

The Management of Hysteroscopy Complications

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ABSTRACT

Gynaecological endoscopic procedures such as hysteroscopy and laparoscopy have a good safety profile, with advantages such as decreased hospital stay, reduced complications, reduced operative procedure time and improved recovery time. However like any surgical procedure hysteroscopy is not completely risk-free. General incidence of complications for diagnostic and operative hysteroscopic procedures is low. Overall complication rate is 2% and a major complication rate is 1%. Training and supervision of new surgeons, familiarity with equipment and instruments, development of excellent surgical skills and awareness of potential complications are keys to management of complications in gynaecological endoscopic procedures. These include use of newer types of surgical instruments such as smaller-diameter hysteroscopes, pharmacological adjuvants and materials including hyaluronan gels such as Hyalobarrier®. Complications and the techniques and innovations that are used or are being developed to minimise and manage them are discussed in this literature review.

Keywords: Hysteroscopy, Complications, Case management

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Introduction

Endoscopic techniques such as hysteroscopy and laparoscopy have revolutionised gynaecological surgery to be carried out in a minimally invasive manner when clinical circumstances are appropriate.¹

Hysteroscopy, meanwhile, entails endoscopic inspection of the uterine cavity and endocervix via the cervix.¹ Diagnostic hysteroscopy facilitates visualisation of the endocervical canal, endometrial cavity, and fallopian tube ostia. Operative hysteroscopy (OH) makes use of mechanical, electrosurgical, or laser instruments for treatment of intracavitary pathology or for hysteroscopic sterilizations.¹ While originally OH was carried out using the resectoscope, which is still in common use, more recently development of smaller-diameter hysteroscopes and of ablation methods has increased the scope of this method.² Office hysteroscopy, whereby hysteroscopy is carried out to diagnose and treat conditions such as endometrial polyps in outpatients rather than in the operating theatre, has also become standard.³

There is ample evidence to suggest that when they are fea-

sible, gynaecological endoscopic procedures, offer advantages such as decreased hospital stay, reduced operative and post-operative complications, reduced operative procedure time and improved recovery time.¹ Reduced long-term costs are also associated with endoscopically assisted gynecological procedures.⁴⁻⁵

However, despite the indications that endoscopic gynaecological surgery has advantages in terms of risk and safety, like any surgical procedure it is not completely risk-free and even the most experienced of surgeons can encounter complications. As standard, surgeons should be trained in these techniques under supervision of an experienced surgeon and should be thoroughly familiarised with equipment before attempting to use it. Examples of complications that can occur include, uterine perforation, haemorrhage and blood loss, fluid overload, vascular injuries, bowel and bladder injuries, intraperitoneal and intrauterine adhesions. Management of pain during office hysteroscopy procedures can also be a challenge. These complications and the techniques and innovations that are used or are being developed to minimise and manage them are discussed in this literature review.

Hysteroscopic Complications and Management

General incidence of complications for diagnostic and operative hysteroscopic (OH) procedures is low. An American College of Gynecologic Laparoscopists (AAGL) survey reported an overall complication rate of 2% and a major complication rate of 1%.⁶ A prospective study of 13.600 cases from the Netherlands reported a higher complication rate for OH at 0.95 % as opposed to diagnostic hysteroscopy at 0.13%.⁷ For another series of 800 women undergoing hystero-

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scopic endometrial ablation, the complication rate was 3.9%.⁸ The major complications encountered during hysteroscopy are uterine perforation, adhesions, haemorrhage, fluid overload and genitourinary and gastrointestinal damage.

