

**Operative hysteroscopy in
conservative management of interstitial pregnancy
and retained products of conception:
a case report and systematic literature review**

Eva D'hoore

00802005

Promotor: Prof. Dr. K. Roelens
Co-promotor: Dr. T. Hamerlynck

Master's dissertation Master of Medicine in Specialist Medicine

Academic year: 2019-2020

Table of contents

Abstract	1
Case presentation	2
Introduction	5
Definition	5
Signs and symptoms	5
Diagnosis	6
Treatment	6
Retained products of conception (RPOC)	7
Hysteroscopic morcellation	8
Objective	8
Methods	9
Eligibility criteria	9
Information sources	9
Search	9
Study selection	9
Results	10
Flow diagram study selection	10
Study characteristics	11
Results of individual studies	11
Discussion	15
Summary of evidence	15
Limitations	16
Conclusions	16
References	17
Nederlandstalig abstract	19

Appendix 1: Search strategy in Medline	20
Appendix 2: Search strategy in Embase	20

Abstract

Objective: An interstitial pregnancy is a rare form of ectopic gravidity. Diagnosis and management can be challenging. Treatment often consists of invasive uterine surgery. Conservative options such as methotrexate are nowadays important alternatives.

The aim of this review is to investigate the role of operative hysteroscopy in the conservative and fertility preserving management of interstitial pregnancy and retained products of conception (RPOC).

Methods: A case is presented in which interstitial RPOC were removed using hysteroscopic morcellation with laparoscopic assistance. Consequently, a systematic literature review was performed.

Results: Literature review resulted in collection of fourteen case reports in which operative hysteroscopy was part of a conservative treatment of interstitial pregnancy and RPOC, of which twelve successful. Different techniques such as laparoscopy and suction curettage were associated. Various hysteroscopic instruments were used, most commonly hysteroscopic grasping forceps. Reported complications were uterine perforation during suction curettage and incomplete hysteroscopic resection. Analysis of the cases did not demonstrate a clear difference between different approaches concerning safety, efficacy or subsequent fertility and pregnancy results.

Conclusion: With the growing experience in hysteroscopy and the development of novel techniques and devices, such as hysteroscopic morcellation, operative hysteroscopy has a promising role in the conservative management of interstitial pregnancy and RPOC. Combined with guiding laparoscopy, it might be a convenient approach to avoid blind curettage and the possible complication of uterine perforation.

Case presentation

A healthy 32-year old woman, G2 P0 A1, presented in early pregnancy for a first evaluation. In her medical history we note one biochemical pregnancy. The current pregnancy occurred after ovulation induction with gonadotropins.

Human chorionic gonadotropin (hCG) at 5 weeks and 5 days gestation was 2028 U/L, transvaginal ultrasound report described a 10 mm gestational sac with yolk sac. One week later hCG increased appropriately to 28230 U/L and ultrasound showed a gestational sac with fetal pole of 4.9 mm without visible heart activity. However, at 7 weeks 5 days gestation the diagnosis of a nonviable pregnancy was made, and dilation and curettage (D&C) was conducted. Pathology analysis, nevertheless, did not show any trophoblastic tissue. A new blood analysis was carried out three days postoperatively. Here, hCG was still as high as 125106 U/L. Unfortunately, no follow-up ultrasound was performed and patient was not informed about the absence of trophoblastic tissue on pathology analysis.

Eight weeks after the D&C, the patient had an episode of heavy vaginal bleeding with severe lower abdominal pain. Therefore she consulted a colleague gynecologist. Transvaginal ultrasound showed the presence of retained products of conception (RPOC) of 24 by 17 mm. hCG levels had decreased to 52 U/L. The patient was advised to use 400 mcg misoprostol vaginally which had no effect. Detailed sonographic control one week later was suspicious for vascularized RPOC (27 by 16 mm) in the left interstitial region of the fallopian tube.

Eventually, she was referred to the university hospital. Ultrasound (*figure 1*) and office diagnostic hysteroscopy (*figure 2*) showed vascularized RPOC (42 by 21 mm) protruding from the left tubal ostium. An operative hysteroscopy using hysteroscopic morcellation with simultaneous laparoscopy was planned in day surgery. Patient was counselled on the possible need for more invasive surgery (e.g. laparoscopic cornual resection) if conservative hysteroscopic management appeared not to be feasible.

