A review of evidence-based management of uterine fibroids

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Accepted on 13 June 2015

Key content
• Fibroids are the most common uterine growth and there is an increasing range of options for their management.
• Management options are affected by the woman’s symptoms, age, desire to conceive and local resources.
• Pharmacological agents are effective in alleviating symptoms and may improve women’s quality of life.
• Interventional radiology procedures may prevent the need for hysterectomy.
• Conventional surgical procedures and minimal access surgery are important in management of fibroids.

Learning objectives
• To understand the options available for the management of uterine fibroids.
• To create awareness of radiological techniques, such as uterine artery embolisation and magnetic resonance imaging-guided focused ultrasonography, that preserve the uterus.
• To understand the use of pharmacological agents in the reduction of menstrual blood loss and fibroid size.

Ethical issues
• Is it ethical to offer new minimally invasive treatment options for fibroids to older women who wish to retain potential fertility?

Keywords: fibroid / infertility / leiomyomata / leiomyoma / menorrhagia due to fibroids

Please cite this paper as: Younas K, Hadoura E, Majoko F, Bunkheila A. A review of evidence-based management of uterine fibroids. The Obstetrician & Gynaecologist 2016;18:33–42. DOI: 10.1111/tog.12223

Introduction
Uterine fibroids (leiomyomata) are the most common benign tumours in women, with a lifetime prevalence of around 30%. These tumours are overgrowths of smooth muscle and connective tissue that are hormone dependent. Each fibroid arises from a single cell. Fibroids may be solitary, multiple or diffuse. There is a genetic predisposition to the development of leiomyomata; they are more common in black women than in white women, with a ratio of between 3 and 9:1. Other risk factors for developing fibroids include being overweight and nulliparity.1,2 The majority of fibroids do not cause any symptoms but one in four women with fibroids are symptomatic.2 The symptoms depend on the location and size of the fibroid and include heavy menstrual bleeding, pain during periods and intercourse, a dragging sensation in the lower abdomen and urinary or defecation problems.3 Fibroids rarely present before menarche and usually regress after menopause.3,4 They can cause concern in women of reproductive age because of heavy, irregular menstrual bleeding and pain, which can have a negative impact on a woman’s life and warrants intervention.3,4 Treatment options include nonsurgical methods (pharmacological, uterine artery embolisation [UAE], magnetic resonance imaging [MRI]-guided focused ultrasound [MRgFUS]), minimally invasive surgery (hysteroscopic myomectomy, laparoscopic myomectomy), and open surgery (myomectomy or hysterectomy). The choice of treatment has to be tailored for each patient according to their wishes, the type and location of the fibroid, and associated symptoms and availability of service.5 Figure 1 shows the locations where fibroids can be found in the uterus.

In women who are asymptomatic or with bearable symptoms, expectant management may be acceptable. Many women with fibroids have successful pregnancies.6 Median fibroid growth of 9% over 6 months of observation
has been reported. Treatment options for fibroids have been the subject of Cochrane reviews, but research is still needed to determine the most appropriate treatment options for women with fibroids.

The aim of this review was to assess the clinical effectiveness of treatments for symptomatic uterine fibroids in premenopausal women. We focused on the effectiveness of treatment in reducing menstrual loss and fibroid size as well as improvement in symptoms.

Methods

In defining our question for the review we used the PICO (participants, intervention, comparison and outcome) tool. We searched the Medline, PubMed, Ovid and Cochrane Library databases using the following keywords: 'fibroid', 'leiomyomata', 'leiomyoma', 'leiomyofibromas', 'menorrhagia due to fibroids', 'menometrorrhagia, symptomatology and management', 'treatment of fibroids', and 'medical and surgical management of fibroid uterus'. Studies of premenopausal women in which the outcome measures were either change in menstrual loss, uterine or fibroid size (volume) or improvement in quality of life were included. All studies from 1990 onwards were included and we placed no limits on language of publications. Relevant papers in foreign languages were translated into English through the library services. When considering procedures that are current standard practice, we included only randomised controlled trials, meta-analyses and systematic reviews. For newer treatments, we included all the available literature, including case series. We also looked for unpublished work discussed in international and national conference abstract books. The subsequent bibliographies were cross-referenced and duplicates were removed.

