Review Article

Fibroids in infertility – consensus statement from ACCEPT (Australasian CREI Consensus Expert Panel on Trial evidence)

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Fibroid management is surrounded by considerable controversy and uncertainty. This paper summarises the consensus developed by a group of Australasian subspecialists in reproductive endocrinology and infertility (the ACCEPT group) on the evidence concerning the impact and management of fibroids in infertility. The location of a fibroid within the uterus influences its effect on fertility. Subserosal fibroids do not appear to impact on fertility outcomes. Intramural (IM) fibroids may be associated with reduced fertility and an increased miscarriage rate (MR); however, there is insufficient evidence to inform whether myomectomy for IM fibroids improves fertility outcomes. Submucosal fibroids are associated with reduced fertility and an increased MR, and myomectomy for submucosal fibroids appears likely to improve fertility outcomes. The relative effect of multiple or different sized fibroids on fertility outcomes is uncertain, as is the relative usefulness of myomectomy in these situations. It is recommended that fibroids with suspected cavity involvement are defined by magnetic resonance imaging, sonohysterography or hysteroscopy because modalities such as transvaginal ultrasound and hysterosalpingography lack appropriate sensitivity and specificity. Medical management of fibroids delays efforts to conceive and is not recommended for the management of infertility associated with fibroids. Newer treatments such as uterine artery embolisation, radiofrequency ablation, bilateral uterine artery ligation, magnetic resonance-guided focussed ultrasound surgery and fibroid myolysis require further investigation prior to their establishment in the routine management of fibroid-associated infertility.

Key words: assisted reproductive technology, fibroids, infertility, leiomyoma, myomectomy.

Introduction

Leiomyomata ('fibroids' or 'myomata') are the most common tumour of the uterus, occurring in 5–77% of women depending on the method of diagnosis used.[1] These benign masses affect many women of reproductive age. Fibroids may present with heavy menstrual loss, pain, pressure symptoms, and in some instances reduced fertility. The effect of fibroids on fertility and the related benefit or otherwise of treatment is the subject of much disagreement.[2] Guidelines for the management of fibroids relevant to reproductive function have been produced by the American Society of Reproductive Medicine (ASRM) in 2008.[3] For the United Kingdom, the NICE guidelines (2004)[4] discuss the management of fibroids that are thought to affect fertility. An Evidence-based Guideline for the Management of Uterine Fibroids by the working party of the New Zealand Guidelines Group (2000)[5] is comprehensive, but does not specify management for women presenting with fibroids and infertility.

A plethora of literature on fibroids exists; however, interpretation of studies examining the influence of fibroids on fertility and the effect of myomectomy on fertility outcomes is difficult. In general, the available literature is poor. Many studies are uncontrolled (or historically controlled) and have small sample sizes. Patient age, length of infertility and suspected aetiology are often not stated or not controlled for.[6] These studies include fibroids of varying size, number and location, all features that may influence reproductive function and the potential utility of myomectomy. Additionally, many studies are not uniform in their method of uterine cavity assessment, a pre-requisite for accurate location of the fibroids.

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A further difficulty in interpretation of the literature lies with the lack of a universally accepted clinical classification system. The classification proposed by the European Society of Hysteroscopy[7] is used most frequently. This classification defines a submucosal fibroid (SM) as one that deforms the uterine cavity. It may be subdivided into type 0 (pedunculated), type 1 (sessile with <50% intramural extension) and type 2 (sessile with ≥50% intramural extension). An IM fibroid does not deform the cavity and has <50% protruding from the wall, while subserosal (SS) fibroids have more than 50% protruding from the myometrium. Clearly, this classification does not account for location within the uterus (such as peri-ostial or cervical fibroids), or its proximity to the endometrium, both factors possibly impacting upon fertility. Somigliana *et al.*[8] argue that such a classification system is flawed because the myometrium is approximately 2 cm thick; thus, any fibroid not deforming the cavity and measuring >4 cm must by definition be SS because more than 50% is protruding from the myometrium. Such a fibroid may be expected (on account of its size and proximity to the endometrium) to potentially have greater fertility effects than, for example, a 4-cm pedunculated SS fibroid, yet both would be examined in the same group for research purposes. The proposed Bethesda classification system may address these discrepancies.[9]

In an effort to provide guidance to clinicians working with infertile couples, this document, produced by the Australasian CREI (Certificate of Reproductive Endocrinology and Infertility) Consensus Expert Panel on Trial evidence (ACCEPT) group, summarises the available evidence of the effect of fibroids on fertility and provides an Australasian consensus statement on the current management of fibroids in infertile women.