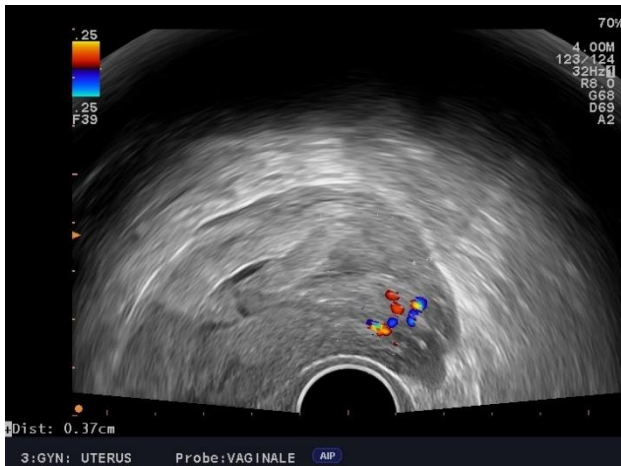


Figure 1: Presence of retained products of conception in the interstitial region of the left fallopian tube



Figure 2: Remaining pregnancy tissue protruding from the left tubal ostium

Laparoscopy revealed a normally shaped uterus with bulging of the left uterine horn (*figure 3*). The fallopian tubes and ovaries were normal. After cervical dilation to Hegar 10, the 8.0 TruClear™ Hysteroscopic Tissue Removal System (Medtronic, Minneapolis, MN, USA) was introduced using normal saline for irrigation and distention. Over half of the RPOC could be removed with the 4.0 ‘soft tissue shaver plus’ device before reaching the limit of 2500 mL fluid deficit, including the most distal and difficult to reach part. Four weeks later, an office diagnostic hysteroscopy showed that no spontaneous expulsion of the remaining tissue occurred. Therefore, a second operative hysteroscopy using hysteroscopic morcellation was conducted. All retained tissue could be removed during the second uneventful procedure.



Figure 3: Laparoscopy shows an asymmetric bulging of the left uterine horn

Transvaginal ultrasound six weeks postoperatively showed a normal uterus without signs of injury to the uterine wall at the operative site. Hysterosalpingo foam sonography (HyFoSy) three months postoperatively showed bilaterally patent fallopian tubes.

Introduction

Definition

An ectopic pregnancy is located outside the uterine cavity¹. The incidence of ectopic pregnancy is approximately 2% of all pregnancies, and the most common location is the fallopian tube (95%). Other possible sites are the abdomen, the ovaries, the cervix, a caesarean scar or the interstitial part of the fallopian tubes. An interstitial ectopic pregnancy is defined as a gestation with a gestational sac in the intramural part of the tube: implantation occurs in the most proximal section of the fallopian tube surrounded by the myometrium. Interstitial pregnancies comprise 2–4% of all ectopic pregnancies².

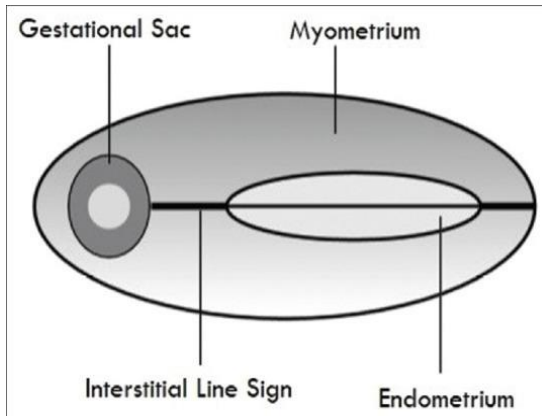
However the terms are often used interchangeably, it is important to distinguish an interstitial pregnancy from a cornual and an angular pregnancy^{1,2}. The term cornual pregnancy refers to a pregnancy in a rudimentary horn or within one horn of a septate or uni- or bicornuate uterus. An angular pregnancy is a potentially viable intrauterine pregnancy with implantation in a lateral angle of the normal uterine cavity which has the potential to behave as an ectopic pregnancy³. Differentiating interstitial from angular pregnancies remains difficult despite advances in imaging.