Articles were screened by titles and abstracts and then full papers were obtained for assessment. Two reviewers (KY and AB) independently assessed the articles for inclusion in the review. A third reviewer (EH) resolved disagreements about study eligibility for inclusion. The keywords search yielded 18 278 articles. Screening of titles and then abstracts identified 96 potential papers for which full texts were reviewed and CASP checklists were used for critical analysis. A total of 44 papers were considered eligible for inclusion in the review. Figure 2 shows a flowchart of the study selection process.

Pharmacological treatment

Pharmacological options are available for short-term use to treat problems associated with fibroids. These options were used more frequently in the following situations:

- in perimenopausal women whose problems were likely to resolve with the onset of the menopause
- in women who were not suitable for surgery and in some women receiving fertility treatment
- preoperatively to reduce the size of the fibroid and to reduce menstrual bleeding to improve haemoglobin levels before surgery. Ulipristal acetate (UA) and gonadotrophin-releasing hormone (GnRH) analogues may be used prior to surgery for a fibroid uterus.

In Table S1, we provide a descriptive summary of available medical treatment options for uterine fibroids and their effects on menstrual loss, fibroid size and quality of life.

Nonhormonal treatment for heavy periods associated with fibroids

Tranexamic acid is frequently used in treating heavy menstrual bleeding in women who have uterine fibroids. Tranexamic acid is an antifibrinolytic drug that reduces menstrual loss. A review of the use of tranexamic acid in women with fibroids concluded that it may reduce menorrhagia as well as perioperative blood loss in myomectomy. Necrosis and infarcts in fibroids (especially in large fibroids) have been reported following use of tranexamic acid.

Hormonal treatments

Published data for the outcome of treatment with the combined pill or progesterone-only pill in women with a fibroid uterus are inconclusive. Fibroids have estrogen and progesterone receptors and both estrogen and progesterone may promote their growth. These hormonal
treatments can also induce endometrial atrophy, which can result in reduced menstrual loss. A small observational study reported a reduction in menstrual blood loss and fibroid volume after 6 months of treatment with depot medroxyprogesterone acetate.

Levonorgestrel intrauterine system

The levonorgestrel intrauterine system (LNG-IUS) has been widely accepted as an effective treatment of heavy menstrual bleeding. There is general agreement among several reviews that use of the LNG-IUS in women with fibroids is successful in reducing menstrual blood loss, increasing haemoglobin and relieving symptoms. There are conflicting results regarding its effect on fibroid or uterine volume and device expulsion rates. Jiang et al. reported no effect on fibroid volume but a decrease in uterine volume; however, Sangkomkamhang et al. and Kim and Seong reported no change in both uterine and fibroid volume. Zapata et al. and Kim and Seong reported higher device expulsion rates that appear to increase with uterine volume. However, Jiang et al. reported low expulsion rates. An online survey for the Uterine Bleeding and Pain Women’s Research Study found that 10.3% of women in the UK and France used the LNG-IUS for menorrhagia associated with fibroids. The LNG-IUS reduces menstrual blood loss from fibroids by inducing endometrial atrophy. A review by Sangkomkamhang et al. included a randomised controlled trial of 58 women assigned to either a combined oral contraceptives treatment group (n = 29) or a LNG-IUS (n = 29) treatment group. The trial showed that the LNG-IUS was more effective than combined oral contraceptives in reducing menstrual blood loss and improving haemoglobin levels. The LNG-IUS group showed an increase in haemoglobin levels from 9.7 ± 1.9 g/dL to 11.7 ± 1.2 g/dL (P <0.001) and a reduced number of days of menstrual loss.

Gonadotropin-releasing hormone analogues

GnRH analogues were approved by the Food and Drug Administration in 1995 for preoperative management of uterine fibroids. GnRH analogue treatment induces a
menopausal state with low estrogen levels that may result in intolerable side effects and bone loss. The hypoestrogenic side effects could be minimised by adding low dose estrogen and progestin or tibolone after initial phase of downregulation. GnRH analogue treatment is therefore limited to a maximum of 6 months. A Cochrane review that evaluated the role of preoperative GnRH analogue treatment in women undergoing hysterectomy or myomectomy suggested a 36% reduction in leiomyoma size and an improvement in symptoms after 12 weeks. After discontinuation of treatment, menstruation returned in 4–8 weeks and fibroid size returned to pretreatment levels within 4–6 months.

