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Guideline No. 446: Hysteroscopic Surgery in Fertility Therapy

(en français : Chirurgie hystéroscopique dans les traitements de fertilité)

The English document is the original version; translation may introduce small differences in the French version.

This clinical practice guideline was prepared by the authors and was reviewed by the SOGC Reproductive Endocrinology and Infertility Committee and approved by the SOGC Guideline Management and Oversight Committee.

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KEY MESSAGES

1. Patients with infertility may benefit from uterine cavity evaluation by either hysteroscopy, sonohysterography, or 3-D sonohysterography.

This document reflects emerging clinical and scientific advances as of the publication date and is subject to change. The information is not meant to dictate an exclusive course of treatment or procedure. Institutions are free to amend the recommendations. The SOGC suggests, however, that they adequately document any such amendments.

Informed consent: Patients have the right and responsibility to make informed decisions about their care, in partnership with their health care provider. To facilitate informed choice, patients should be provided with information and support that is evidence-based, culturally appropriate, and personalized. The values, beliefs, and individual needs of each patient in the context of their personal circumstances should be considered and the final decision about care and treatment options chosen by the patient should be respected.

Language and inclusivity (*for guidelines using gendered language*): The SOGC recognizes the importance to be fully inclusive and when context is appropriate, gender-neutral language will be used. In other circumstances, we continue to use gendered language because of our mission to advance women's health. The SOGC recognizes and respects the rights of all people for whom the information in this document may apply, including but not limited to transgender, non-binary, and intersex people. The SOGC encourages health care providers to engage in respectful conversation with their patients about their gender identity and preferred gender pronouns and to apply these guidelines in a way that is sensitive to each person's needs.

Weeks Gestation Notation: The authors follow the World Health Organization's notation on gestational age: the first day of the last menstrual period is day 0 (of week 0); therefore, days 0 to 6 correspond to completed week 0, days 7 to 13 correspond to completed week 1, etc.

2. Diagnostic imaging (sonohysterography, 3-D sonohysterography, and MRI) and not surgery should be the first-line of investigation in patients suspected of having a müllerian anomaly.
3. Hysteroscopic adhesiolysis increases the rate of conception in patients with infertility or recurrent pregnancy loss and intrauterine adhesions.
4. Hysteroscopic polypectomy improves reproductive outcomes in patients attempting unassisted conception, ovulation induction, or mild ovarian stimulation.

DEFINITIONS

Assisted reproductive technology: Includes all fertility treatments in which either eggs or embryos are handled (does not include intrauterine insemination).
Fertility: The capacity to establish a clinical pregnancy.
Fertility treatments: Ovarian stimulation with oral agents or gonadotropins, intrauterine insemination, or in vitro fertilization.
In vitro fertilization: Fertility treatment in which either eggs or embryos are handled, and eggs are fertilized outside of the body (includes intracytoplasmic sperm injection).
Myomectomy: A gynaecologic surgery to remove fibroids while preserving the uterus.
Unassisted conception or pregnancy: When a pregnancy is achieved through regular unprotected sexual intercourse without the intervention of medical professionals or medications to enhance fertility.
Unexplained infertility: Infertility in which all standard clinical investigations for infertility yield normal results.

ABSTRACT

Objective: To evaluate the indications, benefits, and risks of hysteroscopy in the management of patients with infertility and provide guidance to gynaecologists who manage common conditions in these patients.

Target Population: Patients with infertility (inability to conceive after 12 months of unprotected intercourse) undergoing investigation and treatment.

Benefits, Harms, and Costs: Hysteroscopic surgery can be used to diagnose the etiology of infertility and improve fertility treatment outcomes. All surgery has risks and associated complications. Hysteroscopic surgery may not always improve fertility outcomes. All procedures have costs, which are borne either by the patient or their health insurance provider.

Evidence: We searched English-language articles from January 2010 to May 2021 in PubMed/MEDLINE, Embase, Science Direct, Scopus, and Cochrane Library (see Appendix B for MeSH search terms).

Validation Methods: The authors rated the quality of evidence and strength of recommendations using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach. See Appendix A (Tables A1 for definitions and A2 for interpretations of strong and conditional recommendations).

Intended Audience: Gynaecologists who manage common conditions in patients with infertility.

Tweetable Abstract: When offering hysteroscopic surgery to patients with infertility, ensure it improves the live birth rate.

SUMMARY STATEMENTS:

1. Hysteroscopy, sonohysterography, and 3-D sonohysterography are comparable for diagnosing intracavitary pathology in patients with unexplained infertility *(high).*
2. The beneficial effects of hysteroscopy on conception and live birth rates in patients with unexplained infertility remains uncertain as numerous studies report contradictory results *(low).*
3. Improvements in imaging modalities means that the majority of müllerian anomalies can be diagnosed non-invasively, with hysteroscopy and laparoscopy being reserved for cases where imaging is inconclusive *(high).*
4. There is no evidence of improved reproductive outcomes following the correction of most müllerian anomalies *(low).*
5. Published literature supports resection or correction of a uterine septum or a T-shaped uterus to improve reproductive and obstetrical outcomes; however, a small, randomized controlled trial did not show a benefit *(moderate).*
6. FIGO types 0–2 (submucosal) fibroids are associated with lower pregnancy and higher miscarriage rates *(moderate).*
7. Hysteroscopic myomectomy appears to be associated with improved unassisted and assisted pregnancy rates *(low).*
8. Fertility outcomes are similar between the various hysteroscopic myomectomy techniques *(low).*
9. Hysteroscopy can reliably diagnose intrauterine adhesions in patients with a normal transvaginal ultrasound and hysterosalpingogram *(moderate).*
10. Hysteroscopic correction of intrauterine adhesions increases conception rates in patients with infertility or recurrent pregnancy loss *(high).*
11. Although hysteroscopy improves the live birth rate in patients known to have intrauterine adhesions, the effect on live birth rates in patients with infertility or recurrent pregnancy loss is uncertain *(low).*
12. In patients with infertility, hysteroscopy can diagnose previously unrecognized polyps in patients with normal investigations *(high).*
13. Hysteroscopic polypectomy improves unassisted and intrauterine insemination conception and live birth rates in asymptomatic patients with infertility *(moderate).*
14. Hysteroscopic polypectomy has limited evidence of benefit for pregnancy or live birth rates in asymptomatic infertility patients undergoing IVF *(low).*
15. Although limited fertility data exist, intrauterine barriers may reduce intrauterine adhesions following hysteroscopic surgery *(low).*
16. There are no data to support the use of medications to improve uterine blood flow or antibiotics in hysteroscopic surgery *(low).*
17. The use of steroid hormones, estrogen with or without progestin, may reduce intrauterine adhesions following hysteroscopic surgery *(low).*

RECOMMENDATIONS:

1. Patients with unexplained infertility may benefit from uterine cavity evaluation by either hysteroscopy, sonohysterography, or 3-D sonohysterography *(conditional, low).*
2. In patients with unexplained infertility, correction of intracavitary pathology may improve live birth rates *(conditional, low).*
3. Diagnostic imaging (sonohysterography, 3-D sonohysterography, and MRI) should be the first-line investigation of müllerian

anomalies, reserving invasive surgical procedures for cases where imaging studies are inconclusive *(strong, high)*.

