

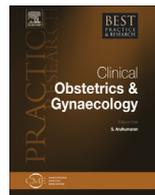


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Pregnancy outcome and uterine fibroids



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Myomas are observed in about 3–12% of pregnant women. Uterine fibroids may affect the outcome of pregnancy. The presence of myomas – in particular of myomas that distort the uterine cavity and larger intramural myomas – has been associated with infertility. In the case of pregnancy, it has been linked to an increased risk of spontaneous abortion, fetal malpresentation, placenta previa, preterm birth, cesarean section, and peripartum hemorrhage. Although fibroids may negatively affect pregnancy outcome, the impact of their treatment, particularly in quantitative terms, is unclear. Hysteroscopic myomectomy is the treatment of choice for submucous fibroids. The comparative efficacy of laparoscopic, laparotomic, or new modalities of treatment of intramural fibroids is not known. Up to date the choice and modalities of treatment of submucous fibroids should not be based on sound evidence but on clinical concerns and the skill of each center.

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Introduction

Uterine fibroids are a common condition [1]: in particular, myomas are reported in about 3–12% of pregnant women [2,3]. In addition to causing pain, uterine fibroids may also affect the outcome of

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pregnancy. The presence of myomas – in particular of myomas that distort the uterine cavity and larger intramural myomas – has been associated with infertility; in the case of pregnancy, this has been linked to an increased risk of spontaneous abortion, fetal malpresentation, placenta previa, preterm birth, cesarean section, and peripartum hemorrhage [4].

Myomectomy is the standard of care for treating symptomatic fibroids in women who wish to bear more children. However, presently, other techniques such as artery embolization, robot-assisted myomectomy, or magnetic resonance imaging (MRI)-guided focused ultrasound surgery (MRgFUS) are available. However, the different efficacy profiles of different techniques on the pregnancy outcome are still a matter of debate [5,6].

In this paper, we review the association between fibroids and pregnancy outcome, as well as the role of fibroid treatment in improving the pregnancy outcome.

In 2008, a review on the effect of myomas on pregnancy outcome was published [4] along with a pool estimate of the frequency of outcomes. Metwally et al. published a Cochrane Database systematic review on the effect of treatment of fibroids on pregnancy outcome [7].

With the aim of updating these reviews/meta-analyses, we searched the electronic databases MEDLINE and EMBASE (from 2009 to present day), using the Medical Subject Heading (MeSH) term “uterine fibroids” combined with “pregnancy.” The results of the retrieved studies and the relevant reviews recently published were considered for this paper.

Fibroids and pregnancy outcome

The presence of fibroids has been associated with an increased risk of several obstetric diseases/conditions.

Miscarriage

In 2008, Klatsky et al. [4] reported an increased risk of miscarriages in women with uterine fibroids compared to women without fibroids. Similarly, in a meta-analysis, Pritts et al. [8] found any location of a fibroid to be associated with an increased risk of miscarriages of 1.7 (95% confidence interval (CI) 1.4–2.1). This analysis included women who underwent assisted reproductive technology (ART).

The studies published after the Klatsky review, which have also analyzed the association between uterine fibroids and miscarriage risk, are shown in Table 1 [2,4,9–15]. All of these studies substantially confirmed the results reported by Klatsky et al. [4], confirming an overall twofold increased risk of miscarriage in women with (submucous/intramural) fibroids.

Fetal malpresentation

Fetal malpresentation, primarily breech presentation, has also been found to be increased among women with fibroids.

Klatsky et al. [4] reported a cumulative frequency of malpresentation of 13%, that is, about 2.5 times higher than in the general population.

We identified three further studies that reported the frequency of breech presentation among women with fibroids. The reported frequency in two of these studies was largely consistent with the Klatsky estimate [12,15], whereas that in the third study was substantially lower, but higher than that in the control group [2].

Placenta previa

We identified two studies on the association between fibroids and the frequency of placenta previa. Consistent with the results of Klatsky et al. [4] both studies reported an approximately twofold increased risk.