Uterine perforation

Uterine perforation is one possible complication of gynaecological procedures including gynaecological endoscopic procedures. In one recent study, 5474 diagnostic and operative hysteroscopic procedures were retrospectively analysed.⁹ While uterine perforation was the most common postoperative complication, the rate of occurrence was actually very low at 15 cases.⁹ Other studies have reported higher rates of uterine perforation for operative hysteroscopy. For example in another retrospective cohort study of 159 procedures, it was reported that hysteroscopic repair of intrauterine synechiae or uterine septa resulted in a uterine perforation rate of 5.3% in the absence of ultrasound or laparoscopic guidance.¹⁰ Uterine perforation is more common in repeat procedures.¹¹ Some conditions such as genital tuberculosis have been associated with greater difficulty in carrying out hysteroscopy and hence a higher rate of complications including uterine perforation.¹² Perforations can occur most commonly due to thermal injury, although it can also be caused by use of scissors during resections.¹¹ Most occur in the fundal region or posterior lower segment.¹¹ Basic preoperative precautions are the first step in avoiding uterine perforation, as with other complications during hysteroscopy, such as inspection of and familiarity with equipment to be used, planning the procedure and briefing the surgical team.¹¹ Awareness of contraindications, both in terms of availability of appropriate and familiar equipment and staff and of patient characteristics such as inability to dilate the cervix or distend the uterus is also important.¹¹ During surgery, the chances of uterine perforation can be minimised by appropriate technique, including always moving the loop towards the operator rather than into the uterus and not activating the power without a clear view of the loop or needle.² In pre-menstrual women, pre-operative self-administration of misoprostol the night before the procedure can assist with cervical ripening and reduce risk of perforation.² "False passage", where the surgeon thinks the hysteroscope is in the uterine cavity can occur, so it is important to be aware of signs of this, including visibility of muscle fibres and tubal ostia, and to stop the procedure even in the absence of detectable perforation as adequate distention could not now be achieved.¹¹ Risk of false passage can be reduced by cervical dilation with slow, steady pressure, stopping when the internal os opens. If the external but not the internal os is sufficiently dilated, the surgeon should not use force to insert the hysteroscope or resectoscope but use the instrument's inflow to allow dilation of the cervix with fluid pressure.¹¹ Simultaneous laparoscopy can be helpful in allowing assistants to monitor the serosal surface and guard against perforation; this would be particularly recommended for large myoma excision, uterine adhesion lysis and tubal cannulation. During myoma removal, excessive traction

with the myoma grasper should be avoided. If perforation is imminent, the uterine serosa becomes visible; surgeons should be familiar with this 'serosal sign'.¹¹ Generally, uterine perforations do not require treatment but once perforation occurs due to thermal injury, laparoscopy becomes necessary for assessment of overlying organs including the bowel. Any bowel damage detected can then be repaired using mini laparotomy.¹¹ Use of intraoperative ultrasound is strongly indicated in endoscopic gynaecological surgery, in particular for the reduction and management of uterine perforation in OH.^{10,13,14} It is helpful, for example, in laparoscopic myomectomy and reduces recurrence and re-operation rates following hysteroscopy as it facilitates a uterine myoma resection.¹³ One retrospective cohort study of 159 women undergoing reparative surgery for intrauterine synechiae or uterine septa showed that use of ultrasound guidance significantly reduced incidence of uterine perforation when compared to laparoscopic guidance or no guidance.¹⁰ It was also financially less costly than laparoscopic guidance and no more expensive than OH alone. In another retrospective study, women undergoing transvaginal hydro laparoscopy (THL) with trans abdominal ultrasound guidance (31 subjects) or prior to introduction of trans abdominal ultrasound guidance (162 subjects) were studied.¹³ The results clearly indicated the efficacy of the use of ultrasound guidance, with successful vaginal access achieved in 29 of the 31 ultrasound patients. This included seven women with a retroverted uterus (24.1%), compared to only one case in the non-ultrasound group.¹³ While three cases of intestinal perforation and one of uterine injury arose in the non-ultrasound group, there were no complications in the ultrasound-guided group.¹³ The use of ultrasound allowed fifteen cases to be entirely conducted by new medical doctors with senior doctor monitoring. Thus, use of trans-abdominal ultrasound guided vaginal access resulted in increased patient safety in THL and contributed to training of junior surgeons.¹³

Adhesions

Intrauterine adhesions in particular are one of the main long-term complications encountered in operational hysteroscopy.¹⁵⁻¹⁷ While hysteroscopy is used in division of adhesions in hysteroscopic adhesiolysis, recurrence of the adhesions after or as a result of such surgery is a common problem.¹⁷⁻¹⁹ It is critical to address the possibility of development of post-operative adhesions in endoscopically-assisted gynaecological surgery as the consequences of intrauterine adhesions can include hypomenorrhoea, infertility and recurrent pregnancy loss.^{16,17} While there are various medications available for the prevention of intraperitoneal adhesions, there are fewer interventions described for prevention of intrauterine adhesions. Possibilities include use of intrauterine balloons, intrauterine contraceptive devices or auto-crosslinked hyaluronan gel such as Hyalobarrier® to prevent adhesions.¹⁶⁻¹⁸ Some randomised control trials on use of auto-crosslinked hyaluronan gel have shown promising results in reducing adhesion formation after laparoscopic myomectomy or OH.¹⁶

However, a recent retrospective cohort study on 107 women with Asherman's syndrome who underwent hysteroscopic adhesiolysis suggested that insertion of an intrauterine balloon or intrauterine device was more effective than hyaluronic acid gel in preventing intra-uterine adhesion recurrence.¹⁸

