence of an endometrioma (OR 0.41, CI 0.18–0.93) (Beretta et al., 1998; Alborzi et al., 2004) (Figure 4).

Conversion from a planned laparoscopic procedure to laparotomy

The two studies that met the inclusion criteria for the laparoscopic approach to the management of endometriomas reported that both excision, and drainage and coagulation, of endometrioma have a low chance of intra-operative conversion to a laparotomy and that there is no difference according to the operative technique used (Beretta et al., 1998; Alborzi et al., 2004).
Effect on ovarian function
No studies were found which addressed the effect of laparoscopic excision versus drainage and coagulation of endometriomata on ovarian function or the quality of life of patients after surgery.

Other outcome measures
The rate of re-operation
One study analysed the effect of the laparoscopic excision versus drainage and coagulation of endometrioma on the need for a further operation within 2 years; this demonstrated a significantly reduced requirement for a further operation in those women undergoing excision of an endometrioma (OR 0.21, CI 0.05–0.79) (Alborzi et al., 2004). However, there may be an element of bias introduced due to the lack of operator blinding as to the initial operation performed.

Operative time and post-operative stay
One study addressed the effect of laparoscopic excision versus drainage and coagulation of endometriomata on operating time and post-operative stay: there were no reported differences between the two groups (Beretta et al., 1998).

Adverse effects
There were no adverse effects of either laparoscopic excision or drainage and coagulation of endometriomata reported in either study that met the inclusion criteria for analysis (Beretta et al., 1998; Alborzi et al., 2004).

Sensitivity analysis
Heterogeneity
Both the included papers report very similar outcome data and consequently there was no significant heterogeneity detected between these studies.

Both the studies report that the patient and surgeon were unblinded as to the procedure performed (Beretta et al., 1998; Alborzi et al., 2004). It is impossible to blind the surgeon; however, the patient and medical staff performing the follow-up assessments should be blinded in further studies.

Discussion
This review addresses the controversial issue of the most appropriate surgical approach to the management of endometrioma—either excision or drainage and ablation of the cyst. There were no randomized studies identified where the approach to the management of the endometrioma was by laparotomy. A prospective randomized trial of laparotomy or laparoscopic ovarian cystectomy for the management of endometrioma has demonstrated the benefits to the patient of the laparoscopic approach as manifest by less analgesic requirement, earlier discharge and a shorter post-operative recovery (Mais et al., 1996). Consequently this discussion will focus on the laparoscopic approach to the management of ovarian endometrioma.

Both studies meeting the criteria for inclusion in the meta-analysis have the potential for bias derived from the fact that both patient and surgeon were not blinded as to the procedure performed (Beretta et al., 1998; Alborzi et al., 2004). However, both studies had full retention of patients for the 2 years of follow-up, with regular interim review. The studies had very similar designs and inclusion and exclusion criteria. In the analysis there was no statistical heterogeneity detected. Neither study addressed ovarian function other than by the surrogate of spontaneous pregnancy, nor was a study found that addressed the issue of patient satisfaction or quality of life. These should be priorities for further research.

An assessment of the effect of excision of an endometrioma versus drainage and ablation on the outcome variable relief...
from pelvic pain (immediately post operation) was impossible to derive as both studies suggest complete relief of pelvic pain by both approaches, and this highlights the difficulty in determining when the initial assessment should be made. However, the outcome variable ‘recurrence of pelvic pain’ was significantly worse in the drainage and ablation treatment arms. The concern that this may be not related to the management of the endometrioma but to the background disease of endometriosis can be dismissed, as in both studies there was no difference in the disease severity between the two treatment modalities. In the analysis of the recurrence of pelvic pain, one of the studies only analysed the recurrence of dysmenorrhoea (Alborzi et al., 2004). The authors were approached but were unable to provide further information as to the recurrence of other symptoms. This meta-analysis demonstrates that excisional surgery for the management of endometriomata is associated with a reduced recurrence rate of dysmenorrhoea, dyspareunia and non-menstrual pelvic pain when compared to the drainage and ablation of the cysts.

The recurrence rate of the endometriomata as assessed by pelvic ultrasonography was analysed in two studies that met the inclusion criteria (Beretta et al., 1998; Alborzi et al., 2004). These studies both followed the patients for up to 2 years. There was a significantly reduced rate of recurrence in the patients who underwent excisional surgery and one study demonstrated a significantly reduced requirement for further surgery in the excisional group (Alborzi et al., 2004).

Failure to complete the laparoscopic operation requiring an intra-operative conversion from a laparoscopic approach to a laparotomy was assessed in both studies. In neither study did a patient require an intra-operative conversion to be performed.

The spontaneous fertility rate after surgery was assessed in both studies that met the inclusion criteria (Beretta et al., 1998; Alborzi et al., 2004). One study followed-up the patients for 2 years (Beretta et al., 1998), and one study followed-up the patients for 1 year prior to them being referred for assisted reproduction (Alborzi et al., 2004). Both studies were rigorous in their inclusion in the subfertile group of only patients without another cause for their subfertility other than their pelvic pathology. The meta-analysis of the rate of spontaneous conception demonstrated a significantly greater rate of conception in the excisional group. From the information supplied in the publication data (Beretta et al., 1998) the spontaneous conception rate at 1 year was derived, as this is a more commonly used follow-up time, to allow for spontaneous conception before referral for assisted reproduction. This also confirmed the favourable outcome with excisional surgery.

As there are only two studies that address the issue of the most effective surgical approach to the management of endometriomata, there exists the possibility of publication bias.

In summary there is some evidence from two non-blinded randomized controlled trials that excisional surgery for endometriomata provides for a more favourable outcome than drainage and ablation using bipolar coagulation, with regard to the recurrence of the endometrioma, recurrence of symptoms and subsequent spontaneous pregnancy in women who were previously infertile. Consequently this surgical approach should be the favoured approach. However, in women who may subsequently undergo assisted reproductive techniques no data exist as to the favoured surgical approach with regard to fertility outcome after the surgical treatment of the endometrioma.

Future studies comparing excisional surgery with drainage and ablation in the management of ovarian endometriomata should address: (i) quality of life after surgery; (ii) ovarian function after surgery; (iii) assisted reproductive performance post surgery.

Acknowledgements

The following members of the Cochrane Menstrual Disorders and Subfertility Group have helped with trial searches: Michelle Proctor and Ruth Buist.

References

Included trials


Excluded trials


Additional references


Acknowledgements

The following members of the Cochrane Menstrual Disorders and Subfertility Group have helped with trial searches: Michelle Proctor and Ruth Buist.


Sampson J (1927b) Metastatic or embolic endometriosis, due to menstrual dissemination of endometrial tissue into venous circulation. Am J Pathol 3,93.


Submitted on June 9, 2005; accepted on June 16, 2005