4. Hysteroscopic correction of müllerian anomalies should be limited to septate and T-shaped uteri, unless functional or pain concerns are present (e.g., cervical agenesis, obstructed uterine horn) *(conditional, low)*.
5. Hysteroscopic myomectomy may be considered in patients attempting conception whether unassisted or with assisted reproductive technology *(conditional, low)*.
6. Patients with infertility or recurrent pregnancy loss diagnosed with intrauterine adhesions on routine investigation should have hysteroscopic adhesiolysis to increase the likelihood of conception *(strong, high)*.
7. Patients planning to conceive and known to have intrauterine adhesions should have hysteroscopic adhesiolysis to improve the likelihood of a live birth *(conditional, moderate)*.
8. Hysteroscopic polypectomy to improve reproductive outcomes is recommended in patients attempting unassisted conception, ovulation induction, or mild ovarian stimulation *(conditional, moderate)*.
9. Hysteroscopic polypectomy is recommended to improve fertility outcomes in patients planning intrauterine insemination *(conditional, moderate)*.

INTRODUCTION

Hysteroscopy is not always a routine fertility investigation but can be used to evaluate the uterine cavity and treat pathology during the same procedure. Routine fertility investigation includes hysterosalpingography and/or sonohysterography. However, hysterosalpingograms have low sensitivity (50%) and positive predictive value (30%) for intracavitary pathology (i.e., polyps and fibroids).[1] Transvaginal ultrasounds help with visualization of adnexal or uterine pathology (e.g., polyps, fibroids, and adenomyosis).[2] Sonohysterography is better at determining the size and shape of the cavity with high (>90%) positive and negative predictive values for intrauterine pathology (e.g., polyps, fibroids, and synechiae).[3] Three-dimensional transvaginal ultrasounds and pelvic MRI are useful for detailed evaluation of the uterus, myometrium, and adnexa.[2] Compared with hysterosalpingography and sonohysterography, hysteroscopy may be a more expensive and invasive procedure for evaluating the uterine cavity.[1]

Although hysteroscopy is increasingly used for evaluation in patients with infertility, there is still no consensus on its effectiveness at improving live birth rates. A Cochrane review found that a screening hysteroscopy prior to in vitro fertilization (IVF) increased the live birth rate, but a sensitivity analysis pooling the results from trials at low risk of bias did not find an increase in live birth rates.[2] The authors concluded that it remains uncertain whether screening hysteroscopy increases conception or live birth rates for either all infertile patients or those with recurrent implantation failure (RIF). Hysteroscopy remains the gold standard for the diagnosis and treatment of intracavitary pathology. Intracavitary pathology is present in 16.2% of patients with infertility, with polyps in 13%, submucous fibroids in 2.8%, and intrauterine adhesions in 0.3%.[3]

Readers of this guideline should be aware that an assessment of surgical literature often overlooks specific surgical or logistical approaches when using a particular technique. This limitation can lead to broad recommendations that lack subtlety. An example of this are the differences between hysteroscopies performed in the operating room setting with an anesthesiologist and those performed in office where procedural sedation may or may not be administered. These differences include costs to the health care system (with office-based approaches usually less expensive than those in a hospital operating room), and the type of hysteroscopic procedures that can be performed. Larger resections usually take longer, require different instruments, and are more uncomfortable, necessitating an operating room setting. The different types of distension media used in hysteroscopy influence the type of equipment used, the duration of the procedure, and the risks to the patient from fluid absorption. Data about these concepts is available but was not addressed in the literature reviewed for this guideline. Clinicians must exercise judgement in determining the most appropriate treatment options in terms of location, equipment, and procedures.

The aim of this review is to provide guidance in investigating and treating common uterine intracavitary conditions in patients attempting conception. This guideline will assist all gynaecologists in counselling patients with infertility and enable evidence-based hysteroscopic management. However, this guideline does not replace individualized patient care. In the era of personalized medicine and patient preferences, the surgeon's skill, knowledge, and experience must take precedence when applying the recommendations provided.

ABBREVIATIONS

ART	Assisted reproductive technology
ICSI	Intracytoplasmic sperm injection
IUD	Intrauterine device
IUI	Intrauterine insemination
IVF	In vitro fertilization
RCT	Randomized controlled trial
RIF	Recurrent implantation failure
RPL	Recurrent pregnancy loss

UNEXPLAINED INFERTILITY

Unexplained infertility is diagnosed when a standard fertility assessment confirms ovulation, a minimum of one patent fallopian tube on hysterosalpingography or sonohysterography, and a normal semen analysis. According to these criteria, about 30%–50% of patients evaluated have unexplained infertility.[4]

Non-Invasive Investigations Compared with Hysteroscopy

Sonohysterography and 3-D sonohysterography appear to be as effective as hysteroscopy at diagnosing intracavitary pathology. Compared with hysteroscopy, sonohysterography is highly sensitive and specific for diagnosing intracavitary pathology prior to IVF.[5] A systematic review of 20 infertility studies (1645 procedures) compared the diagnostic accuracy of sonohysterography to hysteroscopy for intracavitary pathology. Sonohysterography had a sensitivity of 88% (95% CI 0.85–0.90) and a specificity of 94% (95% CI 0.93–0.96).[5] Three-dimensional transvaginal ultrasound

has a high specificity (91.5%, 95% CI 79.6−97.6) but a lower sensitivity (68.2%, 95% CI 45.1−86.1) for diagnosing intracavitary pathology.[6,7] A case series of 214 IVF patients who had undergone both 3-D sonohysterography and hysteroscopy, reported a sensitivity of 68.4% and specificity of 96.3% for the diagnosis of intracavitary pathology. However, 3-D sonohysterography had a better sensitivity at 91.3% and a specificity of 81.4% for diagnosing polyps or endometrial hyperplasia.[7] In a prospective study of 69 infertile patients who had a 3-D transvaginal ultrasound and hysteroscopy, the authors reported a sensitivity of 68.2%, specificity of 91.5%, positive predictive value of 79%, and negative predictive value of 86% for intracavitary pathology.[6]