Signs and symptoms

Clinical symptoms of an interstitial pregnancy are often abnormal vaginal bleeding and lower abdominal pain, but patients can be asymptomatic. The uterine horn is highly vascularized, so uterine rupture as a result of a growing pregnancy can lead to life-threatening bleeding. Before, this complication was often the reason of urgent admission to a hospital. Nowadays, early ultrasound and thus early diagnosis and treatment can prevent this complication. Given the rare and complex nature of interstitial pregnancies, diagnosis and management are difficult.

Diagnosis

Early pregnancy ultrasound is indispensable for diagnosis. Some characteristics can be typically found ^{1,2,4}:



- Empty uterine cavity
- Eccentric location of the gestational sac
- No communication of the sac with the endometrium
- Thin myometrial layer surrounding the gestational sac
- "Interstitial line", defined as an echogenic line that extends from the most superior and lateral aspect of the endometrium to the midportion of the interstitial mass or sac ⁴ (Figure 4)

Figure 4: Interstitial line sign ⁴

Magnetic resonance imaging (MRI) can provide additional information on the exact location of the pregnancy. Sensitivity and specificity of radiologic signs like surrounding myometrium and surrounding endometrium are yet to be validated ². The particular role of MRI in the diagnosis of interstitial pregnancy is thus unclear.

In doubt, a diagnostic laparoscopy can be performed as a final step in determining pregnancy location. Displacement of the round ligament can be assessed to distinguish between cornual and interstitial pregnancy. At laparoscopy, an angular pregnancy appears as an asymmetric bulge in one of the uterine angles, medial to the round ligament. On the other hand, interstitial pregnancy appears lateral to the round ligament.

Treatment

No golden standard exists for the treatment of an interstitial pregnancy. Often, these patients undergo highly invasive surgical interventions meaning cornuostomy, cornual resection with salpingectomy or hysterectomy, carried out by laparotomy or laparoscopy. One should be aware of the direct surgical risks, as well as the possible future pregnancy complications related to the uterine scar. Since nowadays an interstitial pregnancy can be diagnosed at an early gestational age, conservative surgical or medical treatment options need to be considered in clinically stable patients with an unruptured interstitial pregnancy.

In literature, examples of different medical treatments can be found. Systemically administered methotrexate (MTX) is a widely used non-surgical treatment for ectopic pregnancy. It has high success rates of more than 80% in treating interstitial pregnancy, but close follow-up of evolution is necessary. Rupture is still possible during treatment, so urgent surgical treatment may be necessary. Approximately 30 to 40 % of patients will have side effects, most common are stomatitis and conjunctivitis. Clinically important abnormalities in baseline hematologic, renal, or hepatic laboratory values as well as immunodeficiency should be considered as contraindications for its use.

Direct injection of methotrexate or potassium chloride (KCl) into the ectopic pregnancy sac can be performed transvaginally or through laparoscopy or hysteroscopy. This technique seems relatively safe and as effective as systemically used methotrexate, but special expertise is needed for this procedure. An important benefit seems to be tubal patency and high numbers of term pregnancies after treatment. The risk of recurrent interstitial pregnancy or uterine rupture during subsequent pregnancies remains uncertain ¹.

There are also very few case reports describing selective arterial embolization in an experimental setting. As it is already used as a prophylactic measure before surgical intervention to prevent major bleeding, it may be effective as conservative therapeutic modality. Uneventful pregnancies are described after this procedure, but there is no information regarding safety and efficacy ¹.

Successful D&C has been described under sonographic, laparoscopic or hysteroscopic guidance ^{5,6}. There is a risk of perforating the uterus at the level of the uterine horn, and it is unclear what the effect is on tubal patency and reoccurrence of an interstitial pregnancy.

Retained products of conception (RPOC)

RPOC can occur after vaginal or caesarean delivery, miscarriage and medical or surgical pregnancy termination ⁷. As presented in our case report, RPOC are also diagnosed after incomplete expulsion of an interstitial pregnancy. Management of RPOC can be expectant, medical or surgical (D&C, operative hysteroscopy). Avoiding direct, but also long-term surgical risks like intra-uterine adhesions are a major reason to prefer an expectant or medical management. On the other hand, psychological impact of the uncertain outcome and risk of heavy uterine bleeding when avoiding a surgical intervention should not be underestimated.