In terms of adhesion formation after surgery, there is evidence to suggest that use of endoscopic techniques with their minimal accessing of the abdominal cavity, less manipulation of sites distal to the surgical site and gentler and more precise dissection of the relevant structures, results in fewer adhesions than open surgery.²⁰ However, the literature is somewhat divided on this and adhesions are a potential consequence of OH.^{16,17,20} Methods to minimise adhesions in OH and combined laparoscopy and hysteroscopic procedures include adherence to basic microsurgery principles, use of extensive irrigation of the abdominal cavity and exploiting the more newly available surgical instruments such as the ultrasonically activated scalpel and monopolar electrocautery.²⁰ Surgeons should also familiarise themselves with newer surgical techniques which are suggested to reduce adhesion formation, such as temporary ovarian suspension and subserous as opposed to interrupted figure 8 sutures.²⁰ Use of pharmacological adjuvants can also be considered in management of adhesions, particularly in prevention or minimisation, although there is lack of consensus on effectiveness of many suggested agents.²⁰ Use of pre-operative or post-operative GnRH agonists is a promising strategy, as is use of a solid barrier of oxidised regenerated cellulose over traumatised surfaces after haemostasis is complete.²⁰ There is a need for more randomised control trials on these methods, but surgeons should be mindful of their possibilities in management of adhesion recurrence following endoscopic gynaecological surgery.

Blood loss

While blood loss results from any gynaecological surgical procedure, it is generally agreed that endoscopically assisted, minimally invasive procedures minimise blood loss compared to more invasive techniques.^{1,21} Surgeon training and experience and appropriate patient choice is indicated in reducing haemorrhage incidence. Intervention for bleeding is required in approximately 0.5% to 1.9% of OH cases.¹¹ For example, in a recent comparison of a novel combined laparoscopy and hysteroscopy technique to traditional curettage in management of caesarean scar pregnancy, blood loss with the laparoscopy and hysteroscopy technique was significantly less than with curettage.²¹ Bleeding during OH is often a result of cutting too deeply into the myometrium or in resection of large fibroids.² To avoid blood loss, the surgeon should maintain sufficient pressure and flow, administer intravenous oxytocin during operations and control fluid loss.² When blood loss is extensive enough to require intervention, haemostasis can be achieved using a balloon tamponade via a Foley catheter, observing for one hour then removing half the fluid followed by the catheter and remaining fluid over the next

hour if bleeding has stopped.¹¹ An alternative is to pack the uterus with dilute vasopressin solution-soaked gauze.¹¹ Injection of dilute vasopressin directly into the cervix before either of these interventions can greatly reduce blood loss, as well as distention fluid intravasation, and operative time, during OH.^{2,11,22} Another small study suggested the possibility of using intravenous conjugated equine estrogen (CEE) to treat severe post-hysteroscopy bleeding in appropriately selected patients, provided risk factors such as previous thromboembolic disease are considered.²³ Use of the vaporising electrode in cases of endometrial ablation or hysteroscopic myomec-tomy is indicated for minimisation of blood loss.¹¹ Pre-operative measures such as the use of GnRH agonists, as well as showing promise in reduction of adhesion formation, are also known to reduce vascularity and hence operation time and blood loss in OH.^{2,11,20,24}

Fluid overload

Fluid overload, hyponatraemia and hypo-osmolality due to absorption of irrigating solution are major complications of OH.^{2,4} Fluid overload with hyponatraemia and hypo-osmolality has been estimated to occur in up to 6% of cases of OH. As it can be fatal, all possible measures should be taken to prevent it or to detect it and treat it early.⁴ Hyponatraemia and hypo-osmolality can result in swelling of the brain; this is particularly problematic in pre-menstrual women in whom estrogen and progesterone inhibit the ATPase activity in the brain. Indications that fluid overload may have occurred include nausea and vomiting, elevation of amino acids and discrete cerebral oedema causing confusion.² Thus OH should whenever possible be performed under spinal or epidural anaesthetic so that the patient's sensorium can be continually monitored.¹¹ The gradual introduction of bipolar equipment rather than the standard monopolar surgery may help in reduction of fluid overload in hysteroscopy.² Monopolar surgery typically uses three irrigating solutions, glycine, mannitol and sorbitol. Toxic effects of glycine and water absorption associated with water intoxication, hyponatraemia and cerebral oedema contribute to the fluid overload syndrome in monopolar surgery.² For fluid overload, rigorous fluid management is essential. Use of hysteroscopic equipment fitted with highly accurate electronic in-flow-outflow measurement systems should be standard, as opposed to reliance on manual estimation.¹¹ This should be set to a deficit alarm of 500 mL, and if the deficit reaches 750 mL, intravenous furosemide should be given and serum sodium taken.¹¹ The procedure should be stopped for 5 to 10 minutes to facilitate uterus contraction and small blood vessel sealing then continued unless fluid deficit reaches 1250 mL. While glycine has traditionally been used in irrigation solutions, the search for alternative, non-electrolytic alternatives is ongoing. Surgeons also need to be mindful of the importance of the in-flow pressure as this could impact on absorption of irrigating solution.² Infusion line pressure of approximately 100 mg Hg is usually applied but it can be difficult to assess intrauterine pressure due to drops in pressure in the infusion line and suc-

tion of the effluent.² The ideal solution for distension in OH would be sterile, physiological saline, but this is incompatible with traditional monopolar surgery. There is evidence to suggest that use of bipolar electrodes are safer, as they can be used with physiological saline rather than, for example, glycine, and are replacing monopolar electrodes.² Surgeons should be acquainted with this and the use of bipolar surgery should be considered for minimising fluid overload.