Table 1

Main results from studies on the association between myomas and adverse pregnancy outcome.

Author, year	Type of study	Country	No. of women with fibroids	Miscarriage rate/ 1100 pregnancies	Malpresentation	Placenta previa	Preterm birth
Klatsky et al., 2008 [4]	Systematic review	Several countries		Intramural 15.3–22.4% Submucous 46.7%	women with fibroids 13.0% (466/3585), control 4.5% (5864/130,932), $P = 0.001$ OR: 2.9 (2.6–3.2)		16%
Chen et al., 2009 [9]	Analysis of population-based database	China	5627				preterm births (10.98 with fibroids vs. 7.78% without fibroids, $P < 0.001$)
Stout et al., 2010 [2]	Retrospective cohort study	USA	2058		Breech presentation (5.3% compared with 3.1%, adjusted odds ratio (OR) 1.5, 95% confidence interval (CI) 1.3–1.9),	1.4% compared with 0.5%, adjusted OR 2.2, 95% CI 1.5–3.2	preterm birth <37 weeks 15.1% (compared with 10.5%, adjusted OR 1.5, 95% CI 1.3–1.8), and <34 weeks (3.9% compared with 2.8%, adjusted OR 1.4, 95% CI 1.0–1.8),
Shavel et al., 2012 [10]	Retrospective cohort study	USA	95				Compared to women with no fibroids or small fibroids (≤ 5 cm), women with large fibroids (>5 cm) delivered at a significantly earlier gestational age (38.6 vs. 38.4 vs. 36.5 weeks). the presence of leiomyomata was associated with statistically significant increased risks of preterm delivery at <34 weeks (adjusted odds ratio (AOR) 1.7, 95% confidence interval (CI) 1.1–2.6), <32 weeks (AOR 1.9, 95% CI 1.2–3.2), and <28 weeks (AOR 2.0, 95% CI 1.1–3.8))
Lai et al., 2012 [11]	Retrospective cohort study	USA	401				
Navid et al., 2012 [12]	Prospective study	Pakistan	80	10%	12.5%	2.5%	10%

Stout et al., 2013 [13]	Retrospective cohort study	USA	59 twin pregnancies			Twin pregnancies with fibroids were no more likely to have preterm delivery <34 weeks (25.0% vs. 24.0%, aOR 1.0, 95%CI 0.5–1.9) than twin pregnancies without fibroids.
Borja de Mozota et al., 2014 [14]	Retrospective study	Guadalupe	66 pregnancies	25.8% miscarriage.		
Ciavattini et al., 2015 [15]	Retrospective cohort study	Italy	214		Compared to women with no fibroids, women with multiple fibroids: breech presentation (11.8% vs. 2.7%, $P = 0.04$).	Compared to women with no fibroids, women with multiple fibroids had a significantly higher rate of preterm birth (29.4% vs. 5%, $P < 0.001$) Women with large fibroids: 16.7%

Preterm birth

In addition to miscarriage, preterm birth is the most commonly reported negative outcome of pregnancy among women with fibroids.

Klatsky et al. [4] reported a frequency of preterm delivery of 16% among women with fibroids. In 2009, using a 3-year nationwide population-based database, Chen et al. examined the risk of adverse pregnancy outcomes including preterm gestation in pregnant women with uterine leiomyomas. A total of 5627 mothers with uterine leiomyoma and 28,135 unaffected mothers were included for analysis. After adjusting for mother and infant characteristics and monthly family income, women with uterine leiomyomas were found to have a significantly higher percentage of preterm births (11% vs. 7.8%, $P < 0.001$) than unaffected mothers were. Log-binominal regression models showed that the adjusted risk ratio (ARR) of preterm births for mothers with uterine leiomyoma was 1.32 (95% CI 1.19–1.46), compared with unaffected mothers [9]. Similar results were reported by Lai et al. [11] In a small series, Navid reported a frequency of preterm birth of 10% [12].