Effect of Hysteroscopy on Conception, Live Birth, and Miscarriage Rates

The literature is conflicted and uncertain about the effect of hysteroscopy on reproductive outcomes in patients with unexplained infertility. A meta-analysis involving 2976 patients found moderate quality evidence that diagnostic hysteroscopy improves the IVF conception rate and low-quality evidence that operative hysteroscopy increases the IVF conception rate.[8] Within the meta-analysis, the studies that compared hysteroscopy to no intervention found a higher conception rate (n = 2545, RR 1.45, 95% CI 1.26−1.67) and a higher live birth rate in the hysteroscopy group (n = 1088, RR 1.48, 95% CI 1.20−1.81).[8] The studies with data on miscarriage rates (n = 941) found no significant difference in this outcome with hysteroscopy (RR 1.25, 95% CI 0.70−2.21).[8]

Several prospective and retrospective studies found a beneficial effect of hysteroscopy on reproductive outcomes. A randomized controlled trial (RCT) of 200 patients attempting unassisted conception concluded that hysteroscopy should be used to diagnose and correct intracavitary pathology in patients with unexplained infertility.[9] In this study, patients were randomly assigned to the hysteroscopy group (n = 100) or to the control group (no intervention, n = 100). Uterine abnormalities present in the study included endometrial polyps (20%), submucous fibroids (3%), intrauterine adhesions (3%), polypoid endometrium (3%), and bicornuate uterus (1%). All intracavitary pathology was corrected with a conception rate of 28.5% in hysteroscopy patients and 15% in the control group ($P < 0.05$). The miscarriage rate was not significantly different between groups.[9] An RCT of 197 unexplained infertility patients concluded that hysteroscopy improves conception rates with intracytoplasmic sperm injection (ICSI).[10] Patients were randomly assigned to hysteroscopy before ICSI or proceeded directly to ICSI, with 43.3% of hysteroscopy patients found to have intracavitary pathology. The conception rate in the hysteroscopy before ICSI group was 70.1% and 45.8% in the direct to ICSI group (OR 2.77; 95% CI 1.53−5.00, $P = 0.001$).[10] A cohort study of 727 patients with RIF and a normal transvaginal ultrasound and hysterosalpingography concluded that hysteroscopy significantly improves conception and implantation rates.[11] Intracavitary pathology was found in 37.1% of self-selected hysteroscopy patients with correction of all pathology. After a repeat embryo transfer, the conception rate was 41.9% with hysteroscopy versus 32.3% without ($P < 0.01$), and the implantation rate was 23.8% with hysteroscopy versus 18.6% without ($P < 0.05$). Miscarriage, ectopic pregnancy, and live birth rates were not significantly different between the groups.[11] Several retrospective studies of patients with unexplained infertility reached similar conclusions that hysteroscopic intervention improves conception rates.[12-14]

In contrast, several other prospective and retrospective studies found that hysteroscopy had no effect on reproductive outcomes. An RCT of 750 patients with unexplained infertility and normal transvaginal ultrasound findings concluded that hysteroscopy does not improve conception rates.[15] In that study, patients were randomly assigned to hysteroscopy with correction of intracavitary pathology before IVF or proceeded directly to IVF, with 9.9% of patients found to have intracavitary pathology. After 18 months of follow-up, the hysteroscopy before IVF group had a conception rate of 53% compared with 51% for the IVF direct group (RR 1.05; 95% CI 0.92−1.21, $P = 0.46$).[15] Similarly, a multicentre RCT of 702 patients with normal uterine cavities and RIF concluded that hysteroscopy does not improve the live birth rate.[16] In that study, patients were randomly assigned to hysteroscopy before IVF or proceeded directly to IVF. A total of 9.7% of patients had intracavitary pathologies, but only 33% had corrective surgery. After another IVF cycle, implantation rates were not significantly different between groups (29% vs. 30%; RR 0.91, 95% CI 0.61−1.37). Both groups had the same live birth rate of 29% (RR 1.0; 95% CI 0.79−1.25, $P = 0.96$). There were no differences in miscarriage rates.[16] An RCT of 171 patients with unexplained infertility (Ben Abid et al.) concluded that intracavitary pathology that was not detected by transvaginal ultrasound and hysterosalpingography does not affect IVF conception and live birth rates.[17] In the trial, patients with normal transvaginal ultrasound and hysterosalpingography were randomly assigned to hysteroscopy before IVF or proceeded directly to IVF. Intracavitary pathology was found in 30% of patients but only 50% had corrective surgery. The

conception and live birth rates in the hysteroscopy before IVF group were 32.4% and 23.9%, respectively, while in direct to IVF patients they were 21.7% ($P = 0.326$) and 19.3% ($P = 0.607$), respectively. There were no differences in miscarriage or multiple pregnancy rates.[17]

Summary Statement(s) 1, 2 and Recommendation(s) 1, 2

MÜLLERIAN ANOMALIES

Embryologically, the uterus and vagina develop from two separate systems—the müllerian (paramesonephric) ducts form the uterus, fallopian tubes, and upper two-thirds of the vagina; the invagination of the urogenital sinus, with fusion to the upper portion, completes the lower vagina. Congenital uterine anomalies, also known as female genital malformations or müllerian anomalies, occur when there is an error in the process of fusion, canalization and/or absorption in one or more than one area.[18] The prevalence in the literature ranges from 4%—7% in the general population to 12%—18% in patients with recurrent pregnancy loss (RPL).[19] These percentages are likely underestimations, as anomalies are often undiagnosed or under-reported.