Preoperative use of a GnRH analogue may reduce fibroid volume sufficiently to make vaginal hysterectomy or transverse incision for the abdominal approach feasible. Preoperative treatment with a GnRH analogue appears to make hysterectomy easier, with reduced operating time and a shorter hospital stay.

There have been concerns about difficulties during myomectomy in obtaining an appropriate plane for dissection between the fibroid capsule and myometrium and that small fibroids were often poorly defined and therefore were missed in women pretreated with GnRH analogues. Deligdisch et al. reported the blurred interface between myoma and myometrium and obliteration of cleavage plan on anatomical and histopathologic findings with GnRH analogue use before the surgery.

**Progesterone-mediated medical treatment**

Progesterone binds to progesterone receptors to mediate its effects in tissues. It has been established that progesterone acting through its receptors enhances the proliferative activity of fibroids. Antiprogestins and agents that modulate progesterone receptor activity, collectively termed selective progesterone-receptor modulators (SPRMs), could be useful in the treatment of fibroids. Several SPRMs, including mifepristone, telapristone, asoprisnil and UA, have been used in clinical trials for the treatment of uterine fibroids.

**Selective progesterone-receptor modulators**

**Mifepristone**

Mifepristone, a synthetic steroid, works by modulating progesterone receptors and has been used to alleviate the symptoms of fibroids. In one double-blind, randomised clinical trial comparing 10 mg of mifepristone with placebo there was a reduction in uterine and fibroid volume as well as decreased menstrual blood loss in the mifepristone group. The reduction in menstrual loss and improvement in symptoms in women treated with mifepristone appears to be a consistent finding. However, there is no consensus about the effect of mifepristone on fibroid volume and the endometrium. Some reports suggest no effect on fibroid volume while others show a reduction in fibroid or uterine volume. A systematic review of three clinical trials including 112 women treated with 5–50 mg of mifepristone for 3–6 months reported a significant reduction in menstrual blood loss and an improvement of symptoms (OR 17.84; 95% CI 6.72–47.38), but no change in uterine volume.

Mifepristone has been associated with development of endometrial changes in some reports and its use in treatment of fibroids is currently restricted to research settings.

**Ulipristal acetate**

UA is a new SPRM that is considered effective in the treatment of uterine fibroids. It induces apoptosis in uterine fibroid cells and inhibits proliferation of cells. In the first trial (PEARL I), 5 mg and 10 mg UA doses were compared with placebo for 13 weeks. Both doses of UA were effective in reducing menstrual blood loss in over 90% of patients after 13 weeks of treatment. Amenorrhoea was noted within 10 days in three-quarters of patients receiving UA. The median change in uterine fibroid volume was 41% compared with 18% (P = 0.0100) and this reduction was maintained for at least 6 months after discontinuation of treatment.

The PEARL II trial was a noninferiority, double-blind 13 weeks comparison of UA with a GnRH analogue (monthly injection of leuprolide acetate). There was no difference in the control of menstrual bleeding between UA and leuprolide. However, UA was tolerated better and controlled bleeding more rapidly than leuprolide. Uterine volume change was greater with leuprolide than UA, but ultrasound assessment showed no difference in fibroid volume change. UA use was associated with benign endometrial changes termed progesterone-receptor-modulator-associated endometrial changes. These changes were noted in up to two-thirds of women during treatment and resolved within 6 months of discontinuation of treatment.

The PEARL III and extension trials were performed to investigate long-term use of UA with repeated treatment cycles. In PEARL III, 209 patients used 10 mg of UA for 12 weeks and results were similar to those of PEARL I and II. In the PEARL III extension, a subsample of 107 women received four courses of UA as well as norethisterone acetate between courses. The use of norethisterone acetate between courses of UA had no effect on progesterone-receptor-modulator-associated endometrial changes.