Shavel et al. [10] showed that compared to women with no fibroids or small fibroids (≤ 5 cm), women with large fibroids (> 5 cm) delivered at a significantly earlier gestational age (38.6 vs. 38.4 vs. 36.5 weeks).

Stout et al. [13] reported no association between fibroids and preterm birth. The authors partly attributed this finding to the greater frequency of growth ultrasounds and antenatal testing used for twin pregnancies; thus, the risks of adverse outcomes seen in singleton cohorts with fibroids may be avoided in twin gestations.

Conti et al. [16] conducted a multicentric, observational, and retrospective study including women with uterine fibroids. Patients with uterine fibroids showed a significantly greater incidence of preterm birth ($P < 0.0001$).

Finally, Ciavattini et al. [15] reported an increased risk of preterm birth among women with multiple or large fibroids.

Placental abruption

Placental abruption has been associated with uterine fibroids as well as their location [17].

Klatsky et al. [4] estimated the frequency of placental abruption to be 3.0%. In a large study, Stout et al. [2] reported an increased risk of placental abruption (1.4% vs. 0.7%, adjusted odds ratio (AdjOR) 2.1, 95% CI 1.4–3.0) [2]. Navid et al. [12] reported a frequency of placental abruption of 7.5% (6/80), although this estimate was based on very small numbers. However, Stout et al. [2] and Navid et al. [12] did not describe the site of the placenta and fibroids.

Cesarean section

In the Klatsky review [4], 48.8% of women with fibroids and 13.3% of those without fibroids were delivered by cesarean section. We identified three studies that focused on this issue. In a large retrospective study, Stout et al. [2] found that women with leiomyomas were more likely to require cesarean deliveries, even after excluding diagnoses such as placenta previa and breech presentation (33.1% vs. 24.2%, AdjOR 1.2 (1.1–1.3)). To determine whether women with leiomyomas detected using uniform ultrasound methods are at an increased risk of cesarean birth, without any indication, women were enrolled in the prospective cohort “Right from the Start Study.” Leiomyomas were counted, categorized, and measured during the first-trimester ultrasounds. Women with leiomyomas showed a 27% increase in the risk of cesarean birth (RR, 1.27; CI, 1.17–1.37) compared to women without leiomyomas. The association was weaker after adjusting for maternal body mass index and age (ARR, 1.11; CI, 1.02–1.20). The adjusted risk was elevated for women with a single leiomyoma of ≥ 3 -cm diameter (ARR, 1.22; CI, 1.14–1.32) and women with the largest total leiomyoma volumes (ARR, 1.59; CI, 1.44–1.76) [18].

Similar results were reported in a retrospective study conducted in Italy, which showed that women with fibroids had a significantly higher rate of cesarean section than those without fibroids, although the risk was limited to women with multiple fibroids [15].

Postpartum hemorrhage

Klatsky et al. [4] reported a frequency of postpartum hemorrhage of 2.5% among women with fibroids and 1.4% among those without fibroids.

Conti et al. [16] conducted a multicentric, observational, and retrospective study including women with uterine fibroids, who showed significantly more postpartum bleeding.

We did not identify any other paper reporting on the frequency of postpartum hemorrhage.

On summarizing the results on the association between myomas and pregnancy outcome, the presence of fibroids was found to increase the risk of several obstetric diseases/conditions. Some discrepancies in the risk estimate were noted for the studies. These may be partly attributed to the lack of control groups, residual confounding, and biases inherent in study designs [4,6,8]. However, for almost all of the considered conditions, most of the studies show a twofold higher risk than that in the general population.

Role of site, number, and size of fibroids on pregnancy outcome

As previously suggested, the effect of fibroids on pregnancy outcome may differ according to the characteristics of myomas.

The impact of myomas on fertility and pregnancy outcome depends on the degree of anatomical alteration of the uterus and of the uterine cavity in particular.