Hysteroscopic Diagnosis of Müllerian Anomalies

The two commonly used classification systems for müllerian anomalies are the 2021 American Society for Reproductive Medicine Müllerian Anomalies Classification (ASRM MAC2021), and the European Society of Human Reproduction and Embryology (ESHRE)/European Society for Gynaecological Endoscopy (ESGE) classification system.[18,20] Both attempt to standardize the description of müllerian anomalies, as the lack of standardization has made comparative studies difficult. Both make recommendations on diagnostic imaging modalities, which includes, in decreasing order of diagnostic accuracy: MRI, 3-D transvaginal ultrasound, sonohysterography, and hysterosalpingography.[21] The recommendations move away from the previous gold standard of concurrent laparoscopy and hysteroscopy, reserving surgery for patients whose condition cannot be accurately defined or where surgical correction may be helpful.[20,21]

Effect of Hysteroscopy on Conception and Miscarriage Rates

The value of surgical correction of most müllerian anomalies remains uncertain. Resection of a non-communicating horn, removal of an obstructive or longitudinal vaginal septum, or vaginoplasty may be indicated for functional or pain-control reasons.[20] In patients attempting to conceive, there is a paucity of evidence to support surgical correction of müllerian anomalies, aside from septate or T-shaped uteri. The morphologic features of the septum prior to resection (length, width, and surface area) may predict post-resection outcomes.[22] These features significantly predict the incidence of postoperative intrauterine adhesions, the need for re-operation, and subsequent fertility outcomes.[22] Multiple small retrospective studies, case-control studies, and a meta-analysis have reported that surgical correction of septate uteri improves reproductive outcomes.[22] In these studies, uterine septum resection improved conception and live birth rates in patients with RPL or unexplained infertility.[23] Freud et al. reported that the risk of miscarriage was more than 50% lower after septum resection.[24] The 2016 ASRM guideline stated, "it is reasonable to consider uterine septum incision [. . .]" in patients with or without infertility, prior pregnancy loss, or poor obstetrical outcome "[. . .] following counselling regarding potential risks and benefits." This guideline was based on limited evidence, mainly grade B and C evidence.[25]

In an RCT, 80 patients with septate uteri and a history of subfertility, pregnancy loss, or preterm birth , were randomly assigned over 8 years to either septum resection or expectant management.[26] Baseline characteristics, size of the septum, age, and parity were similar between the groups. Twenty-six of the 80 patients had a live birth (12 from the resection group and 14 from the expectant group; RR 0.88, 95% CI 0.47—1.7). There were no differences in pregnancy loss rate (RR 2.3, 95% CI 0.86—5.9) or preterm birth risk (RR 1.3, 95% CI 0.37—4.4), leading the authors to conclude that septum resection did not affect reproductive outcomes. The study has been criticized for small sample size and crossover (5 of the 40 patients assigned to expectant management [12.5%] had a septum resection), although the study was analyzed on an intention-to-treat basis.

A recent systematic review and meta-analysis of 38 studies involving 6182 patients (including Rikken et al.) concluded that the presence of a uterine septum significantly decreases conception rates (OR 0.45, 95% CI 0.27—0.76) and live birth rates (OR 0.21, 95% CI 0.12—0.39).[27] It also found that uterine septum significantly increase the risk of miscarriage (OR 4.29, 95% CI 2.90—6.36) and preterm birth (OR 2.56, 95% CI 1.52—4.31). A secondary analysis of 1053 patients, comparing patients who had a septum resection to no intervention, found a significantly higher live birth rate (OR 3.07, 95% CI 1.22—7.73), with no differences in conception, miscarriage, and preterm birth rates between the two groups.[27] An analysis of 1920

patients before and after septum resection showed significant improvements in the live birth rate (OR 46.68, 95% CI 29.93−82.13) and significant reductions in the risks of miscarriage (OR 0.02, 95% CI 0.02−0.04) and preterm labour (OR 0.05, 95% CI 0.03−0.08).[27]

A T-shaped uterus may occur congenitally or after infection, instrumentation, or exposure to diethylstilbestrol (DES). Studies looking specifically at reproductive outcomes following DES exposure have shown similar adverse reproductive outcomes to septate uteri.[28] In patients with infertility and a T-shaped uterus, pregnancy and live birth rates improved significantly after hysteroscopic correction.[29,30] Study patients had similar reproductive outcomes as patients with a uterine septum who had undergone hysteroscopic septum resection.[29,30]

Effect of Hysteroscopy on Live Birth Rates and Obstetric Complications

Obstetric outcomes after hysteroscopic septum resection have been well studied. A retrospective study of patients who underwent a hysteroscopic septum resection versus matched controls, reported no differences in incidence of placental anomalies (abruption, previa, accreta), preterm delivery, uterine rupture, and postpartum hemorrhage.[31] However, the rates of caesarean delivery and breech presentation were significantly higher in the septum resection group. The authors concluded that this was due in part to the bias of the delivering physicians and unfounded fears of uterine rupture during labour. Approximately 35% of caesarean deliveries in the septum resection group were attributed to breech presentation, and 35% were performed for arrest of labour, which was similar to the control group. The RCT by Rikken et al. found no statistical difference in pregnancy outcomes between the patients who received septum resection or expectant management.[26]

A large retrospective, matched cohort study of patients using assisted reproductive technology (ART) showed significant improvements in conception (OR 2.5, $P < 0.001$) and live birth rates (OR 32, $P < 0.001$) with hysteroscopic septum resection.[32] The study reported a 50% reduction in miscarriage following septum resection.[32] A second retrospective study of hysteroscopy for müllerian anomalies, polyps, and fibroids, prior to ART, reported a concerning increase in the risk of cervical insufficiency.[33] Unfortunately, this study was not powered to differentiate between indications for surgery.

Summary Statement(s) 3, 4, 5 and Recommendation(s) 3, 4

FIBROIDS

Uterine fibroids (leiomyoma) are benign monoclonal tumours of the myometrium. They are frequently seen in patients trying to conceive.[34] Fibroids were traditionally classified, according to location, as submucosal, intramural, or subserous, but today the International Federation of Gynaecology and Obstetrics's (FIGO's) classification types 0−8 are commonly used.[35] Cavity distorting fibroids (FIGO types 0−2) have been associated with decreased clinical pregnancy, implantation, and live birth rates, as well as with increased miscarriage rates.[36] Several mechanisms have been proposed to explain the link between cavity distorting fibroids and infertility including anatomical, functional, hormonal, and molecular modifications induced by the presence of fibroids.[37] Available data on hysteroscopic myomectomy and infertility is limited with most studies being of low quality.

