Uterine Perforation Associated with Minimally Invasive Gynecologic Procedures

ABSTRACT

Dilation and curettage, dilation and evacuation, and hysteroscopy are three minimally invasive gynecologic procedures that are performed to diagnose and treat various female pelvic health conditions. Studies show that these procedures have relatively low complication rates and can be performed safely in multiple clinical settings. The most frequent complication noted is puncture of the cervix or uterus related to cervical dilation or uterine entry techniques. The Pennsylvania Patient Safety Authority has received 376 reports related to complications associated with these gynecologic procedures. The predominant complication reported is perforation of an organ (77%), most frequently the uterus (96%). Risk reduction strategies employed to decrease the incidence of uterine perforation involve conducting a thorough preprocedure evaluation to identify any predisposing factors, preparing the cervix for the procedure, and using careful cervical/uterine entry techniques. (Pa Patient Saf Advis 2009 Jun;6[2]:51-5.)

In their lifetime, many women will experience some type of pelvic health condition, such as abnormal uterine bleeding, that requires further evaluation. Minimally invasive procedures such as dilation and curettage (D&C), dilation and evacuation (D&E), and hysteroscopy are commonly performed to diagnose or treat female pathology. All three procedures require that an instrument be inserted through the cervical os into the uterus. A review by Lohr showed that these procedures have a low overall risk of complications and can be performed in both the inpatient and outpatient setting.1 Uterine perforation, a risk known to be associated with all three procedures, occurs in about 1% of all hysteroscopic procedures as well as during cervical dilation or uterine entry. When uterine perforation occurs, the patient may require more invasive procedures (e.g., laparoscopy, laparotomy) to determine the extent of injury and for repair as needed.1,2

From June 2004 to December 2008, the Pennsylvania Patient Safety Authority received 376 reports related to complications associated with the following minimally invasive procedures: D&C, D&E, and hysteroscopy. The predominant complication reported was uterine perforation. This article will illustrate the Authority’s data, discuss whether patients at risk for this complication can be identified before the procedure, and discuss risk reduction strategies that may be implemented to eliminate adverse outcomes.

Patient Safety Authority Data

Reports identified in the Authority’s event report database were reviewed for D&C, D&E, and hysteroscopy procedures for which a complication was reported. Facility types submitting reports included hospitals, ambulatory surgical facilities, and abortion facilities in Pennsylvania. Analysis of the data revealed that perforation was the most frequently reported complication of these procedures (see Figure 1) and, of the reported perforation complications, 96% reported that the uterus was the most affected organ (see Figure 2). Usually, more than one procedure, such as D&C and hysteroscopy, was performed during a surgical session. Figure 3 shows the overlap and combination of procedures that resulted in uterine perforation. The most commonly reported procedures that resulted in a perforated uterus were D&E and D&E combined with hysterectomy. The procedures associated with the fewest number of uterine perforations were D&C and D&E combined with hysterectomy. Endometrial biopsy is another minimally invasive procedure, but since the Authority database contained only five reports in which biopsy was performed in conjunction with a D&C or hysterectomy, endometrial biopsy was not included in the scope of this article.

Minimally Invasive Procedures

Dilation and Curettage

D&C is a procedure in which the cervical os is dilated and the uterine lining is removed using a spoon-shaped instrument or curette. This procedure is performed to diagnose or treat pathology such as abnormal bleeding from the uterus. For this purpose, a D&C is used to provide a sample of uterine tissue in order to assess the cause of abnormal bleeding. This sample is examined microscopically to determine the presence of abnormal cells. As with a D&E, D&C also may be performed when a woman has experienced a miscarriage; the purpose of D&C is to remove remaining products of conception from the uterus. This is important because the tissue left in place may cause infection or heavy bleeding. In cases in which the cervical os/canal is narrow, caution must be taken to carefully dilate the cervical canal to avoid uterine perforation.3 The following Authority report narratives exemplify this point.

Patient had D&C early today. The patient [then experienced] heavy bleeding and abdominal pain. The patient was returned to [operating room (OR)] for D&C, diagnostic laparoscopy, and abdominal hysterectomy. After diagnostic scope, [it] was determined that a hysterectomy was needed because of uterine perforation and broad ligament hematoma. The
Patient was transferred to postanesthesia care unit in stable condition.

During a D&C procedure, the patient sustained an iatrogenic uterine perforation. The procedure was aborted when what appeared to be a loop of bowel was seen through the hysteroscope. An unplanned diagnostic laparoscopy confirmed perforation at the fundus of the uterus. A catheter was placed in the bladder to assess possible bladder injury. The urine was clear. Upon diagnostic laparoscopy, no active bleeding was noted and no further surgery was deemed necessary. The patient was observed overnight. The patient remained afebrile and her hematocrit and hemoglobin was stable.