The effect of clinically significant submucosal myomas on pregnancy through mechanical distortion of the endometrial cavity, disruption of the endometrium, impairment of endometrial vascularization, and endometrial inflammation remains debatable. Furthermore, the role of intramural fibroids has also been questioned [4,8]. In 2011, a meta-analysis on the role of intramural fibroids in reproductive outcomes after ART was published [5]. The authors of this meta-analysis considered 10 studies reporting the effects of intramural fibroids on assisted conception treatment. A combined analysis of the included studies, after considering the possible confounding factors, showed no significant effect of intramural fibroids on the rate of miscarriage (odds ratio (OR) 1.61, 95% CI 0.61–4.20). As previously noted, this analysis included women who underwent ART.

Subserosal myomas are not considered a significant cause of poor pregnancy outcome. In this respect, a meta-analysis conducted in 2009 confirmed that women with subserosal fibroids do not differ in their fertility outcomes from women without myomas [8]. In 2012, Deever et al. analyzed 84 pregnant women diagnosed with a uterine myoma >30 mm in diameter. These myomas were detected at the anterior uterine wall in 64 patients and at the posterior uterine wall in 20 patients. All patients were followed up monthly until the end of pregnancy. The demographic and obstetric characteristics were compared between the two groups. No difference was observed between the two groups with regard to the rates of preterm delivery, bleeding in early pregnancy, infants that were small for gestational age, and hospitalization period during pregnancy. Women with posteriorly located myomas had significantly higher miscarriage rates [19].

Zhang Y et al. [20] investigated the clinical characteristics that influence the live birth rate after myomectomy. The location of the myoma was found to affect the live birth rate after myomectomy: Anterior and posterior myomas were associated with higher live birth rates than other locations ($P = 0.001$).

With regard to the size of fibroids, Lam et al. [21] identified women with fibroids of size ≥ 4 cm using ultrasonography. The size (4–7, 7–10, and >10 cm), number (multiple/single), location (lower uterus/body of uterus), and type (intramural, combination of intramural/subserosal, and subserosal) of fibroids were determined. A total of 121 patients with 179 pregnancies were identified. Preterm delivery was more likely to occur in women with multiple fibroids than in those with single fibroids (18% vs. 6%; $P = .05$). The location of the fibroid had an important effect on the mode of delivery, with a higher cesarean section rate noted for fibroids in the lower part of the uterus than those in the body of the uterus (86% vs. 40%; $P = .01$), a higher rate of postpartum hemorrhage (22% vs. 11%; $P = .03$), and greater estimated blood loss (830 mL (standard deviation (SD), 551) vs. 573 mL (SD, 383); $P = .03$). Increase in the size of the fibroid was found to be associated with greater rates of hemorrhage (11% vs. 13% vs. 36%;

$P \frac{1}{4} .04$), increased estimated blood loss (567 mL (SD, 365) vs. 643 mL (SD, 365) vs. 961 mL (SD, 764); $P \frac{1}{4} .01$), and higher rates of admissions for fibroid-related pain (5% vs. 23% vs. 21%; $P \frac{1}{4} .01$).

In 2015, Ciavattini et al. [15] reported that only multiple fibroids were associated with negative pregnancy outcome, for instance, an increased frequency of cesarean section.

Based on more recent findings, it is reasonable to conclude that the size and number of fibroids are associated with an increased risk of poor pregnancy outcome. With respect to the site of fibroids, some evidence suggests that submucosal myomas may impair fertility and affect the pregnancy outcome. Large intramural fibroids may increase the risk, although the supporting evidence is still inconsistent.

Role of fibroid treatment on pregnancy outcome

The following question is relevant to the association between fibroids and pregnancy outcome: “Is the risk of negative pregnancy outcome due to the presence of uterine fibroid reduced (or possibly avoided) after removal of the myomas?” [6].

In general, several non-controlled studies have suggested a decrease in the miscarriage rate following myomectomy. The rate of miscarriage after myomectomy was generally compared with the rate reported before surgery. In a study including women with recurrent miscarriages [22], women with intracavitary distortion and undergoing myomectomy showed significantly reduced midtrimester miscarriage rates in subsequent pregnancies from 21.7% to 0% ($P = 0.01$).