Hysteroscopic morcellation

A novel device, the hysteroscopic morcellator, became available in 2005. A mechanical cutting blade is used to reduce the pathological intra-uterine tissue into small chips which are immediately evacuated from the uterine cavity by aspiration. This hysteroscopic tissue removal system has been reported as an effective and safe new technique to remove intra-uterine lesions such as polyps, fibroids and RPOC ⁸. Different hysteroscopic morcellators are commercially available. In our university hospital, the TruClear™ Hysteroscopic Tissue Removal System (Medtronic, Minneapolis, MN, USA) is used. Important advantages of this advanced system are the efficient morcellation and suction of tissue under continuous direct visualisation and the pathology-specific removal devices.



Figure 6: Medtronic TruClear tissue removal system with different tissue shaver devices (4.0 'soft tissue shaver plus' device, used for the resection of the interstitial RPOC in our case report, indicated in blue)

Objective

Following the described case, we aim to determine the role of operative hysteroscopy in the conservative management of interstitial pregnancy and interstitial RPOC. A literature review was performed to investigate the current role of operative hysteroscopy in the conservative and fertility preserving management of interstitial pregnancy and RPOC, and to learn which techniques and instruments have been described for this indication.

Methods

We followed the PRISMA guidelines for writing a systematic literature review.

Eligibility criteria

This systematic literature review discusses the management of interstitial pregnancy and interstitial RPOC. For inclusion, treatment had to exist of operative hysteroscopy, meaning that the actual intervention of removing the interstitial pregnancy or RPOC is carried out -at least partially- hysteroscopically. Given the uncommon presentation, all types of articles with online full text availability were eligible. Publication language or date were no exclusion criteria.

Information sources

An electronic search was made in the online libraries Medline, Embase and The Cochrane Library on January 1st 2020.

Search

Search terms were adapted for use to each database, and a combination of both MeSH or Emtree terms and free-text words was used. Key words used were terms describing the clinical problem (interstitial pregnancy) and the intervention (hysteroscopy). A search combining the term 'interstitial' and different descriptions for RPOC (retained /residual/persistent, products of conception/trophoblastic tissue/trophoblast/gestational tissue/gestational products/placental tissue, gestational remnant, placental remnant) did not generate any article. A first search in Medline via PubMed interface (*see appendix 1*) was complemented with a search in Embase, adding a filter to exclude the articles that are also published in Medline. In addition, the reference lists of eligible articles were scanned.