Methods

Medline, Embase and the Cochrane Database of Systematic Reviews were searched using the terms 'fibroids', 'myomas', 'leiomyoma', 'infertility', 'subfertilty', 'infertility', 'IVF', 'in-vitro fertilisation', 'implantation', 'miscarriage' and 'myomectomy' and limited to humans and English language. The date of the last search was May 2010. Reference lists of all relevant primary and review articles were hand searched for articles not identified in the initial search. Searches were conducted independently by BK and RH.

This document uses the NHMRC levels of evidence.[10] The ACCEPT group have introduced the following nomenclature to define the levels of agreement regarding individual statements within this and future documents.
Consensus:

Unanimous	α
Unanimous with caveat	β
Majority	γ
No consensus	δ

All consensus statements derived by the authors from the search outlined earlier were modified as required and voted on by the CREI expert group in Sydney on 7/5/2010. Those clinicians in attendance are listed in Acknowledgements. All contributing ACCEPT group clinicians were again invited to have input into the final statement before it was finalised by the authors.

Results

The effect of fibroids on fertility

Fibroids are hypothesised to affect fertility outcomes by a number of mechanisms. Anatomical distortion of the cervix, uterine cavity or tubal ostia may alter the likelihood of sperm entering the uterus, migrating through the uterus and entering the proximal fallopian tube.[3] Similarly, altered tubo-ovarian anatomy may hinder ovum retrieval and transport by the fallopian tube. Fibroids may also alter implantation potential by promoting abnormal uterine contractility, altering endometrial blood supply and by localised endometrial inflammation or secretion of vasoactive substances.[3]

The extent to which fibroids affect fertility has been addressed in four recent reviews: Sunkara *et al.*, (2010)[11] Pritts *et al.*, (2009)[6] Klatsky *et al.* (2008)[12] and Somigliana *et al.* (2007)[8] Pritts *et al.* (23 studies, 1776 patients) and Klatsky *et al.* (19 studies, 2370 patients) include papers where spontaneous conception was allowed, while Somigliana *et al.* (16 studies, 1426 patients) and Sunkara *et al.* (19 studies, 2086 patients) consider only studies involving IVF conceptions. Sunkara *et al.* specifically address the effect of intramural fibroids without cavity distortion. Table 1 summarises the effect of fibroids on fertility outcomes.

Subserosal (SS) fibroids

Despite limited evidence, SS fibroids do not appear to have a significant effect on fertility.[6,8,11]

Table 1 Summary of the effect of fibroids on fertility outcomes

Type of fibroid	Grade of recommendation
Subserosal fibroids *do not* appear to have a significant effect on fertility outcomes	Level 3 evidence Consensus grade α
Intramural fibroids *may be* associated with reduced fertility and an increased miscarriage rate	Level 3 evidence Consensus grade α
Submucosal fibroids *are* associated with reduced fertility and an increased miscarriage rate	Level 3 evidence Consensus grade α
The relative effect of multiple or different sized fibroids on fertility outcomes is uncertain and further research is required	Level 3 evidence Consensus grade α

Intramural (IM) fibroids

Intramural fibroids may be associated with reduced fertility and an increased miscarriage rate.

Clinical pregnancy rate (CPR)

IM fibroids appear to be associated with a small but significant reduction in CPR. While all three reviews concur on this finding, including Pritts *et al.* (RR 0.810, 95%CI 0.696–0.941), Klastky *et al.* (OR 0.84, 95%CI 0.74–0.95) and Somigliana *et al.* (OR 0.8, 95%CI 0.6–0.9), a caveat should be placed on this interpretation. The majority of included studies have inadequately or inconsistently evaluated the uterine cavity so the true effect of IM fibroids is far from conclusive. Pritts *et al.* found no significant effect on CPR when including only prospective studies (n = 3, RR 0.708, 95%CI 0.437–1.146) and, those with hysteroscopic evaluation of the cavity (n = 2, RR 0.845, 95%CI 0.66–1.071). Sunkara *et al.* concur with the overall findings from all studies in their more recently published meta-analysis of the effect of IM fibroids on IVF (n = 18, RR 0.85, 95%CI 0.77–0.94).