Dilation and Evacuation

D&E is most frequently performed for abortions occurring between 13 and 21 weeks gestation or to remove the products of conception after a miscarriage, medically defined as a missed abortion.1 Patients can undergo this second trimester procedure on an outpatient basis or in a nonhospital setting. Bleeding is the most common complication of D&E, and the risk of hemorrhage increases with advancing gestational age. Underestimation of gestational age is associated with uterine perforation; therefore, care in accurately determining gestational age is critical.1 Uterine perforation is a potentially serious complication of second trimester D&E and may be associated with bowel injury.1 The following Authority reports depict complications reported with D&Es.

The doctor dilated the cervix with no resistance, began suctioning, and noticed omentum protruding through the uterus. The doctor immediately stopped the procedure (D&E). The patient was transferred by ambulance to the hospital in stable condition.

[The physician] perforated the uterus during the evacuation of the uterus. The physician performed a laparoscopy with fulguration of a small tear in the uterus.

Hysteroscopy

Hysteroscopy allows direct visualization of the uterus via insertion of a thin endoscopic device that is passed through the cervical os into the endometrial cavity. Hysteroscopy can be performed for diagnostic purposes, such as evaluation of abnormal uterine bleeding. It can also be used operatively to treat a range of uterine pathologies such as myomas, endometrial polyps, and adhesions.4

Hysteroscopic surgery performed by well-trained surgeons is a safe procedure with an overall complication rate of 3% and uterine perforation rate of 1%.5 The American Association of Gynecologic Laparoscopists surveyed its members in 1993 regarding their use of and experiences with performing hysteroscopic procedures. This survey recounted that the most frequently reported complication was uterine perforation not requiring transfusion.2,6 Propst et al. reported that, with hysteroscopic procedures, uterine perforation was directly related to the type of procedure being performed and that diagnostic hysteroscopy had a lower complication rate than operative hysteroscopy.7

In a 1997 study by Jansen et al., 82 hospitals in the Netherlands recorded findings on complications related to hysteroscopies. Thirty-eight complications
Reducing the Risk of Uterine Perforation

In addition, Jansen et al. reported that 55% of uterine perforations were entry-related and 45% were related to technique of the surgeon.8 In a study by Agostini et al., the risk of uterine perforation rate was 1.61%. Risk was evaluated according to hysteroscopic procedure, with adhesiolysis associated with the highest risk. It was suggested that adhesions might mask uterine cavity delineation.9

Women who experience uterine perforation during surgical hysteroscopic procedures and then go on to become pregnant are at an increased risk for uterine rupture.20 Uterine perforation, as well as resection of endometrium, myomas, or endometrial ablations, may allow access for excessive absorption of distending media, which can lead to complications such as hyponatremia, fluid overload, and pulmonary/cerebral edema.21 In addition, uterine perforations created by the use of electrical or laser energy pose the risk of burns to the bowel and must be evaluated appropriately.9,22 The following Authority reports depict complications reported with hysteroscopy.

In the course of cervical dilation in preparation for the hysteroscopy, the left fundal myometrium was perforated. The perforation was suspected by the surgeon based on the sudden absence of resistance on the dilator during cervical dilation. The perforation was subsequently confirmed with hysteroscopy. The perforation did not extend the time required to complete the surgery or prevent completion of the operative hysteroscopic portion of the surgery, which included resection of intrauterine adhesions and endometrial polypectomies. With release of the fluid pressure during the hysteroscopy, there was minimal bleeding from the perforation site, and there was no blood emanating from the cervix following the procedure. No interventions were required to treat the complication. Uterine perforation during cervical dilation is a known complication of this procedure that is of infrequent occurrence. In this case, the presence of intrauterine adhesions may have contributed to this event.

The patient had a hysteroscopy done [at the beginning of the week] in the surgical center. The patient returned to the emergency room [the following day] and was sent to the OR that evening. Investigation showed she had a perforated uterus and small bowel perforation from the [hysteroscopy] to remove fibroids.

Reducing the Risk of Uterine Perforation

The first step in preventing uterine perforation is identifying the patients who may be at risk. Several factors have been reported to increase the chance of a patient experiencing a uterine perforation during one of the aforementioned procedures. Cooper states that in respect to hysteroscopic surgery, uterine perforation occurs commonly during dilation of the cervix and that the presence of cervical stenosis, severe uterine anteflexion or retroflexion, synechiae, and Asherman’s syndrome (intrauterine adhesions) may increase the incidence of uterine perforation.13 Bradley cited additional patient-specific factors that included nulliparity, menopause, gonadotropin-releasing hormone (GnRH) agonist use, previous cone biopsy, and markedly retroverted uterus.14 The physician should address this information during the informed consent discussion with the patient, including what steps he or she will take to reduce the risk of uterine perforation.