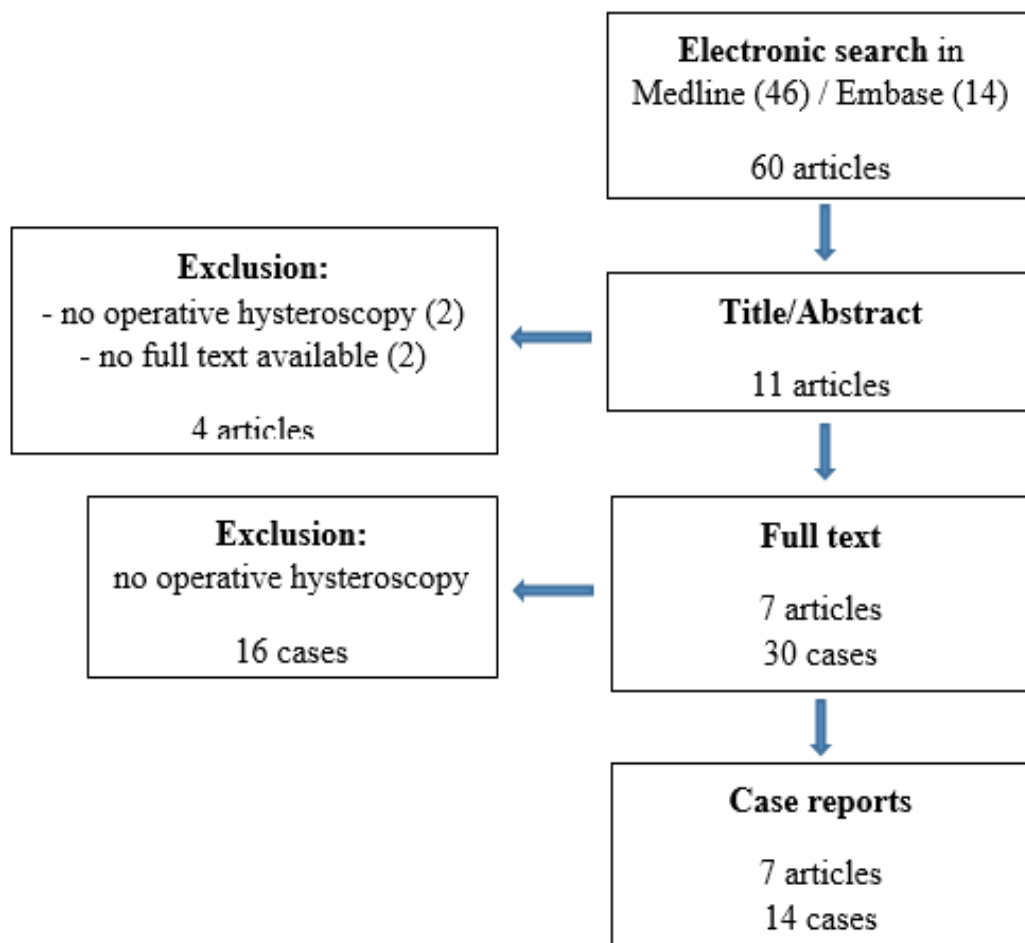
Study selection

The titles and abstracts of the study articles were screened for eligibility by two independent researchers (E.D. and L.D.). Full text of these articles was retrieved and assessed for meeting the inclusion criteria of our review by the same two reviewers. Disagreements were solved by discussion or by consulting a third review author (T.H.).

Results

Flow diagram study selection

After the electronic search in Medline and Embase we found 60 unique articles that matched our search terms. The Cochrane Library did not result in additional useful titles. Based on title and abstract, a selection of eleven articles was made. By reading the full text of these eleven articles, seven articles were eligible for inclusion in our systematic literature review. The four excluded articles did not treat the interstitial pregnancy or ROPC by operative hysteroscopy or had no full text available online. Scanning of the reference lists did not result in any more useful titles. In total, the seven selected articles accounted for 30 cases. In two case series different techniques were used by the same research group in different patients ^{5, 9}. There, we only selected the cases which met our inclusion criteria. In the end, fourteen cases of interstitial pregnancy or RPOC treated with operative hysteroscopy were remaining.



Study characteristics

Four case reports and three case series were found in which operative hysteroscopy was part of the treatment of an interstitial pregnancy or RPOC in at least one case. All together, they account for fourteen eligible cases.

Results of individual studies

When comparing the collected case reports, there were important differences in management. Various combinations of techniques and different hysteroscopic devices were used to remove the interstitial pregnancy tissue. A summary of all case reports and series is made in table 1.

Most articles give a short description of the sonographic aspect of the interstitial pregnancy at the start of treatment. One case is reported by Nezhat et al. as being a viable pregnancy, with the presence of a gestational sac and fetal pole with heart activity¹⁰. Grindler et al. and Procas-Ramon et al. describe the persistence of a nonviable pregnancy after treatment with MTX^{5,11}. Takeda et al. write about a ‘heterogeneous mass’, existing after D&C and increasing vaginal bleeding postoperatively¹², but no baseline sonographic exam is reported. No sonographic image was described in three cases^{9, 14, 15}.

Operative hysteroscopy was most frequently combined with laparoscopy, namely in twelve out of fourteen reported cases. Diagnostic laparoscopy was added to confirm the interstitial location of the pregnancy, to confirm the absence of uterine rupture, to assess the thickness of the uterine wall at the location of the interstitial pregnancy, to ensure that no perforation occurred during intra-uterine intervention and to verify that the majority of tissue had been removed. Cai et al. based the decision of laparoscopic or transcervical management of the interstitial pregnancy on the laparoscopic assessment of the thickness of the uterine muscle overlying the pregnancy⁹. If chorionic villi were not visible during laparoscopy, then the muscular wall was considered thick enough to accept suction. One other group, Nezhat et al., used laparoscopy to externally push the interstitially located pregnancy towards the uterine cavity, using atraumatic laparoscopic graspers in a milking technique¹⁰.

Another commonly associated technique during the same intervention was curettage with a pediatric flexible suction catheter (9/14 cases). Here, the interstitial pregnancy was removed

by suction curettage and operative hysteroscopy was used to remove the remaining trophoblastic tissue. In two cases, the uterine wall was perforated during the attempt to position the flexible catheter and conversion to laparoscopic or laparotomic cornual resection and salpingectomy was required because of bleeding complications ⁹.