Miscarriage rate (MR)

The rate of miscarriage is increased in women with IM fibroids when compared with women without fibroids; Pritts *et al.* (n = 8, RR 1.747 (95%CI 1.22–2.489); however, when high-quality cavity evaluation was undertaken, this no longer reached significance (n = 2, RR 1.215, 95%CI 0.391–3.774). Klatsky *et al.* report an increased overall spontaneous MR in 14 studies comparing women with fibroids to those without (OR 1.34 95%CI 1.04–1.65). Sunkara *et al.* report a non-significant trend towards increased miscarriage when looking at the IVF population alone (n = 14, RR 1.24, 95% CI 0.99–1.57).

Live birth rate (LBR)/ongoing pregnancy rate (OPR)

In some studies, LBR was not an outcome measure and an OPR (which is any pregnancy continuing beyond first trimester) was evaluated. Pritts *et al.* combined these outcomes and report a reduction in LBR/OPR in eight studies (RR 0.703, 95%CI 0.583–0.848). When studies utilising hysteroscopic cavity evaluation were considered, the LBR/OPR was no longer significantly different; (n = 2, RR 0.733, 95%CI 0.383–1.405). Somigliana *et al.* report a significantly reduced delivery rate in seven studies assessing the influence of IM fibroids on IVF outcomes (OR 0.7, 95%CI 0.5–0.8). Comment is not made as to the adequacy of uterine cavity evaluation in these studies. Sunkara *et al.* found a 21% relative reduction in LBR when IVF is undertaken in the presence of IM fibroids (n = 11, RR 0.79, 95%CI 0.70–0.88).

Submucosal (SM) fibroids

SM fibroids have a significant influence upon fertility, as might be expected given their proximity to the endometrium. The relative effect of different subtypes of SM fibroids is not known.

Clinical Pregnancy Rate (CPR)

Pritts *et al.* (n = 4, RR 0.363, 95%CI 0.170–0.737), Klatsky *et al.* (n = 3, OR 0.44, 95%CI 0.28–0.70 and Somigliana *et al.* (n = 2, OR 0.3, 95%CI 0.1–0.7) all report a significant reduction in CPR associated with the presence of SM fibroids.

Miscarriage Rate (MR)

The number of studies that specifically addressed the association between SM fibroids and spontaneous miscarriage was small; however, both Pritts *et al.* (n = 2, RR 1.678, 95%CI 1.373–2.051) and Klatsky *et al.* (n = 3, OR 3.85, 95%CI 1.12–13.27) found a significant increase in the risk of miscarriage in women with submucosal fibroids.

Live Birth Rate (LBR)/ongoing pregnancy rate (OPR)

The effect on LBR/OPR is of particular interest in any fertility review and was addressed by both Pritts *et al.* and Somigliana *et al.* (delivery rate). Both groups found a significant negative correlation between the presence of SM fibroids and LBR/OPR or delivery rate, RR 0.318 (95%CI 0.119–0.850) and OR 0.3 (95%CI 0.1–0.8) respectively, although only two studies are included in each and the confidence intervals are wide.

Features of the fibroid

Fibroid size

The effect of fibroid size upon fertility outcomes was evaluated in a number of studies reported on in the review by Pritts *et al.* Fibroid size did not significantly correlate with fertility outcomes when comparing women with fibroids of varying sizes with infertile women without fibroids (in other words, larger fibroids did not appear to have a greater effect on fertility than smaller fibroids).

Fibroid number

The effect of fibroid number upon fertility outcomes has not been adequately addressed.