Hysteroscopic Removal of Fibroids

Most FIGO type 0−2 (submucosal) fibroids and FIGO type 3 (intramural) fibroids, in close contact with the endometrium, can be diagnosed and often treated using hysteroscopy. Fibroid removal can safely be achieved using mono- or bipolar resectoscopes or mechanical morcellation.[38-40] Studies and meta-analyses comparing different fibroid removal techniques (i.e., morcellation vs. resectoscope and monopolar vs. bipolar resectoscope) did not show significant differences in surgery outcomes or fertility following hysteroscopy.[39,41] Morcellation had a slightly shorter operating time (3.42 min) and shorter learning curve.[42] Surgery can be undertaken in an office, outpatient, or operating room setting.[43] The most important factors for successful myomectomy are the size and number of fibroids, their degree of penetration into the uterine cavity (FIGO type 0 vs. 2 or 3), and the surgeon's experience. Large (>3 cm) or deep type 2 fibroids occasionally need more than one procedure to complete removal.[34] Intraoperative ultrasound can be beneficial for type 2−5 fibroids.[44]

Effect of Hysteroscopic Myomectomy on Conception Rates

In a comprehensive systematic review, Pritts et al. reported higher clinical pregnancy rates (with or without fertility treatment) after removal of submucosal fibroids when compared with patients with fibroids left in situ (RR 2.034; CI 95% 1.081−3.826, $P = 0.028$).[36] However, there was a non-significant difference in ongoing pregnancy and live birth rates.[36] Myomectomy was associated with pregnancy rates comparable to those seen in patients without fibroids.

In the only published RCT on fibroid surgery in patients with infertility (n = 92), Casini et al. found an increased pregnancy rate in the myomectomy group of 43.3% compared with 27.2% in the control group ($P < 0.05$).[45] The pregnancy rate in patients with submucosal fibroids ≤4 cm that were resected was 36.4% compared with 15% ($P < 0.05$) in patients with mixed intramural and submucosal fibroids.[45] Two independent Cochrane reviews based on the Casini et al. study, concluded (based on very low-quality evidence) that it was uncertain whether hysteroscopic myomectomy improved clinical pregnancy rates compared with expectant management in patients with submucosal fibroids.[39,45,46]

A retrospective study on patients attempting conception after hysteroscopic myomectomy reported no differences in pregnancy and live birth rates between FIGO types 0, 1, or 2 fibroids.[47] Hysteroscopic myomectomy was associated with a risk of significant damage to the endometrium resulting in intrauterine adhesions or a hydrometra (the presence of endometrial fluid) during preparation for an embryo transfer.[37,48]

After a successful hysteroscopic myomectomy, no 'healing' time appears necessary before ART, according to a subanalysis of a retrospective cohort study.[41] Pregnancy rates were unaffected by the timing of embryo transfer 30 days or more after hysteroscopic myomectomy.

Hysteroscopic Myomectomy and Miscarriage Rates

A systematic review by Pritts et al. reported no differences in miscarriage rates in patients following hysteroscopic myomectomy compared with controls with fibroids left in situ.[36] A 2018 Cochrane review concluded that there was uncertainty as to whether hysteroscopic myomectomy decreased miscarriage rates compared with no intervention.[46]

Summary Statement(s) 6, 7, 8 and Recommendation(s) 5

INTRAUTERINE ADHESIONS

The most common etiologies of intrauterine adhesions are intrauterine surgical procedures and infections. Asherman syndrome is partial or complete obstruction of the uterine cavity resulting in menstrual abnormalities, cyclic lower abdominal pain, infertility, and/or RPL.[49] Compared with hysteroscopy for the diagnosis of intrauterine adhesions, hysterosalpingography has a sensitivity of 75%–81%, specificity of 80%, and positive predictive value of 50%.[50] In the diagnosis of intrauterine adhesions, transvaginal ultrasound has a sensitivity of 52% and positive predictive value of 11%, compared with hysteroscopy.[50]

Hysteroscopic Diagnosis of Intrauterine Adhesions

Hysteroscopy can reliably diagnose intrauterine adhesions with an incidence reflective of the patient's risks. In a series of 217 IVF patients with normal transvaginal ultrasound and hysterosalpingography findings (Bakas et al.), 1.4% were found to have intrauterine adhesions on hysteroscopy.[51] The study found that intrauterine adhesions were more common in patients with RIF. In the Gao et al. study, 4.5% of the self-selected hysteroscopy patients were found to have intrauterine adhesions.[11] In Ben Abid et al., 15% of the 171 IVF patients required hysteroscopic adhesiolysis.[17] In a series of 200 infertile patients who had both hysterosalpingography and hysteroscopy, hysteroscopy diagnosed intrauterine adhesions in 38.7% of patients.[52] Hysterosalpingograms were abnormal in only two-thirds of patients with intrauterine adhesions, leading the authors to conclude that hysteroscopy is more accurate than hysterosalpingography. In study of 200 patients with unexplained RPL, 12.5% were found to have intrauterine adhesions on hysteroscopy.[53] The authors deemed hysteroscopy a useful tool in investigating RPL.

Effect of Hysteroscopic Adhesiolysis on Conception Rates

In patients with infertility or RPL diagnosed with intrauterine adhesions on routine investigation, hysteroscopic adhesiolysis has been found to increase conception rates. A study of 61 infertile or RPL patients with intrauterine adhesions diagnosed by hysterosalpingography and transvaginal ultrasound (Sanad and Aboulfotouh) reported a conception rate before hysteroscopic adhesiolysis of 18.0% and 65.5% afterward ($P = 0.0001$).[54] The authors asserted that hysteroscopic adhesiolysis significantly improved conception rates. In Ben Abid et al. hysteroscopic adhesiolysis did not affect conception or multiple pregnancy rates when compared with the IVF direct group (32.4% vs. 21.7%, $P = 0.326$).[17] A study of 4577 infertile patients who had a 3-D transvaginal ultrasound found 110 patients to have intrauterine adhesions and saw a 17.0% conception rate within 2 years of hysteroscopic adhesiolysis.[11]

A study of 683 patients with intrauterine adhesions concluded that hysteroscopic adhesiolysis improved the conception rate.[55] Patients were followed for 5 years, with a conception rate of 66.1%. A series of 357 patients with intrauterine adhesions who underwent hysteroscopic adhesiolysis with restoration of the uterine cavity reported

a conception rate of 48.2%, which decreased with increasing severity of the adhesions (mild, 60.7%, moderate, 53.4%, and severe, 25%).[56] A study of 153 patients with intrauterine adhesions had a conception rate of 51%, with 18.2% of patients experiencing adhesion that reformed after hysteroscopic adhesiolysis.[57] A study of 202 patients diagnosed with intrauterine adhesions on hysterosalpingography reported a 52% conception rate after hysteroscopic adhesiolysis, with 86% of conceptions being unassisted.[58] The authors reported a trend toward a lower conception rate in patients with severe adhesions (40.5%, $P = 0.09$). This finding is supported by findings from a series of 154 patients who had hysteroscopic adhesiolysis and were followed for at least 1 year. This study had a conception rate of 79.0% (95% CI 63.6−83.1).[59] The authors noted that adhesion severity had a negative effect on prognosis. There are no RCTs comparing expectant management to hysteroscopic adhesiolysis in patients with signs or symptoms of intrauterine adhesions.[60] A meta-analysis (n = 1596) concluded that mechanical barriers reduce the severity and recurrence of adhesions while improving fertility outcomes.[61]