Progesterone plays an important role in normal physiological function of reproductive organs, mammary glands, and bone, brain and endothelial cells in vessels and the central nervous system. Studies are needed to evaluate the effects of SPRMs on other body systems, especially after prolonged use.
Selective estrogen-receptor modulators
Estrogens are known to promote fibroid growth. Anti-
estrogens, like tamoxifen or raloxifene that block estrogen activity, have the potential for therapeutic activity against fibroids. A meta-analysis including three randomised controlled trials with 215 participants who used raloxifene reported inconsistent trial results regarding relief of symptoms and decrease in fibroid size. In one of the trials, women received a GnRH analogue in addition to raloxifene. The authors concluded that there was limited evidence for the use of selective estrogen-receptor modulators in fibroid management.

Aromatase inhibitors
Aromatase is an enzyme that converts androgens to estrogen. Several small studies have investigated the use of aromatase inhibitors to reduce uterine fibroid size. A review based on one trial with 70 women comparing letrozole to a GnRH agonist (triptorelin) reported equal effectiveness in reducing fibroid volume; however, GnRH agonists had more adverse effects. Use of aromatase inhibitors in the treatment of fibroids is still at an experimental stage and is not recommended for wider clinical use until more information is available on their effectiveness and safety.

In Table S1, we provide a descriptive summary of available medical treatment options for uterine fibroids and their effects on menstrual loss, fibroid size and quality of life.

Uterine artery embolisation
UAE was introduced in 1994 and is considered an effective alternative to hysterectomy. A randomised controlled trial (UAE versus hysterectomy) of 177 patients from 28 Dutch hospitals showed a lower rate of major complications and shorter hospital stay, but an increase in readmission rate, after UAE. An updated Cochrane review in 2014 reporting on 793 women showed that patient satisfaction with UAE was similar to that with surgery (myomectomy and hysterectomy) with quicker recovery and early return to work. However, UAE was associated with more minor complications and an almost five-fold increase in the likelihood of further interventions within 2–5 years. The long-term follow-up showed no significant difference in ovarian failure rates.

One study of 66 women, 26 treated with UAE and 40 with myomectomy, demonstrated no difference in live birth rates. The most common side effects reported were postprocedure pain and vaginal discharge but major complications were rare. Out of more than 100 000 procedures, 12 deaths have been reported worldwide for UAE, demonstrating an estimated UAE mortality rate of 1 in 10 000 women compared with 3 in 10 000 women for hysterectomy.

The HOPEFUL study, which included a 5-year follow-up after UAE or hysterectomy, showed that both treatments were safe. A meta-analysis including randomised and nonrandomised clinical trials also suggested that UAE was associated with a lower rate of major complications compared with surgery. However, UAE had an increased risk of reintervention (OR 10.45; 95% CI 2.65–41.14). The results of these studies are summarised in Table 1.

MRI-guided focused ultrasonography
MRgFUS for symptomatic uterine fibroids is an ambulatory, safe and effective treatment option with the advantage of preserving the uterus. High-frequency ultrasound waves

Table 1. Uterine artery embolisation in treatment of fibroids

<table>
<thead>
<tr>
<th>Author</th>
<th>Study design</th>
<th>Participants</th>
<th>Interventions</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gupta et al.35</td>
<td>Review</td>
<td>7 studies 793 women</td>
<td>UAE versus abdominal</td>
<td>Higher rate of minor complications in UAE group.</td>
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<td></td>
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<td></td>
<td>hysterectomy</td>
<td>No difference in major complications.</td>
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<td></td>
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<td></td>
<td>UAE versus myomectomy</td>
<td>UAE associated with higher rate of need for further interventions.</td>
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<tr>
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<td></td>
<td>Insufficient evidence on fertility outcomes but suggestion that myomectomy</td>
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<td>may have advantage over UAE.</td>
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<td></td>
<td></td>
<td></td>
<td>UAE versus either</td>
<td>UAE had shorter hospital stay, reduced need for blood transfusion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>myomectomy or hysterectomy</td>
<td></td>
</tr>
<tr>
<td>Hirst et al.37</td>
<td>Retrospective</td>
<td>UAE 972 Hysterectomy 762</td>
<td>Fewer complications with UAE</td>
<td></td>
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<tr>
<td></td>
<td>cohort (HOPEFUL)</td>
<td></td>
<td></td>
<td>Further interventions required in 23% women after UAE.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>More information needed on fertility prospects after UAE to enable expectations to be managed.</td>
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</tbody>
</table>

UAE = uterine artery embolisation.
produce heat to denature proteins leading to cell death and shrinkage of fibroids. MRI is used to target the fibroids and treatment is monitored by assessing the temperature of treated tissue. The major advantages of MRgFUS are quick recovery and very low morbidity. This treatment is not yet recommended for women wishing to preserve fertility. The Food and Drug Administration approved this treatment in 2004 but the National Institute for Health and Care Excellence advises its use only in research and audit settings.

