Role of Assisted Operative Hysteroscopy in Asherman's Management

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Asherman's syndrome describes the occurrence of intrauterine adhesions in association with symptoms such as menstrual irregularities, recurrent pregnancy loss, and infertility. It is most often preceded by pregnancy-related procedures such as curettage of a pregnant or recently pregnant uterus. Hysteroscopy remains the gold standard in the treatment of Asherman's syndrome. There is limited evidence regarding the ideal treatment modality and randomized controlled trials are needed to determine the optimum modality for prevention of recurrence.

10.1 Introduction

It was Heinrich Fritsch who in 1894 described and published the first case of intrauterine adhesions (IUAs). It however took another 54 years for Joseph Asherman to fully characterize the condition. Asherman initially reported his findings in 29 women who presented with amenorrhea and associated cervical stenosis. He later confirmed intrauterine adhesions involving the endometrial cavity following hysterosalpingography. While intrauterine adhesions describe the occurrence of scar tissues within the uterine cavity, the term Asherman's syndrome is used when IUAs are associated with symptoms such as menstrual irregularities, recurrent pregnancy loss, and infertility.

Intrauterine adhesions and Asherman's syndrome are commonly used interchangeably; some are of the opinion that Asherman's syndrome should only be used when the cause of the IUA is pregnancy related.

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10.1.1 Pathophysiology

There are limited data regarding the pathophysiology of Asherman's syndrome. There are possible roles for adhesion-related cytokines such as b-fibroblast growth factor, platelet-derived growth factor, and transforming growth factor type 1 [1].

Schenker and Margalioth [2] found the highest association of Asherman's syndrome among women who had curettage after a miscarriage. The highest incidence of IUA was found in a study, when the curettage was performed between the second and fourth postpartum week [3].

Hysteroscopic division of intrauterine adhesions may be technically difficult, especially if the adhesions are dense. It carries a significant risk of perforation of the uterus, especially during the dilatation of the cervical channel and introduction of the hysteroscope. The introduction of the dilator and hysteroscope must be guided carefully by one of the methods described here to avoid perforation because perforation at this early stage would preclude satisfactory completion of the hysteroscopy. The efficiency and safety of hysteroscopic surgery for Asherman's syndrome may be improved if the procedure is guided by one of the following methods decsribed in this chapter.

10.1.2 Management

Not all cases of IUA require treatment. Historically, IUAs were managed by blind adhesiolysis. The management of severe Asherman's syndrome is still rather challenging despite the widespread use of diagnostic and operative hysteroscopy. In 1978, Sugimoto [4] described the findings of IUA in 192 patients undergoing diagnostic hysteroscopy. Out of these, 143 recovered previous menstrual flow. He however voiced out his frustration at treating severe IUA. Some level of frustration still persists today!

Hysteroscopy remains the gold standard in the diagnosis and treatment of Asherman's syndrome. Hysteroscopy not only allows for the direct visualization of the IUA, but also helps in the classification of the condition.

10.1.3 Aims of Hysteroscopy

1. Restoration of the anatomical shape and capacity of the uterine cavity
2. Restoration of menstruation
3. Restoration of fertility, by ensuring the normal continuity between the tubal ostia, endometrial cavity, and cervical canal

10.1.4 Technique of Hysteroscopic Adhesiolysis

Asherman's syndrome, although a rare condition, was the commonest indication for operative hysteroscopy, in a study performed in an environment with highly

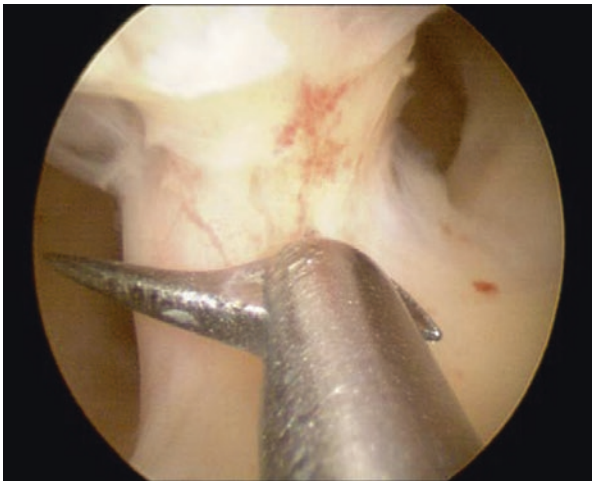

Fig. 10.1 Hysteroscopic adhesiolysis with scissors

restrictive abortion laws [5]. It is the procedure considered to be the most difficult of all the hysteroscopic procedures and therefore it is associated with the greatest risk of complications, especially uterine perforation (ESGE and AAGL standards and guidelines).

The following question has always arisen: Whether to use hysteroscopic scissors or electrocautery (Figs. 10.1 and 10.2) for adhesiolysis?