Including our own presented case, only four cases are reported in which operative hysteroscopy was the only intra-uterine intervention. Two times, resection was complete after one hysteroscopic intervention ^{10,11}. One hysteroscopic procedure was insufficient to remove all tissue in the two other cases ¹². In one case, treatment with MTX was added with complete resolution of all pregnancy tissue. In our case, we preferred to continue with a second operative hysteroscopy which was successful.

Peroperative ultrasound was used in two cases. Nezhat et al., who used operative laparoscopy to push the interstitial pregnancy towards the uterine cavity, used transvaginal ultrasound to assess the location of the pregnancy until it was intra-uterine ¹⁰. Grindler et al. used transabdominal ultrasound for guidance of intra-uterine devices towards the uterine horn and to confirm removal of the pregnancy tissue at the end of the procedure ⁵.

Preoperative systemically used MTX was given in two cases as a primary management strategy of the interstitial pregnancy ^{5,11}. Grindler et al. describe a total of four doses with a persistent interstitial gestational sac and fetal pole despite hCG value <5 U/L. Also Procas-Ramon et al. describe failed treatment with four doses of MTX, with persistent trophoblastic tissue and plateau hCG of 70 U/L.

Postoperative MTX was applied in two out of fourteen cases. Takeda et al. applied three doses of systemic MTX because of incomplete hysteroscopic resection ¹². Intervention was stopped because the risk of perforating the uterine wall was too high. Cai et al. describe a single dose of MTX as a routine measure after hysteroscopic removal of the interstitial pregnancy ⁹. It was used only in the first patient of the case series of five successful hysteroscopic resections. They recommend to use it only when it is uncertain whether all pregnancy tissue is removed.

Different hysteroscopic instruments were used to remove the interstitial pregnancy tissue. Nine out of fourteen times, hysteroscopic graspers or forceps were used to clamp and remove the tissue. Two times a hysteroscopic loop was used, with or without electric energy ^{10,12}. Grindler

et al. describe the alternative use of a urologic stone retrieval forceps, as described earlier in hysteroscopic cornual interventions ^{5, 13}.

Extra preventive measures against hemorrhage were taken by different groups. Takeda et al. used preoperative bilateral transcatheter arterial chemoembolization (TACE) of the feeding branches of the uterine arteries ¹². Nezhat et al. administered intracervical vasopressin injections and placed an intra-uterine balloon (7 ml pediatric Foley catheter) postoperatively as tamponade overnight ¹⁰. Cai et al. used vasotocin (an oxytocin analogue) during every suction D&C ⁹.

Seven out of fourteen patients received a hysterosalpingography (HSG) at follow-up. They all showed bilaterally patent fallopian tubes. Six subsequent uneventful pregnancies have been described. We found very little information about these pregnancies concerning time to pregnancy, pregnancy course or mode and time of delivery.

Author Year of publication	N	Description of pregnancy	+lsc	+D&C	+US	MTX before	MTX after	Hysteroscopic material	Extra measures against bleeding	Perforation	Complete hysteroscopic resection	Tubes	Pregnancy
Katz, 2003	2	?	y=2	y=2	n=2	n=2	n=2	graspers	n=2	n=2	y=2	?	y=2
Cai, 2012	7	?	y=7	y=5 n/a=2	n=7	n=7	y=1 n=6	graspers	Vasotocin=5 Conversion to surgical intervention=2	n=5 y=2	y=5 n/a=2	HSG ok=5 n/a=2	y=2
Lin, 2013	1	?	y	y	n	n	n	graspers	n	n	y	?	?
Nezhat, 2014	1	Viable	y	n	y	n	n	loop	Intracervical injection vasopressin, tamponade intra-uterine Foley balloon	n	y	HSG ok	?
Takeda, 2015	1	Nonviable RPOC?	y	n	n	n	y	loop	Preoperative TACE	n	n	HSG ok	y
Grindler, 2016	1	Nonviable RPOC	n	y failed	y	y	n	urologic stone retrieval forceps +forceps	n	n	y	?	y
Procas-Ramon, 2019	1	Nonviable RPOC	n	n	n	y	n	forceps	n	n	y	?	?
D'hoore, 2020	1	RPOC	y	n	n	n	n	morcellator	n	n	n Complete in 2 nd procedure	HyFoSy ok	?