Evaluation of uterine fibroids

Where imaging such as transvaginal ultrasound suggests the presence of fibroids in close approximation to the endometrium, or when a hysterosalpingogram suggests a filling defect, further evaluation of the uterine cavity should be performed. Appropriate imaging is required to differentiate between a fibroid with a SM or IM location (Table 2). Transvaginal ultrasound has been found in a

Table 2 Cavity assessment

Cavity assessment	Grade of recommendation
The optimal imaging techniques for excluding cavity involvement by fibroids are either MRI, sonohysterography or hysteroscopy	Level 3 evidence Consensus grade β. *Consensus with caveat.* The consensus group felt that cavity assessment with hysteroscopy may at times miss SM lesions because of raised intrauterine pressure causing temporary regression of the fibroid contour

[Correction added after online publication 8 July 2011: In Table 2, "Level 4 evidence" was changed to "Level 3 evidence".]

large, high-quality study to have a sensitivity of only 80% and specificity of just 69% for the detection of SM fibroids.[13] A review of transvaginal ultrasound, sonohysterography and hysteroscopy in pre-menopausal women suggests that unlike transvaginal ultrasound, both sonohysterogram and hysteroscopy have excellent diagnostic accuracy for SM fibroids.[14] Magnetic resonance imaging (MRI) has proven reproducibility and may exceed sonohysterography, transvaginal ultrasound and hysteroscopy in efficacy for the localisation of fibroids.[15,16]

Management of fibroids in the infertile couple

The management of fibroids in infertile couples depends on the clinical presentation. In infertile couples where the female partner has an asymptomatic fibroid uterus, a thorough evaluation of the couple for other causes of infertility must be undertaken. Where the female partner has specific fibroid-related symptoms such as heavy menstrual periods or pressure symptoms, treatment may be unavoidable. If leiomyosarcoma is suspected, urgent investigation and management is necessary.

Surgical management

Hysterectomy

While this is the definitive treatment for uterine fibroids, it precludes the patient from carrying a pregnancy and would necessitate gestational surrogacy or adoption as alternatives.

Myomectomy

Hysteroscopic myomectomy. This is the common treatment of choice for SM fibroids. As described below, the removal of SM fibroids in infertile women improves CPR. In preparation for this procedure, women must be counselled not only about operative risks, including fluid overload with secondary hyponatraemia, pulmonary oedema, cerebral oedema, intra and post-operative bleeding, uterine perforation, gas embolism and infection, but also the risk of postoperative intrauterine adhesions which may alter fertility.

Abdominal myomectomy. . This is the classic approach to myomectomy and remains the routine approach for most surgeons faced with multiple or large fibroids. Women must be specifically counselled about the risk of intra-operative haemorrhage and blood transfusion and made aware of the attendant risk of hysterectomy which occurs in <1% of cases.[17] A risk of the operation is the subsequent development of pelvic adhesions which may have a detrimental impact upon fertility. Breaching the uterine cavity at the time of myomectomy may subsequently mandate delivery by caesarean section, although the rate of uterine rupture post myomectomy is much lower (0.002%) than after prior classical caesarean (3.7%).[18] Women are generally advised to wait three or more months before attempting conception after myomectomy.

Laparoscopic myomectomy. . For surgeons skilled in laparoscopic suturing, a laparoscopic approach to myomectomy may be undertaken. When compared with open myomectomy, laparoscopic myomectomy is associated with a reduced post-operative haemoglobin drop, reduced operative blood loss, a quicker recovery, reduced postoperative pain and fewer overall complications, but with a longer operating time.[19] The relative effects of laparoscopic versus abdominal myomectomy on fertility outcomes are unknown.

Effect of myomectomy on fertility outcomes

It is known that SM and possibly IM fibroids have a negative effect on fertility; however, it does not necessarily follow that myomectomy will improve fertility outcomes in these situations, as the influence of uterine scar formation on embryo implantation is unknown. Myomectomy is at times surgically complex, with specific associated risks, including haemorrhage, blood transfusion, hysterectomy and post-operative adhesion formation. The effect of myomectomy has been summarised by Pritts *et al.*[6] The authors report on four studies that compare infertile women having myomectomy to women with fibroids left *in situ*, and six studies comparing infertile women having myomectomy with infertile women without fibroids. Additional evidence is presented by Shokeir *et al.*[20] who more recently published a pseudo-randomised controlled trial comparing hysteroscopic resection of SM fibroids with conservative management.

Pritts *et al.* demonstrated that myomectomy for IM fibroids does not have a significant effect upon CPR when compared to controls with fibroids *in situ* (n = 2, RR 3.765, 95%CI 0.470–30.136), MR (n = 1, RR 0.758, 95%CI 0.296–1.943) or OPR/LBR (n = 1, RR 1.671, 95%CI 0.750–3.723).