In one study, 91.5% of 54 patients who completed a fibroid symptom and quality of life questionnaire, both before and after MRgFUS treatment, reported satisfaction with treatment and a significant reduction in fibroid-related symptoms at 12 months.

Machtinger et al. reported the outcome of telephone interviews at 33 months (±15 months) with 81 women treated with MRgFUS. Most women (69%) did not need further surgical intervention, but 24% needed further treatment, especially women with hyperintense fibroids (on ultrasound the fibroid is whiter than the myometrium); the OR was 2.96 (95% CI 1.01–8.71). Less vascular fibroids with low signal intensity on MRI were more likely to respond to treatment than high signal intensity vascular fibroids. The incidence of side effects was generally low. Transient adverse effects included mild skin burn, nausea, short-term buttock or leg pain and transient sciatic nerve palsy. One case of severe skin burn needing skin graft has been reported. A systematic review including 2500 patients in 38 studies concluded that MRgFUS was a safe, cost-effective, minimally invasive technique for treatment of fibroids. Further research is needed regarding its effect on fertility.

A small clinical trial comparing MRgFUS with UAE in fibroid treatment found no difference in relief of symptoms; however, MRgFUS was associated with a seven-fold need for reintervention within 12 months.

The newer uterus-preserving fibroid treatments need further research to determine their safety for future child bearing. Around a quarter (21–28%) of women needed further intervention after treatment of fibroids with MRgFUS.

Surgical treatments of fibroids

Surgical management of uterine fibroids may be required in women with severe pressure symptoms, unresponsiveness to other therapies (medical, UAE) or in large pedunculated subserosal or submucous fibroids. Surgical treatment can be either hysterectomy or myomectomy. The size and location of the fibroid in the uterus and the desire for future fertility affects the choice of surgical procedure. Hysteroscopic, laparoscopic, vaginal or laparotomy routes may be used to remove fibroids. Myomectomy may alleviate symptoms in most women with uterine fibroids but complications (e.g. severe haemorrhage that is difficult to control), may lead to hysterectomy. The need for careful counselling prior to surgical interventions cannot be overemphasised.

Myomectomy

Hysteroscopic myomectomy

Hysteroscopic myomectomy for submucous and intracavity fibroids is an established procedure for heavy menstrual bleeding, recurrent miscarriages and infertility. Submucous fibroids have been reported in 6–34% of women with abnormal uterine bleeding, in 2–7% of women undergoing infertility investigations and in 1–5% of asymptomatic women who had hysteroscopic sterilisation. Classification systems have been devised to enable accurate

Figure 3. Saline sonography for submucous fibroids. (a) Grade 0, (b) Grade 1, (c) Grade 2.
Reproduced with permission from Professor A Abdel-Gadir, www.gynaecologist4u.com.
description of submucous fibroids (Figure 3) and assist clinicians in determining the likelihood of successful hysteroscopic surgery. The most widely used classification is that adopted by the European Society of Gynaecological Endoscopy (ESGE); the International Federation of Gynaecology and Obstetrics (FIGO) have a more extensive classification system for fibroids (Table 2 contains details of the FIGO and ESGE classification systems). There are limitations in using these classifications to predict operative outcomes; therefore, another classification was introduced to improve the outcome in hysteroscopic myomectomy. This is called STEPW (size, topography, extension, penetration and lateral wall); one multicentre study comparing this classification system with the ESGE classification system for hysteroscopic myomectomy indicated that the former system was better at predicting successful myoma resection and minimising surgical complications. Grade 0 and Grade 1 fibroids can be easily removed hysteroscopically, but difficulties are likely to be encountered with Grade 2 fibroids as most of the fibroid is in the myometrium. The thickness of the myometrium between the fibroid and the serosa is an important factor in determining the safety of hysteroscopic resection in Grade 2 cases.