Table 1: overview of eligible articles

Y= yes, n= no, n/a= not applicable, ?= not reported

Lsc= laparoscopy, MTX= methotrexate, US= ultrasound, D&C= dilatation and curettage, HSG= hysterosalpiogram, HyFoSy= hysterosalpingo foam sonography

Discussion

Summary of evidence

This systematic literature review investigates the current role of operative hysteroscopy in the conservative management of interstitial pregnancy and retained products of conception. During the last twenty years, different groups have attempted to treat interstitial pregnancies in a safe, efficient, rapid and fertility preserving way by using operative hysteroscopy.

Hysteroscopic treatment of both viable and nonviable interstitial pregnancies is reported. Two nonviable pregnancies are reported after primary treatment with MTX. We believe to account these two cases as RPOC. In one case a 'heterogeneous mass', existing after D&C and increasing vaginal bleeding postoperatively is described. Possibly, also this case can be seen as RPOC. We can conclude that hysteroscopic resection is possible for viable or nonviable interstitial pregnancy and RPOC.

In the reported cases, operative hysteroscopy was frequently combined with guiding laparoscopy or with suction curettage. Laparoscopy seems crucial for confirmation of diagnosis and to assess the operative risks before and during hysteroscopy.

Suction curettage was mostly used after guiding diagnostic hysteroscopy to remove the interstitial pregnancy. Consequently, the remaining products of conception were removed by operative hysteroscopy during the same procedure. Suction curettage failed in one case and lead to perforation of the uterine wall in two out of nine presented cases, despite laparoscopic and hysteroscopic guidance. After perforation, a laparoscopic or laparotomic cornual resection and salpingectomy was required. The added value of suction curettage should be questioned in an era where advanced hysteroscopic techniques (eg. hysteroscopic morcellator) can be used to have a continuous view of the operation field instead of using blind approaches.

Alternative hysteroscopic instruments have been used: most commonly simple graspers, but also 90° loop, urologic stone retrieval forceps and in our case hysteroscopic morcellation. Based on the reviewed cases, there is no evident advantage of one of these devices when used to remove interstitial pregnancy or RPOC.

Tubal patency was found to be maintained in all cases undergoing tubal patency testing after hysteroscopic intervention. Subsequent pregnancies should be closely monitored because of the possibility of recurrent ectopic pregnancy and the theoretical risk of uterine rupture. Nevertheless, the reported pregnancies following hysteroscopic treatment of interstitial pregnancy and RPOC were recorded as uneventful.

Limitations

Only very few case reports and series are published about the hysteroscopic management of this rare form of ectopic pregnancy. Moreover, the management of the reported cases is different regarding combination of techniques and mode of hysteroscopic approach. Given the limited and heterogenous information, it is too early to make recommendations. Patients with interstitial pregnancy or RPOC should be referred to a specialised endoscopic center and a hysteroscopic approach can be considered. Treatment results should be reported. Hereby, we emphasize the importance of using the correct terminology to differentiate between interstitial, angular and cornual pregnancy.

Conclusions

Hemodynamically stable patients with an unruptured interstitial pregnancy and the wish to preserve fertility, can be proposed to undergo hysteroscopic resection by an experienced endoscopic gynecological surgeon in a specialized center, after counseling about potential benefits and risks and an informed consent for surgical intervention if needed. Possible advantages are rapid treatment results, preservation of the uterine wall, maintenance of tubal patency and fertility.

Laparoscopic assistance appears most helpful, if not necessary to guide the intra-uterine intervention. Possibly, advanced hysteroscopic devices like the morcellator can be valuable, but further experience will be needed to find the most suitable hysteroscopic instrument.