Effect of Hysteroscopic Adhesiolysis on Miscarriage and Live Birth Rates

The effect of hysteroscopic adhesiolysis on live birth rates is unclear in patients with infertility or RPL found to have intrauterine adhesions on fertility investigations. The previously mentioned series by Sanad and Aboulfotouh reported live birth rates of 14.7% before hysteroscopic adhesiolysis and 36% afterward ($P = 0.0118$).[54] The study found that live birth rates are significantly affected by adhesion severity and not by the clinical presentation.[54] In Ben Abid et al., hysteroscopic adhesiolysis did not alter the live birth rate when compared with the direct to IVF group (23.9% vs. 19.3%, $P = 0.607$).[17] A study of 4577 infertile patients and 110 patients with intrauterine adhesions diagnosed on 3-D transvaginal ultrasound, reported a 50% live birth rate and a 50% miscarriage rate within 2 years of hysteroscopic adhesiolysis.[62]

In patients with known intrauterine adhesions, hysteroscopic adhesiolysis increases live birth rates. The previously mentioned study by Xiao et al. concluded that hysteroscopic adhesiolysis was effective at improving live birth rates in patients with intrauterine adhesions.[55] Patients were followed for 5 years, with a live birth rate of 64% and a miscarriage rate of 14.6%. The previously mentioned study by Chen et al. reported a live birth rate of 85.6% and a miscarriage rate of 9.4%.[56] The authors concluded that hysteroscopic adhesiolysis was an effective procedure to improve the likelihood of live birth in patients with intrauterine adhesions.[56] The previously mentioned study by Liu et al. found a live birth rate of 62.8%, an ongoing pregnancy rate of 24.4%, and a miscarriage rate of 12.8% after hysteroscopic adhesiolysis.[57] The previously mentioned study by Capmas et al. reported a live birth rate of 79.3% and a miscarriage rate of 17.2% after hysteroscopic adhesiolysis.[58] The previously mentioned study by Deans et al. had a live birth rate of 63.7% (95% CI 51.3%−70.7%) and a miscarriage rate of 23.4% (95% CI 18.8%−37.1%).[59]

Summary Statement(s) 9, 10, 11 and Recommendation(s) 6, 7

ENDOMETRIAL POLYPS

Endometrial polyps represent localized endometrial overgrowths consisting of endometrial stroma, glands, and blood vessels.[63] Polyps may be pedunculated or sessile, arise alone or as multiple lesions, and vary in size from millimetres to centimetres.[64,65] The incidence of polyps varies from 5.0% in patients with RPL to 46.7% in patients with endometriosis.[66,67] Patients with symptomatic polyps usually present with abnormal uterine bleeding.[35] However, many patients with infertility have asymptomatic polyps diagnosed incidentally during a fertility evaluation.[64,68]

Hysteroscopy for the Diagnosis of Endometrial Polyps in Fertility Patients

Several studies support hysteroscopy for identifying polyps in fertility patients with normal transvaginal ultrasound and hysterosalpingography findings.[68-70] A retrospective study of patients with RIF and normal hysterosalpingography who underwent a hysteroscopy found that 25% had polyps.[71] In the previously mentioned study by Bakas et al., hysteroscopy identified polyps in 12% of patients.[51] A prospective study of 334 patients with RIF and normal transvaginal ultrasound and hysterosalpingography findings found that 19.2% of patients had polyps on hysteroscopy.[11] An RCT comparing hysteroscopy before ICSI to no hysteroscopy in patients with normal transvaginal ultrasound and/or hysterosalpingography findings found polyps in 9.3% of hysteroscopy patients.[72]

Effect of Hysteroscopic Polypectomy on Reproductive Outcomes in Patients with Infertility

Unassisted Conception

Four small studies found a beneficial effect of hysteroscopic polypectomy on unassisted pregnancy outcomes in fertility patients. In a retrospective study of 42 infertility patients undergoing hysteroscopy, 23 had polypectomies,

while 19 had normal findings. Conception rates in the polypectomy group were 78.3% versus 42.1% in the normal group (RR 3.89, 95% CI 1.62−9.36). However, the cumulative live birth rate of 65.2% versus 36.8%, did not reach statistical significance (RR 2.44, 95% CI 0.966−6.18), likely owing to a small sample size.[73] Two retrospective studies reported conception rates of 76% and 42% in infertile patients who had undergone polypectomy.[74,75] A retrospective study assessed the effect of size and number of polyps on outcomes. Post-polypectomy conception and live birth rates for polyps <1 cm were 67.6% and 58.8%, respectively, and for polyps >1 cm, they were 57.1% and 51%, respectively.[76] Unfortunately, pre-polypectomy rates were not reported.

Intrauterine Insemination

One case-control study and two RCTs reported higher conception rates with hysteroscopic polypectomy in patients undergoing intrauterine insemination (IUI). The retrospective study compared 86 polypectomy patients with 85 controls who had 3 IUI cycles starting 3 months after polypectomy or enrollment.[77] The polypectomy patients had higher conception rates (40.7% vs. 22.4%, $P < 0.05$). The RCT randomly assigned patients with polyps to either hysteroscopy and polypectomy (n = 107) or hysteroscopy with polyp biopsy (n = 108).[78] IUI was scheduled to start 3 cycles after enrollment with a total of 4 IUIs planned. 63.4% of polypectomy patients conceived, compared with 28.2% of the control group (RR 2.1; 95% CI 1.5−.9, $P < 0.001$). Sixty-five percent of conceptions in the polypectomy group occurred prior to IUI, suggesting a benefit from polypectomy in unassisted conceptions.[78] Another RCT allocated 120 patients with polyps to either hysteroscopy or observation (60 per group). IUI was scheduled to start 3 cycles after enrollment, with a total of 4 IUIs planned. In total, 38.3% of hysteroscopy patients conceived (all within 2 attempts), compared with 18.3% of the control group ($P = 0.010$).[79] A 2019 systematic review of these studies found an IUI conception rate that favoured hysteroscopic polypectomy (OR 3.24,95% CI 2.20−4.79).[80]

In Vitro Fertilization

Studies examining the effects of polyps and polypectomy in patients undergoing IVF are heterogeneous, with different patient populations, polyp sizes or locations, polypectomy before IVF or during stimulation, or fresh versus frozen embryo transfers. This heterogeneity makes drawing conclusions challenging.