When comparing women who underwent myomectomy for SM fibroids to those for whom fibroids were left *in situ*, Pritts *et al.* report an increase in CPR (n = 2, RR 2.034, 95%CI 1.081–3.826), but no significant influence on MR (n = 1, RR 0.771, 95%CI 0.359–1.658) or OPR/LBR (n = 1, RR 2.654, 95%CI 0.920–7.658). In those studies that addressed myomectomy for SM fibroids where controls were infertile women with no fibroids, Pritts *et al.* found no

significant difference in fertility between myomectomy and control groups, indicating that the procedure of hysteroscopic myomectomy itself has no detrimental effect upon implantation.

Shokeir *et al.*[20] reported an improved pregnancy rate in his pseudo-randomised study of 215 women with unexplained infertility with SM fibroids. 107 women underwent hysteroscopic resection of SM fibroids, while the remainder had hysteroscopy and myoma biopsy ($n = 108$). A significant improvement in pregnancy rate in the intervention arm was recorded, 63.4% vs 28.2% (RR 2.1, 95%CI 1.5–2.9). Table 3 summarises the effect of myomectomy on fertility. Table 4 outlines indications for myomectomy in infertile women.

Other surgical options

Permanent uterine artery ligation. Targeted surgical occlusion of the uterine vessels has been trialled as an alternative to uterine artery embolisation (UAE)[21–24] because it may avoid collateral damage to ovarian vasculature. There is limited data on pregnancy outcomes after laparoscopic uterine artery occlusion[25], so safe use in women wishing to maintain their fertility has not yet been established.

Temporary uterine artery occlusion. A Doppler ultrasound-guided transvaginal clamp which is left *in situ* for 6 h has yielded success in terms of symptom reduction and reduction in fibroid size.[26] This technique is based on the theory that fibroids are exquisitely susceptible to ischaemia because of their tenuous blood supply, while normal myometrium is more resilient. This too is a novel technique for which long-term outcomes are not known.

Table 3 Surgical management of fibroids in women desiring future fertility

Type of fibroid	Grade of recommendation
Intramural (IM) fibroids – *There is insufficient evidence* to determine whether myomectomy for IM fibroids improves fertility outcomes	Level 2 evidence Consensus grade α
SM fibroids – Hysteroscopic myomectomy for SM fibroids *appears likely* to improve fertility outcomes	Level 2 evidence Consensus grade β *Consensus with caveat.* The consensus group felt that the quality of the included studies was poor and that further research is required
The effect of fibroid size, number and location within the uterus *may impact* on the usefulness of myomectomy	Level 3 evidence Consensus grade α
Newer surgical approaches such as temporary or permanent uterine artery ligation should only be used in the setting of clinical trials	Level 3 evidence Consensus grade α

[Correction added after online publication 8 July 2011: In Table 3, both "Level 1 evidence" was changed to "Level 2 evidence".]

Table 4 Indications for myomectomy in infertile women

Management indicated in	Grade of recommendation
Infertile women who have demonstrated SM fibroid(s)	Level 2 evidence Consensus grade α
Infertile women with symptomatic fibroid(s)	Level 4 evidence Consensus grade β *Consensus with caveat.* The consensus group felt that even though trial evidence did not show clear fertility benefit from myomectomy, the presence of symptoms that could improve with surgery makes it worthwhile in most cases
Couples presenting with multiple failed cycles of assisted reproductive technology (ART) where the female partner has intramural fibroids	Level 4 evidence Consensus grade α

[Correction added after online publication 8 July 2011: In Table 4, "Level 1 evidence" was changed to "Level 2 evidence".]

Medical management

Medical treatments have long been used for the management of uterine fibroids. Their role in treatment of women desiring future fertility is limited (Table 5).

Gonadotropin-releasing hormone analogues (GnRHa) down-regulate the hypothalamic-pituitary-ovarian axis to produce hypo-oestrogenaemia and a 35–65% reduction in fibroid volume.[27] Fibroid shrinkage is temporary, and use in women desiring fertility only delays attempts to conceive. Preoperative use of GnRHa improves pre-operative haemoglobin, reduces uterine volume and fibroid size and

Table 5 Medical management of fibroids in women desiring future fertility

Medical management of fibroids in women desiring future fertility	Grade of recommendation
Medical management of fibroids delays efforts to conceive and is *not recommended* for the management of infertility associated with fibroids	Level 4 evidence Consensus grade α
Short-term GnRHa use in infertile women with fibroids can be useful for pre-operative correction of anaemia or to reduce fibroid volume	Level 1 evidence Consensus grade α