When fertility is not a concern, the combination of hysteroscopic fibroid resection with endometrial ablation may be performed. In one study, 90% of women showed a decrease in menstrual blood loss at 1-year follow-up.

One review of different techniques used for hysteroscopic myomectomy has suggested that resectoscopic slicing is the gold standard for intracavity fibroids (Grade 0), although there is no single proven technique for fibroid treatment with an intramural component (Grades 1 and 2). Figure 4 shows a resection of a Grade 0 submucous fibroid using a resectoscope. Traditional methods of fibroid resection may be partly replaced by myolysis (in which an electric current is passed through a needle to destroy the fibroid) or cryomyolysis (in which a freezing probe is used in a similar manner). These techniques can be used for all types of fibroids through laparoscopic or hysteroscopic routes. They are associated with less blood loss but have the disadvantages of providing no tissue for histology, an increased risk of postoperative adhesions and the need for

<table>
<thead>
<tr>
<th>ESGE classification</th>
<th>FIGO classification</th>
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<tr>
<td>Type 0: no myometrial involvement, entirely in endometrium (pedunculated)</td>
<td>Submucosal 0 Pedunculated (intracavity)</td>
</tr>
<tr>
<td>Type 1:</td>
<td>1 &lt;50% intramural</td>
</tr>
<tr>
<td>&lt;50% myometrial extension (sessile)</td>
<td>2 ≥50% intramural</td>
</tr>
<tr>
<td>&lt;90° angle of myoma surface to uterine wall</td>
<td>Others 3 Contact endometrium (100% intramural)</td>
</tr>
<tr>
<td>Type II:</td>
<td>4 Intramural</td>
</tr>
<tr>
<td>≥50% myometrial extension (sessile)</td>
<td>5 Subserosal ≥50% intramural</td>
</tr>
<tr>
<td>≥90° angle of myoma surface to uterine wall</td>
<td>6 Subserosal &lt;50% intramural</td>
</tr>
<tr>
<td>Others (cervical or parasitic)</td>
<td>7 Subserosal pedunculated</td>
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</table>

ESGE = European Society of Gynaecological Endoscopy; FIGO = International Federation of Gynaecology and Obstetrics.

Figure 4. Hysteroscopic resection of Grade 0 submucous fibroid using resectoscope. Reproduced with permission from Professor A. Abdel-Gadir, www.gynaecologist4u.com.
reintervention.52,53 Myolysis can be an alternative to myomectomy in selected cases.

**Laparotomy/laparoscopic myomectomy**

Myomectomy can be performed either by the laparoscopic route or open laparotomy. Myomectomy may reduce menstrual blood loss and can be considered for women who want to preserve the uterus.54 Women who have laparotomy for hysterectomy or myomectomy show similar surgical complications, such as haemorrhage, unintended repeat surgery and rehospitalisation, while bladder and bowel injuries are more frequent with hysterectomy.54 One systematic review showed that laparoscopic occlusion of the uterine artery is less effective for the treatment of symptomatic uterine fibroids compared with myomectomy and uterine artery embolisation.55

Techniques for reducing blood loss during myomectomy include a preoperative course of GnRH analogue or SPRM, use of vasoconstriction agents (vasopressin) and tourniquets during surgery. Laparoscopic myomectomy is considered the best treatment option for symptomatic uterine fibroids in women who wish to retain childbearing capacity.56 A systematic review comparing laparoscopic myomectomy and open myomectomy showed that laparoscopic procedures were associated with less postoperative pain or fever and shorter hospital stay.46 One meta-analysis showed that the laparoscopic approach is associated with longer operating times, less blood loss, less postoperative pain and fewer complications than open conventional myomectomy.57

The choice of open laparotomy or laparoscopic myomectomy depends upon the availability of facilities and expertise of surgeons. The size and number of fibroids may make laparoscopic myomectomy inappropriate. Conventional open myomectomy has advantages in the presence of huge, multiple fibroids where a laparoscopic approach is not possible.58