Three non-randomized studies reported a benefit from hysteroscopic polypectomy. Cenksoy et al. found that 48.1% of RIF patients conceived after hysteroscopy.[71] The conception rate was higher after polypectomy ($P = 0.001$), but no numbers were reported. Similarly, Elsetohy et al. reported a higher conception rate with hysteroscopy in patients having ICSI (70.1% vs. 45.8%), although polyps only represented 21% of the lesions treated.[72] Kilic et al. compared the outcomes of 100 patients who underwent hysteroscopy, 23 of whom were found to have polyps, to 398 controls.[81] Higher live birth rates were found in the hysteroscopy group (26%) and polypectomy group (36.5%) compared with the control group (18.3%, $P < 0.05$).

Conversely, several additional studies found no benefit from hysteroscopic polypectomy on conception rates. Lass et al. compared patients diagnosed with a polyp during an IVF cycle who either continued to a fresh embryo transfer without polypectomy or had a polypectomy during their egg retrieval and a subsequent frozen embryo transfer.[82] No differences were reported in conception rates (22.4% vs. 33.3%) or live birth rates (16.3% vs. 17.6%). However, embryo freezing techniques have improved significantly since this study was published, and only 57% of patients with a suspected polyp had histologic confirmation of a polyp at polypectomy. A retrospective study compared fresh embryo transfer pregnancy rates in patients undergoing ICSI who were diagnosed with polyps and had a polypectomy before ICSI to those diagnosed with polyps (by transvaginal ultrasound) during IVF stimulation and did not undergo polypectomy before transfer.[83] There were no differences in conception rates, miscarriage rates, or live birth rates between the groups. A retrospective study by Isikoglu et al. compared polyps removed before ICSI to polyps found during ICSI but not removed and to controls with no polyps.[84] There were no differences in conception rates between the groups (53.3% vs. 45.0% vs. 40.1%). A case-control study compared 102 patients with polypectomy before frozen blastocyst transfer to matched controls without polyps.[85] It found no differences in conception, miscarriage, or live birth rates. A 2019 systematic review of 5 studies comparing hysteroscopic polypectomy before ICSI to no treatment if a polyp was identified during IVF stimulation found no differences in conception rates (OR 1.36, 95% CI 0.89−2.07), live birth rates (OR 1.37, 95% CI 0.90−2.09), or miscarriage rates (OR 0.84, 95% CI 0.40−1.75).[80] The limitation of these studies is the absence of a direct comparison between polypectomy versus no polypectomy in patients who have a polyp identified prior to IVF cycle start. In most cases, polyps are removed upon identification, before ART treatment begins.

A prospective study of 58 patients who underwent polypectomy during IVF stimulation and had a fresh embryo

transfer were compared with 102 patients with polyps who had no intervention and proceeded to a fresh embryo transfer. No differences in conception, miscarriage or live birth rates were noted.[86] An earlier study also showed that polyps diagnosed during IVF (with transvaginal ultrasound) and not removed did not affect conception and live birth rates from fresh embryo transfers compared with controls without polyps identified before or during the IVF cycle.[64] A meta-analysis of studies assessing patients with RIF who had a diagnostic hysteroscopy without any pathology identified found improved conception (OR 1.79, 95% CI 1.40−2.30) and live birth rates (OR 1.46, 95% CI 1.08−1.97).[87]

Despite the standard practice of polyp identification during a fertility assessment and removal before IVF, given the implied benefit from the unassisted conception and IUI data and the high safety profile of hysteroscopic polypectomy, it remains uncertain whether this approach is beneficial. The latter studies, along with the Isikoglu et al. study, suggest that polyps may not affect IVF outcomes and that hysteroscopy alone (without polypectomy) may lead to improvements in IVF outcomes.[84] This implies that hysteroscopy, and not the polypectomy, may account for the improvements in ongoing pregnancy and live birth rates.

Summary Statement(s) 12, 13, 14 and Recommendation(s) 8, 9

ADJUVANTS FOLLOWING HYSTEROSCOPY

Intrauterine barriers (intrauterine devices [IUDs]), intrauterine stents, hyaluronic acid gel, and paediatric Foley catheters) appear to reduce intrauterine adhesions following hysteroscopic surgery; however, limited fertility data exist.[60] A meta-analysis of RCTs found that intrauterine barriers improve menstrual disorders and fertility following hysteroscopy.[61] Hyaluronic acid gel was more effective at reducing adhesion recurrence than a catheter (RR 0.29, 95% CI 0.13−0.65). However, a catheter was more effective than no treatment (RR 3.71, 95% CI 1.39−9.90). A catheter with an IUD was more effective than a catheter alone (RR 2.10, 95% CI 1.13− 3.93).[61] Hyaluronic acid gel compared with no treatment after hysteroscopy was associated with a lower incidence of intrauterine adhesions (14% vs. 32%, $P < 0.05$).[88] An RCT comparing IUD for 3 months to a catheter for 1 week, followed by IUD for 3 months, to a catheter for 1 month, followed by IUD for 3 months, found that a catheter with IUD was better than IUD alone in preventing adhesions.[89] Lin et al. compared catheters, IUDs, and hyaluronic acid gel to no intervention and found the greatest reduction in intrauterine adhesions in the catheter group ($P < 0.001$).[90] The infection risk is minimal with solid intrauterine barriers. Copper IUDs are not recommended, as they cause inflammation with an 8% infection rate.[91,92]

There are no data to support the use of antibiotics before, during, or after hysteroscopic surgery.[60] The American College of Obstetricians and Gynecologists does not recommend the routine use of antibiotic prophylaxis for hysteroscopic procedures.[93] A meta-analysis of RCTs on antibiotic prophylaxis reported no clinical benefit in hysteroscopic surgery.[94] Medications to improve uterine blood flow (e.g., aspirin, nitroglycerin, sildenafil) should only be used in research protocols.[60]