Pain management in office hysteroscopy

The complication rate in office hysteroscopy procedures is very low.^{3,25} For example, in a series of 1028 office hysteroscopy procedures with the vaginoscopic approach, only one significant complication was identified.²⁵ In another series of 3488 office hysteroscopies, the perioperative complication rate was also very low, with, for example, five cases of uterine perforation.³ However, with regard to pain assessment carried out in 1349 patients in this series, moderate pain was reported by 43.1% of patients while severe pain was reported by 12%.⁶ These procedures were mainly carried out without any form of anaesthesia. It appears that paracervical anaesthesia is indicated for at least some patients and that pain medication prior to, during and after procedures needs to be considered further.³ Long-term complication rate with office hysteroscopy with the vaginoscopic approach is however extremely low.²⁵

Conclusions

Endoscopic gynaecological surgery, such as laparoscopy and hysteroscopy, has many advantages in terms of safety and cost effectiveness. Complications are rare, but their effective management depends on surgeon awareness and training and familiarity with techniques, equipment and instruments. Studies suggest that training and experience results in reduced complication and reoperation rates.²⁶ Preoperative preparation and keen awareness of contraindications and risk factors for different complications improves outcomes by allowing possible complications to be anticipated and steps to be taken to minimise their likelihood. It also maximises the chance that effective action will be taken when complications arise, as inevitably they will for even the most experienced surgeons. Gastrointestinal and genitourinary injuries are also major complications of hysteroscopy, along with uterine perforation, intrauterine adhesions, blood loss and fluid overload. In every case, employment of sound surgical techniques, awareness of the possible complications and readiness to react appropriately can minimise the incidence or, when they arise, effectively manage these rare complications. Awareness of signs of complications, for example foul-smelling odour in gastrointestinal injury, visible uterine serosa in imminent uterine perforation or fluid deficit in excess of 750 mL in fluid overload, increases the chance of early diagnosis and intraoperative repair, reducing the post-operative complications and necessity for further corrective surgery for the patient. Many innovations are available to potentially assist surgeons in carrying

out this type of surgery and minimising potential complications. Use of pharmacological adjuvants such as vasopressin, estrogen and preoperative GnRH agonists in reduction of blood loss. Use of auto-crosslinked hyaluronan gel like Hyalobarrier® to prevent adhesions.^{23,27} Other innovations such as use of intraoperative ultrasound is in endoscopic gynaecological surgery, are strongly indicated for the reduction and management of uterine perforation in OH.^{10,13,14} Added to development of excellent surgical technique and constant mindfulness of the potential complications that can arise, the future appears bright for minimisation and management of complications in endoscopic gynaecological surgery.

Histeroskopi Komplikasyonlarında Yönetim

ÖZET

Histeroskopi ve laparoskopi gibi jinekolojik endoskopik yöntemler, daha kısa hastanede yatış süreleri, azalan komplikasyonlar, daha kısa operasyon süreleri ve artan iyileşme süreleri gibi avantajlarıyla iyi bir güvenlik profiline sahiptir. Ancak diğer tüm cerrahi operasyonlar gibi, histeroskopi de tam anlamıyla risksiz değildir. Diagnostik ve operatif histeroskopik prosedürlerde komplikasyon görülme oranı genel olarak düşüktür. Toplam komplikasyon oranı %2, majör komplikasyon oranı ise %1'dir. Yeni cerrahların eğitilmesi ve denetlenmesi, araç gereçleri tanınmaları, kusursuz cerrahi yetenekler geliştirmeleri ve potansiyel komplikasyonlara dair bilince sahip olmaları jinekolojik endoskopik yöntemlerde komplikasyon yönetiminin anahtarlarıdır. Daha küçük çaplı histeroskop gibi yeni tip cerrahi ekipmanların, farmakolojik adjuvanların ve Hyalobarrier® gibi hiyalüronik asit jellerin kullanımı bu yöntemlerden bazılarıdır. Bu literatür taramasında komplikasyonlar ve komplikasyonları minimize etmek ve yönetmek amacıyla kullanılan ya da geliştirilmekte olan yenilikler ve teknikler ele alınmaktadır.

Anahtar Kelimeler: Histeroskopi, Komplikasyonlar, Vaka yönetimi

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