References

1. Moawad N. Current diagnosis and treatment of interstitial pregnancy. *American Journal of Obstetrics and Gynecology*. 2010.
2. Marfori C. Angular vs. interstitial pregnancy: A case report highlighting diagnostic nuances with stark management differences. *Case Reports in Women's Health*. 2018.
3. Laus K. A Novel Approach to Management of Angular Pregnancies: A Case Series. *J Minim Invasive Gynecol*. 2019.
4. Kanshaiym S. Successful Procedure in Conservative Management of Interstitial (Cornual) Ectopic Pregnancy. *Gynecol Minim Invasive Ther*. 2019.
5. Grindler NM. Considerations for management of interstitial ectopic pregnancies: two case reports. *J Med Case Rep*. 2016.
6. Kahramanoglu I. Management options for interstitial ectopic pregnancies: A case series. *Pak J Med Sci*. 2017.
7. Hamerlynck T. Fertility outcome after treatment of retained products of conception: a systematic review. *Gynecological Surgery*. 2018.
8. Hamerlynck T. Clinical implementation of the hysteroscopic morcellator for removal of intrauterine myomas and polyps. A retrospective descriptive study. *Gynecological Surgery*. 2011.
9. Cai Z. The value of laparoscopy alone or combined with hysteroscopy in the treatment of interstitial pregnancy: analysis of 22 cases. *Arch Gynecol Obstet*. 2012.
10. Nezhat CH. Laparoscopically-assisted, hysteroscopic removal of an interstitial pregnancy with a fertility-preserving technique. *J Minim Invasive Gynecol*. 2014.
11. Procas-Ramon B. Hysteroscopic Management of an Interstitial Ectopic Pregnancy. *J Minim Invasive Gynecol*. 2019.
12. Takeda A. Magnetic Resonance Imaging and 3-dimensional Computed Tomographic Angiography for Conservative Management of Proximal Interstitial Pregnancy by Hysteroscopic Resection After Transcatheter Arterial Chemoembolization. *J Minim Invasive Gynecol*. 2015.
13. Goldthwaite LM. Early hysteroscopic removal of intratubal microinserts with urologic stone retrieval forceps. *Obstet Gynecol*. 2014.
14. Katz D. Combined hysteroscopy and laparoscopy in the treatment of interstitial pregnancy. *American Journal of Obstetrics and Gynecology*. 2003.

15. Lin K. A new fertility-preserving surgery for interstitial pregnancy involving hysteroscopic removal under laparoscopic guidance. *Int J Gynaecol Obstet.* 2013.

Nederlandstalig abstract

Doel: Een interstitiële zwangerschap is een zeldzame vorm van ectopische zwangerschap. De diagnose en aanpak kunnen uitdagend zijn. De behandeling bestaat vaak uit invasieve uteriene chirurgie. Conservatieve opties zoals methotrexaat zijn de dag van vandaag belangrijke alternatieven. Er wordt nagegaan wat de rol van operatieve hysteroscopie is in de conservatieve en fertiliteitssparende aanpak van de interstitiële zwangerschap en zwangerschapsresten.

Methoden: Er wordt een casus voorgesteld waarbij een interstitiële zwangerschapsrest verwijderd werd met behulp van hysteroscopische morcellatie onder laparoscopische begeleiding. Vervolgens werd een systematisch literatuuronderzoek uitgevoerd.

Resultaten: Literatuuronderzoek leverde veertien casussen op waarbij operatieve hysteroscopie deel uitmaakte van een conservatieve behandeling van interstitiële zwangerschap en zwangerschapsresten, waarvan twaalf succesvol. Verschillende technieken zoals laparoscopie en zuigcurettage werden geassocieerd. Diverse hysteroscopische instrumenten werden gebruikt, meestal een hysteroscopische klem. Gerapporteerde complicaties waren uteriene perforatie tijdens zuigcurettage en incomplete hysteroscopische resectie. Analyse van de casussen toonde geen duidelijk verschil aan tussen deze manieren van aanpak aangaande veiligheid, efficiëntie of toekomstige fertiliteits- en zwangerschapsresultaten.

Conclusie: Door de toenemende ervaring in hysteroscopie en de ontwikkeling van nieuwe technieken en apparaten, zoals de hysteroscopische morcellator, heeft operatieve hysteroscopie een veelbelovende rol in de conservatieve behandeling van interstitiële zwangerschap en zwangerschapsresten. Gecombineerd met begeleidende laparoscopie, zou het een geschikte aanpak kunnen zijn om blinde zuigcurettage en de mogelijke complicatie van uteriene perforatie te vermijden.

Appendix 1: Search strategy in Medline

("hysteroscopy"[MeSH Terms] OR hysteroscop*[Title/Abstract])
AND
("pregnancy, interstitial"[MeSH Terms] OR (interstitial*[Title/Abstract] AND
pregnanc*[Title/Abstract]))

Appendix 2: Search strategy in Embase

('interstitial pregnancy'/exp OR 'interstit* near/3 pregnan*')
AND ('hysteroscopy'/exp OR 'hysteroscop*')
AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)