Other studies showed a similar marked reduction in miscarriage rates (decreasing from 61.6% to 26.3% after hysteroscopic treatment of submucous fibroids [23] or from 43% to 24% after laparoscopic myomectomy (LM)) [24].

Overall, the data from all published studies suggest that clinical pregnancy, live birth, and spontaneous abortion rates will normalize over time in women who have undergone myomectomy for submucosal myomas, compared to infertile women without fibroids [23]. In particular, patients with submucosal myomas are known to benefit significantly more from myomectomy, with a greater impact on fertility and pregnancy outcome, although no sound data support this clinical judgment.

However, during interpretation of the observational studies, the patients' response to nonsurgical treatment could not be predicted, although the outcomes seemed favorable.

In 2012, Metwally M et al. [7] reviewed a published randomized trial on the effect of surgical treatment of fibroids for subfertility. In that review, they identified one study that investigated the effect of myomectomy on reproductive outcomes, which showed no evidence for a significant effect on the miscarriage rate (intramural fibroids OR 0.89 (95% CI 0.14–5.48), submucous fibroids OR 0.63 (95% CI 0.09–4.40), combined intramural and subserous fibroids OR 0.25 (95% CI 0.01–4.73), and combined intramural submucous fibroids OR 0.50 (95% CI 0.03–7.99)).

We did not find any randomized trial published after 2012 that compared the effect of any treatment with no treatment on improving the pregnancy outcome.

In conclusion, clinical experience and observational studies suggest that fibroid treatment may improve the outcome of pregnancy. However, due to the limited and inconsistent findings as well as the lack of large randomized clinical trials, definitive conclusions on the impact of fibroid treatment on the pregnancy outcomes cannot be drawn.

Type of treatment

Hysteroscopic myomectomy, performed using hysteroscopic scissors, monopolar or bipolar electrosurgery, mechanical morcellators, or lasers, is the most common procedure for treating submucosal myomas.

Complications of hysteroscopic surgery that may interfere with fertility include intrauterine adhesions, which occur more frequently after the removal of large myomas or after postsurgical endometritis. As hysteroscopic myomectomy is not associated with uterine rupture at the time of vaginal delivery, cesarean section is not indicated for subsequent pregnancies following the procedure.

Transabdominal myomectomy (TAM), at laparotomy or laparoscopy, is indicated for intramural and subserosal myomas. This procedure poses a major risk of the development of postoperative adhesions, which distort the adnexal anatomy and impair future fertility. It also poses a risk of uterine rupture

during pregnancies following surgery. However, only limited data show that vaginal delivery is contraindicated in women who have undergone abdominal myomectomy, which is still debated. Most clinicians, however, prefer cesarean section for patients with a transmural incision alongside the opening of the endometrial cavity.

The different efficacy profiles of laparoscopic or laparotomic techniques on pregnancy outcome remain to be elucidated.

In the abovementioned meta-analysis, Metwally et al. [5] identified two randomized clinical trials comparing open myomectomy versus LM, with no evidence for a significant effect on the miscarriage rate (OR 1.31, 95% CI 0.40–4.27), preterm labor rate (OR 0.68, 95% CI 0.11–4.43), and cesarean section rate (OR 0.59, 95% CI 0.13–2.72).

In a nonrandomized study, Fukuda et al. [25] compared the perinatal outcomes in 105 women who delivered after LM versus abdominal myomectomy. There were no significant differences in the perinatal outcomes including the rates of emergency cesarean sections, preterm deliveries, placental abnormalities, pregnancy-induced hypertension, low Apgar score, non-reassuring fetal heart rate patterns, and intrauterine fetal death. No significant difference was observed in the incidence of postpartum hemorrhage. No uterine rupture was observed in either group. Of the women included in the study, 15 (31%) women who had undergone LM were candidates for transvaginal delivery, whereas 14 delivered vaginally (93% success rate). By contrast, 20 (35%) of the women who had undergone AM were candidates for transvaginal delivery, whereas 19 delivered vaginally (95% success rate).