Table 6 Other treatments for the management of fibroids in women desiring future fertility

Management of fibroid	Grade of recommendation
UAE, MRgFUS, myolysis and radiofrequency thermal ablation should only be used in the setting of approved clinical trials on the management of fibroids in women with infertility	Level 3 evidence Consensus grade α

MRgFUS, magnetic resonance-guided focussed ultrasound surgery; UAE, uterine artery embolisation.

reduces intra-operative blood loss potentially allowing for a more conservative operative approach.[28]

Danazol, mifepristone, aromatase inhibitors and selective oestrogen and progestogen receptor modulators have all shown benefit in reducing fibroid volume[14]; however, their use in women presenting with infertility is unclear.

Other treatments for fibroids

The use of other treatments for fibroids in women desiring future fertility is summarised in Table 6.

Uterine artery embolisation (UAE). UAE involves the injection of an embolic agent into the uterine arteries under radiological guidance, causing irreversible ischaemic injury to the myoma, while the normal myometrium is generally able to recover.[29]

Evidence suggests a 50–60% reduction in fibroid size and 85–95% relief of symptoms following UAE.[24] The effect of such treatment on reproductive outcomes has been recently reviewed.[30] Conclusive statements on the effect of UAE on fertility are made difficult because of patient heterogeneity (women undergoing UAE for post-partum haemorrhage versus those with fibroids), differences in procedure (varying embolic materials and differing sizes of particles) and because of study-related factors (small patient numbers, inclusion of women who did not desire pregnancy, limited follow-up periods and varying measures of menstrual and ovarian function).[30] Concern remains about premature ovarian failure owing to inadvertent passage of embolic particles into the utero-ovarian anastomoses, synechia resulting from small diameter particles lodging in the endometrial vasculature, and reports of increased spontaneous miscarriage, preterm delivery, abnormal placentation, caesarean section and post-partum haemorrhage.[30] Importantly, however, many of these outcomes may be associated with other treatments for fibroids or indeed pregnancies conceived with fibroids in situ, so conclusive statements cannot yet be made.

The American Society for Reproductive Medicine does not support the use of UAE for women wishing to maintain or improve their fertility because the safety and effectiveness of UAE in these women has not been established.[3] In the light of the available evidence, UAE should only be performed on women desiring future fertility in the setting of a clinical trial.

Magnetic resonance-guided focussed ultrasound surgery (MRgFUS). MRgFUS employs real-time MRI guidance to direct high-intensity ultrasound waves into the body of a myoma causing protein denaturation, irreversible cell damage and coagulative necrosis. While successful pregnancies have been reported following this technology, randomised, controlled trials have not been published to date.[31] The use of MRgFUS in women desiring future fertility should only be performed in the setting of a clinical trial.

Fibroid myolysis. Myolysis involves the placement of probes within the fibroid, usually by laparoscopy, followed by the use of bipolar or monopolar heat, cold (cryomyolysis) or laser to destroy the tissue. While potentially effective at reducing fibroid volume,[32] pregnancy outcomes are unclear.

Radiofrequency thermal ablation. This procedure uses an ultrasound- or laparoscopy-guided needle electrode to heat fibroid tissue and cause tissue necrosis. Early reports of outcomes in terms of reduced fibroid volume are encouraging, but reproductive parameters are unknown.[33]

Conclusions

Fibroids occur commonly in women of the reproductive age group. The question of whether the existence of a fibroid is causally related to a couple's infertility depends on its location and the existence of other factors that may explain the inability to conceive. Clinicians working with infertile patients should be aware that the evidence guiding the management of uterine fibroids is generally not strong.

SS fibroids do not appear to have a significant effect on fertility outcomes, and thus removal is generally undertaken for symptomatic reasons only. IM fibroids may be associated with reduced fertility and an increased MR; however, there is insufficient evidence to inform whether myomectomy for IM fibroids improves fertility outcomes. SM fibroids are associated with reduced fertility and an increased MR, and myomectomy for SM fibroids appears likely to improve fertility outcomes. The relative effect of multiple or different sized fibroids on fertility outcomes is uncertain, as is the relative usefulness of myomectomy in these situations.

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