The use of estrogen, with or without progestin, after hysteroscopic surgery may reduce adhesion formation.[60] A systematic review reported that estrogen with an intrauterine barrier had better menstrual and fertility outcomes, regardless of adhesion severity.[95] The most common regimen was estradiol 4 mg daily with medroxyprogesterone acetate 10 mg for 7 days per cycle, for up to 5 cycles. No comparative studies have confirmed the ideal dosage, regimen, route of administration, or hormone combination.[95] Following hysteroscopic septum resection, estradiol for 30 days showed no significant differences in intrauterine adhesions or conception rate (37% vs. 41%) after 2 years of follow-up.[96] An RCT comparing 3 cycles of postoperative estradiol 4 mg daily for 3 weeks with progestogen 10 mg daily for 7 days did not reduce the incidence or severity of intrauterine adhesions.[97] Tonguc et al. found no differences in intrauterine adhesions or pregnancy outcomes after hysteroscopy between no treatment, estrogen only, estrogen with a copper IUD, and a copper IUD only.[98]

Summary Statements 15, 16, 17

CONCLUSION

Indications for hysteroscopy and surgical techniques continue to evolve, and as a result, critical evaluation of outcomes remains essential. All surgical reviews are challenged by a paucity of high-quality published literature. However, this does not lessen the need for evidence-based surgical recommendations. Improvements in fertility treatments have meant that there are fewer indications for surgery in treating infertility. This review indicates that

there remains an important role for hysteroscopy in select cases to optimize fertility outcomes. Gynaecologists offering hysteroscopy to patients with infertility must remain cognizant of the poor evidence of benefit for some surgical procedures on fertility outcomes.

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APPENDIX A

Table A1. Key to Grading of Recommendations, Assessment, Development and Evaluation

Strength of recommendation	Definition
Strong	High level of confidence that the desirable effects outweigh the undesirable effects (strong recommendation for) or that the undesirable effects outweigh the desirable effects (strong recommendation against)
Conditional (weak)*	Desirable effects probably outweigh the undesirable effects (weak recommendation for) or that the undesirable effects probably outweigh the desirable effects (weak recommendation against)

Quality of evidence	Definition
High	High level of confidence that the true effect lies close to that of the estimate of the effect
Moderate	Moderate confidence in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Limited confidence in the effect estimate: The true effect may be substantially different from the estimate of the effect
Very low	Very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

*Do not interpret conditional (weak) recommendations to mean weak evidence or uncertainty of the recommendation. Adapated from GRADE Handbook (2013), Table 5.1, available at gdt.gradepro.org/app/handbook/handbook.html.

Table A2. Implications of Strong and Conditional (Weak) Recommendations

Perspective	Strong recommendation • "We recommend…" • "We recommend to not…"	Conditional (weak) recommendation • "We suggest…" • "We suggest to not…"
Authors	The net desirable effects of a course of action outweigh the effects of the alternative course of action.	It is less clear whether the net desirable consequences of a strategy outweigh the alternative strategy.
Patients	Most patients in the situation would want the recommended course of action, while only a small proportion would not.	The majority of patients in the situation would choose the suggested course of action, but many would not.
Clinicians	Most patients should receive the course of action.	Recognize that patient choices will vary by individual and that they must ensure care is consistent with a patient's values and preferences.
Policy makers	The recommendation can be adapted as policy in most settings. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator.	The recommendation can serve as a starting point for debate with the involvement of many stakeholders.

APPENDIX B

HYSTEROSCOPIC SURGERY IN FERTILITY THERAPY SEARCH STRATEGY

The search was performed in English and the following key words were searched using three different databases. Results were limited to human studies only, in both English and French, published since January 1, 2012.

After removing duplicate references 1107 articles were found. After screening, 139 references were found to be relevant to the guideline. Examples of references not found to be relevant include studies that used laparoscopy and studies conducted in perimenopausal/menopausal women. Screened references were further subdivided into individual chapter areas (some references appear in multiple groups): 34 in unexplained infertility, 46 in endometrial polyps, 33 in intrauterine synechiae, 26 in Mullerian anomalies, and 43 in uterine fibroids.

Medline Search

1. exp Infertility, Female/ or Infertility/
2. *Minimally Invasive Surgical Procedures/ or exp Gynecologic Surgical Procedures/ or *Hysteroscopy/ or *Uterine myomectomy/ 1 and 2
3. (infertility or fertility).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
4. (hysteroscopy or hysteroscopicADJsurgery).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5. 1 or 3
6. 2 or 4
7. 5 and 6
8. (fibroid* or uterineADJfibroid* or myomectomy or leiomyoma or MullerianADJanomaly or MullerianADJanomalies or polyp* or endometrialADJpolyp* or unexplainedADJinfertility or intracavityADJpathology or intrauterineADJadhesion or intrauterineADJsynechiae).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. (pregnancyADJrate* or assistedADJreproductiveADJtechnology or pregnancyADJloss or miscarriage or diagnosis or conception or liveADJbirth or obstetricADJcomplication or preganncyADJcomplication or reproductiveADJoutcome).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
10. 7 and 8 and 9

Results: 232

PubMed Search

((((("fertility"[MeSH Terms] OR "infertility"[MeSH Terms] OR "infertility, female"[MeSH Terms]) AND ("hysteroscopy"[MeSH Terms] OR "hysteroscopy"[MeSH Terms])) OR ("infertility"[Title/Abstract] OR "fertility"[Title/Abstract] OR "hysteroscopy"[Title/Abstract] OR "hysteroscopic surgery"[Title/Abstract])) AND ("fibroid*"[Title/Abstract] OR "uterine fibroid*"[Title/Abstract] OR "myomectomy"[Title/Abstract] OR "leiomyoma"[Title/Abstract] OR "mullerian anomaly"[Title/Abstract] OR "mullerian anomalies"[Title/Abstract] OR "polyp*"[Title/Abstract] OR "endometrial polyp*"[Title/Abstract] OR "unexplained infertility"[Title/Abstract] OR "intracavity pathology"[Title/Abstract] OR "intrauterine adhesion*"[Title/Abstract] OR "intrauterine synechiae"[Title/Abstract]) AND ("pregnancy rate*"[Title/Abstract] OR "assisted reproductive technology"[Title/Abstract] OR "pregnancy loss"[Title/Abstract] OR "miscarriage"[Title/Abstract] OR "diagnosis"[Title/Abstract] OR "conception"[Title/Abstract] OR "live birth"[Title/Abstract] OR "obstetric complication*"[Title/Abstract] OR "pregnancy complication*"[Title/Abstract] OR "reproductive outcome*"[Title/Abstract])

Results: 1022

Cochrane Search

1. MeSH descriptor: [Infertility] this term only
2. MeSH descriptor: [Infertility, Female] explode all trees
3. {OR #1, #2}
4. MeSH descriptor: [Hysteroscopy] explode all trees
5. {AND #3, #4} with Cochrane Library publication date from Jan 2012 to present

Results: 3