Recently, Tian et al. [26] published a comparative, nonrandomized study on 268 patients to compare the pregnancy outcomes following TAM and LM. There was no significant difference in the overall relapse and subsequent cumulative pregnancy rates and obstetric complications between the two groups. Similar results were reported in a recent meta-analysis on four randomized controlled trials involving 577 women with symptomatic uterine leiomyoma, which compared minilaparotomic myomectomy versus LM. There was no significant difference in the cumulative live birth rate and abortion rates between the two groups [27].

Myomectomy by laparotomic or endoscopic techniques remains the standard of care for treating symptomatic fibroids in women who wish preserve their fertility. However, other techniques such as robot-assisted myomectomy, MRgFUS, or artery embolization are currently available.

Lonnerfors and Persson [28] reported a total of 15 pregnancies after robot-assisted LM, resulting in three miscarriages, two terminated pregnancies, and 10 successful term deliveries.

Pitter et al. [29] analyzed the pregnancy outcomes following robot-assisted myomectomy in 127 pregnancies (seven twin pregnancies and two triplet pregnancies): spontaneous abortions occurred in

Table 2

Main results from clinical series of pregnancies after uterine artery embolization for uterine fibroids.

Author, year	Type of study	Number of pregnancies	Main results
Firouznia et al., 2009 [33]		14 spontaneous pregnancies and one achieved by zygote intrafallopian transfer.	– 2 miscarriages (13.3%) – all women delivered by elective cesarean section.
Bonduki et al., 2011 [34]	retrospective study	15 spontaneous pregnancies	– 2 miscarriage (12.5%) – 2 placenta accreta (12.5%), – 1 case of premature rupture of the membranes (PRM) (6.3%) – All women delivered via cesarean section
Pisco et al., 2011 [35]		39 pregnancies	– 4 spontaneous abortions (10.3%), – 2 preterm deliveries (6.1%) – 22 cesarean deliveries (66.6%)
Redecha et al., 2013 [36]		6 spontaneous conception (1 patient was pregnant twice)	– 1 missed abortion – 1 placental retention.
McLucas B, 2013 [37]	retrospective chart review of patients below the age of 40	27 pregnancies.	– 3 miscarriages, – 17 cesarean sections

18.9% (95% CI 13.0, 26.6) and preterm delivery prior to 35 weeks of gestational age occurred in 17.4% (95% CI 10.9, 26.5). One uterine rupture (1.1%; 95% CI 0.3, 4.7) was documented. Higher preterm delivery rates were significantly associated with a greater number of myomas removed and the anterior location of the largest incision (compared with all other sites) in logistic regression analyses ($P = 0.01$). None of the myoma characteristics was related to spontaneous abortion.

No study compared laparotomic or endoscopic myomectomy with robot-assisted myomectomy.

Similarly, no study compared the efficacy of artery embolization (uterine artery embolization (UAE)) or MRgFUS with myomectomy on pregnancy outcome. The information currently available on the pregnancy outcome after fibroid treatment was obtained from non-controlled clinical series.

In the treatment of uterine leiomyomas, several studies have shown MRgFUS to be effective in reducing symptoms associated with myomas in several studies. This treatment induces necrosis and shrinkage of myomas. MRgFUS is not indicated in the case of multiple myomas.

Rabinovici J et al. [30] reported 54 pregnancies in 51 women after MRgFUS treatment of uterine leiomyomas. Live births occurred in 41% of pregnancies, with a 28% spontaneous abortion rate, an 11% rate of elective pregnancy termination, and 11 (20%) ongoing pregnancies beyond 20 gestational weeks.

A recent review of the reproductive impact of MRgFUS for fibroid treatment reported 34 pregnancies, with complications being reported in about 50% of the reported cases [31].