In addition to performing an appropriate preprocedure evaluation, care must be taken while preparing the cervix and entering the uterine cavity. Use of laminara to prepare the cervix is associated with a lower risk of uterine perforation than mechanical dilation.13,14 The use of misoprostol intravaginally several hours before surgery is also associated with a lower risk of perforation.14

Use of intraoperative ultrasound guidance during D&E has been associated with a decreased rate of perforation.14 Since blind dilation of the cervical canal is more frequently associated with uterine perforation, use of a visualized approach, via diagnostic hysteroscopic sheath, to dilate the cervical canal may result in a reduced incidence of uterine perforation during hysteroscopic procedures.15 Use of a uterine sound to measure the depth of the uterus may give the physician a more accurate assessment of uterine length and direction. Recognizing a uterine perforation when the procedure is not performed under direct visualization is more difficult because there is no sensation of encountering the uterine wall. The only way to make the diagnosis may be when the uterine sound or other passed instrument goes beyond the measured depth of the uterus.

Operative inexperience may also increase the risk of uterine perforation. Cooper reported that 33% of
uterine perforations occurred during a surgeon’s first procedure and 52% during the first five procedures. Use of undue force when dilating the cervix or entering the uterus may also lead to perforation.

Management of Uterine Perforation

If the physician suspects that uterine perforation has occurred, the procedure must be stopped immediately. Uterine perforation associated with use of a sound or dilator may be managed with observation if bleeding is not present. If bleeding is present, a diagnostic hysteroscopy or other diagnostic measures should be considered to determine the severity of the bleeding or whether other visceral injuries are present. The physician must be prepared to perform a laparoscopy or laparotomy depending on the patient’s condition.

When a distending medium is used in conjunction with a hysteroscopic procedure, meticulous measurement of intake and output is recommended. A fluid deficit of greater than one liter may be an indication of uterine perforation. Pelvic ultrasound may be used to estimate the level of intraperitoneal fluid. As uterine perforation may result in excess absorption of the distending medium, the patient’s cardiovascular and neurological status will need to be monitored for any symptoms of electrolyte imbalance and/or fluid overload.

Finally, if the outpatient setting does not have the resources noted above, then a plan must be in place to transfer the patient to an appropriate facility for further treatment and/or observation. Discharge teaching and written discharge instructions should include all pertinent signs and symptoms the patient should report regarding complications, including increased/lingering pain, bleeding, and fever. These symptoms will require a prompt evaluation by the physician.

Conclusion

D&C, D&E, and hysteroscopy are minimally invasive gynecologic procedures that are frequently used for both diagnostic and therapeutic purposes. They have been shown to be associated with an overall low risk of complications. Uterine perforation is a known risk of all three procedures, and the physician must thoroughly evaluate the patient to determine what risks are foreseeable. Care must be taken in preparing the patient for cervical dilation and uterine entry so that the risk of uterine perforation can be reduced. If uterine perforation does occur, the physician and facility must be prepared to further evaluate and treat the patient.

Notes


Reviewer Commentary

A technique I utilize to prevent uterine perforation is to hold the dilating instrument between the thumb and the forefinger, while using the heel of the same hand as a stop against the vulva. This allows the physician to pass the instrument into the uterine cavity but no deeper.

Larry Veltman, MD
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Self-Assessment Questions

The following questions about this article may be useful for internal education and assessment. You may use the following examples or come up with your own.

1. Which of the following steps may NOT assist the physician in reducing the risk of uterine perforation during a minimally invasive gynecologic procedure?
   a. Performing a thorough preprocedure evaluation to identify patients at risk for uterine perforation
   b. Preparation of the cervix by use of laminara or medication
   c. Use of blind visualization to dilate the cervix
   d. Use of intraoperative ultrasound guidance

2. All of the following factors may increase the risk of a patient experiencing a uterine perforation EXCEPT:
   a. Nulliparity
   b. Menopause
   c. History of breast feeding
   d. Cervical stenosis

3. During a D & C, what appeared to be a loop of bowel was seen through the hysteroscope. An unplanned diagnostic laparoscopy confirmed perforation of the fundus of the uterus. Upon diagnostic laparoscopy, no active bleeding was noted.

Which of the following statements is inaccurate about management of a uterine perforation?
   a. If perforation is suspected, the procedure should be stopped.
   b. Other diagnostic procedures, such as laparoscopy, may be performed to evaluate potential visceral injuries.
   c. If no active bleeding is present at the uterine perforation site and no peritoneal signs are present on abdominal examination, the patient may be a candidate for observation.
   d. Blood should be administered immediately.