**Hysterectomy**

Hysterectomy remains the definitive surgical intervention for uterine fibroids.58,59 It is the permanent treatment that shows the highest satisfaction regarding heavy menstrual bleeding symptoms. In the USA, uterine fibroids are the indication for one-third of all hysterectomies.59 Hysterectomy is a major surgical procedure associated with longer hospital stay and increased time off work. Open conventional hysterectomy, vaginal hysterectomy and total laparoscopic hysterectomy can be performed when there is a fibroid uterus. Walsh et al.60 compared open conventional hysterectomy with total laparoscopic hysterectomy and reported that the latter resulted in shorter hospital stay, fewer perioperative

<table>
<thead>
<tr>
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<th>Participants</th>
<th>Intervention details</th>
<th>Main results</th>
</tr>
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<tbody>
<tr>
<td>Hysteroscopic myomectomy</td>
<td>Sardo et al.53</td>
<td>Review of surgical techniques</td>
<td>6 studies 1520 women</td>
<td>Hysteroscopic resection for submucous fibroids is a gold standard. No difference in major complications. Higher blood loss with hysterectomy but no difference in blood transfusion rates. Laparoscopic myomectomy group had lower postoperative pain, postoperative fever and shorter hospital stay compared with all types of open myomectomy.</td>
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<tr>
<td>Myomectomy versus Hysterectomy</td>
<td>Pundir et al.59</td>
<td>6 studies women</td>
<td>1520 women</td>
<td>No difference in major complications. Higher blood loss with hysterectomy but no difference in blood transfusion rates. Laparoscopic myomectomy group had lower postoperative pain, postoperative fever and shorter hospital stay compared with all types of open myomectomy.</td>
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<tr>
<td>Min access versus open myomectomy</td>
<td>Bhave et al.46</td>
<td>Review</td>
<td>9 trials 808 women</td>
<td>Laparoscopic myomectomy was associated with less haemoglobin drop, reduced operative blood loss, more patients. Fully recuperated at day 15, diminished postoperative pain and fewer overall complications, but longer operating times compared with open myomectomy for patients with fibroids. Major complications, recurrence and pregnancy were similar between treatments.</td>
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<tr>
<td>Laparoscopic versus open myomectomy</td>
<td>Jin et al.57</td>
<td>Review</td>
<td>6 trials 576 women</td>
<td>Laparoscopic myomectomy was associated with less haemoglobin drop, reduced operative blood loss, more patients. Fully recuperated at day 15, diminished postoperative pain and fewer overall complications, but longer operating times compared with open myomectomy for patients with fibroids. Major complications, recurrence and pregnancy were similar between treatments.</td>
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complications and reduced intraoperative blood loss. However, feasibility of total laparoscopic hysterectomy for fibroids depends on the size of the fibroids and may be associated with a longer operating time. Surgical interventions are shown in Table 3.

Conclusion

There is good evidence to support the following suggestions for fibroid uterus management:

- Medical management and noninvasive techniques (UAE, MRGFSUS) are effective in alleviating the symptoms associated with uterine fibroids.
- New technologies that have been recently introduced without adequate assessment require further research regarding long-term outcomes, especially in the context of future fertility.
- The surgical options can be considered after careful selection of patients with informed choice.
- For hysteroscopic myomectomy, traditional resection is still the gold standard for submucous fibroids.
- There have been reports of successful pregnancies after UAE and MRGFSUS, but further randomised trials are needed to prove the safety of these treatments in young women where future fertility is desired.

Contribution to authorship

Two authors (KY and AB) independently reviewed the articles for relevant evidence and this was cross-checked by EH to resolve disagreement about a few papers. KY prepared the initial draft with EH; FM helped with corrections to prepare it according to the TOG guidance. All four authors were involved in all the stages of preparation of the final draft.

Disclosure of interests

All authors confirm that we have no conflicts of interest to disclose.

Acknowledgements

We are thankful to the library staff at Singleton hospital, Swansea, for their help in obtaining full articles, contacting authors for further information and translating papers from other languages.

Special thanks to Professor Ahmed Abdel-Gadir for his kind permission to use saline sonography images and hysteroscopic images for submucous fibroids from his website: www.gynaecologist4u.com.

Supporting Information

Additional supporting information may be found in the online version of this article at http://wileyonlinelibrary.com/journal/tog:

Table S1. Pharmacological interventions for treatment of fibroids.

Single Best Answer questions are available for this article at https://stratog.rcog.org.uk/tutorial/tog-online-sba-resource

References


Fibroid management


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