Berman et al. [32] reported reproductive outcomes in six women who underwent radiofrequency volumetric thermal ablation (RFVTA) of symptomatic uterine fibroids. Five patients (5/6, 83%) delivered full-term healthy infants: one by vaginal delivery and four by cesarean section. One patient (1/6, 17%) spontaneously miscarried in the first trimester.

UAE is a minimally invasive procedure that may be as effective as surgery in selected cases. UAE is not generally recommended in women who wish to bear more children, due to the associated risks of endometrial damage and the high rate of abnormalities in the uterine cavity after the procedure. Endometrial necrosis, intracavitary myoma protrusion, intrauterine synechiae, and fistulas between the uterine cavity and the intramural myoma have been reported in as many as 60% of the patients.

Some clinical series have been published on the pregnancy outcome after UAE. A summary of the main findings is presented in Table 2.

Firouznia et al. [33] reported 14 spontaneous pregnancies and one achieved by zygote intrafallopian transfer. Two miscarriages occurred, in the 12th and 16th week of gestation. The other 13 pregnancies reached full term, presented no complication, and ended in elective cesarean delivery.

Bonduki et al. [34] conducted a retrospective study on 15 spontaneous pregnancies reported after uterine arterial embolization for symptomatic uterine fibroids. Of these, 12.5% were miscarriages ($n = 2$) and 87.5% were successful live births ($n = 14$). The gestation time for the pregnancies with successful live births ranged from 36 to 39.2 weeks. Two cases of placenta accreta (12.5%, treated with hysterectomy in one case (6.3%)) and one case of premature rupture of the membranes (PRM) (6.3%) were noted. All of the patients were delivered via cesarean section. Pisco et al. [35] evaluated the obstetric outcome in 39 pregnancies following uterine fibroid embolization: four spontaneous abortions (10.3%), 22 cesarean deliveries (66.6%), and two preterm deliveries at 36 weeks (6.1%) were reported.

Redecha et al. [36] reported six women with successful spontaneous conception (23.08%) and one who became pregnant twice after uterine embolization. No serious complication was observed during gestation and delivery, although one case of missed abortion and one case of placental retention were noted.

McLucas B³⁷ published a retrospective chart review of patients below the age of 40 who wished to bear more children prior to embolization. Twenty-two of these women reported 28 pregnancies. Of these pregnancies, 20 live births, three miscarriages, and three cases of premature labor were reported. Seventeen of these pregnancies were delivered by cesarean section, and six pregnancies were vaginal deliveries (one woman was currently pregnant at the time of publication).

Although the findings of the published series are inconclusive, an increased risk of negative pregnancy outcome may be present following artery embolization.

Summary

In conclusion, clinical experiences and some observational studies suggest that submucous fibroids have a negative impact on the pregnancy outcome. The role of intramural or subserous fibroids is less clear, but multiple or large fibroids are likely to have a negative impact on pregnancy outcome.

The treatment of uterine fibroids may improve pregnancy outcome, although the real impact, particularly in quantitative terms, is unclear. Hysteroscopic myomectomy is the treatment of choice for submucous fibroids. The comparative efficacy of laparoscopic, laparotomic, or new modalities of treatment of intramural fibroids is not known. The choice and modalities of treatment of submucous fibroids should not be based on sound evidence but on clinical concerns and the skill of each center.

Practice points

- Submucous fibroids have a negative impact on pregnancy outcome.
- The role of intramural fibroids is unclear.
- Multiple or large fibroids are likely to have a negative impact on pregnancy outcome.
- The treatment of uterine fibroids may improve pregnancy outcome, but the real impact, particularly in quantitative terms, is unclear.
- The comparative efficacy of different treatment modalities has not been studied.

Research points

A large randomized trial should be planned in order to compare the efficacy of different modalities of treatment of intramural fibroids before pregnancy on the pregnancy outcome.

Conflict of interest statement

The authors have no conflicts of interest to disclose.

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