There are presently no comparative studies and therefore most hysteroscopists tend to use whichever they are conversant with. The author, in his almost two decades' experience with operative hysteroscopy, working in an environment with highly restrictive abortion laws and considerably high unsafe abortion rates, has not had cause to use energy (electrocautery) for hysteroscopic adhesiolysis.

Mild-to-moderate cases might be managed on an outpatient basis without any need for anesthesia, while severe cases are generally managed under general or regional anesthesia.

10.1.5 Important Differences Between Hysteroscopic Scissors and Electrocautery

1. Cautery is more likely to cause damage to the endometrium compared with scissors [6].
2. Following inadvertent perforation of the uterus, significant bowel or urinary bladder injury is more likely with cautery.
3. The use of the resectoscope is likely to be more expensive compared with scissors.
4. The resectoscope would more likely require cervical dilatation compared with the scissors.
5. The use of cautery is however associated with better ability to secure hemostasis.

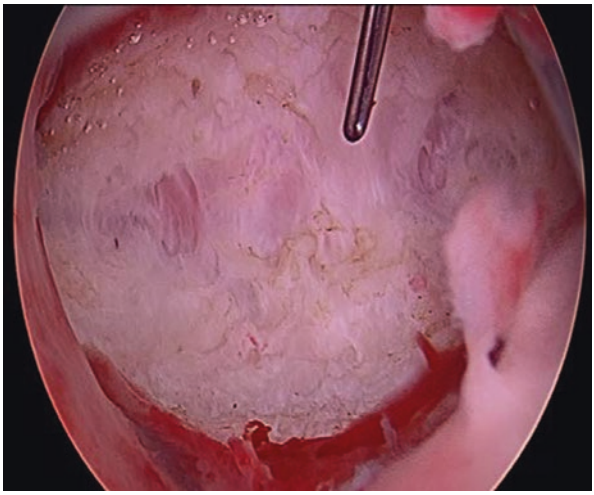

Fig. 10.2 Hysteroscopic adhesiolysis with cautery. Courtesy of Prof. N. Malhotra

Laser vaporization using Nd-YAG (neodymium-doped yttrium aluminum garnet) and KTP (potassium titanyl phosphate) is generally not widespread on account of its higher cost and damage to the endometrial cavity.

If electrocautery is chosen for hysteroscopic adhesiolysis, monopolar and bipolar energy can be used. While both provide satisfactory results, bipolar cautery has the advantage that it is used with electrolyte-containing fluid such as normal saline for uterine distension. Over 2 L of fluid deficit is required for normal saline to cause any serious issue with fluid overload. On the other hand, monopolar energy requires nonelectrolyte-containing fluids such as glycine. A deficit greater than 1 L of glycine might lead to serious complications of fluid overload.

In performing hysteroscopic adhesiolysis, it is important to note that more centrally placed adhesions are less vascularized and less dense, compared with adhesions that are more laterally placed. It is therefore good practice to commence with the more centrally placed adhesions working towards the lateral walls. Distal adhesions are also often dealt with first before the proximal or fundal adhesions.

In case of mild adhesions as shown in Fig. 10.3 (European Society of Hysteroscopy classification, grade 1), the pressure from the distension fluid might be enough to separate the adhesions. Some adhesions are easily separated with the use of the tip of the hysteroscope and sheath. Figure 10.4a–c shows other forms of IUA.

During surgery, it is prudent to be gentle at all times while ensuring a clear operating field, especially with the use of cautery, to prevent uterine perforation. Care must be taken to search for possible routes into the uterine cavity.

When the uterine cavity is completely obliterated due to severe disease (Fig. 10.5), it poses a major challenge. Occasionally, it might be difficult introducing the hysteroscope and sheaths in order to perform an adhesiolysis.

Various techniques have been described with the aim of re-establishing the anatomy of the endometrial cavity. These include the myometrial scoring technique in

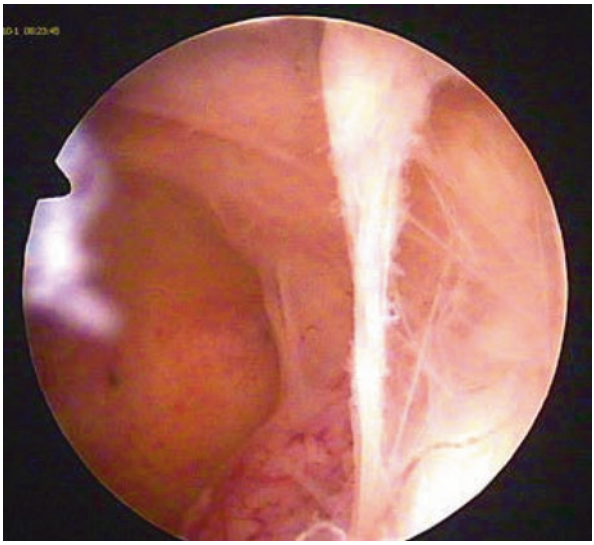

Fig. 10.3 Mild intrauterine adhesions with associated submucous fibroid

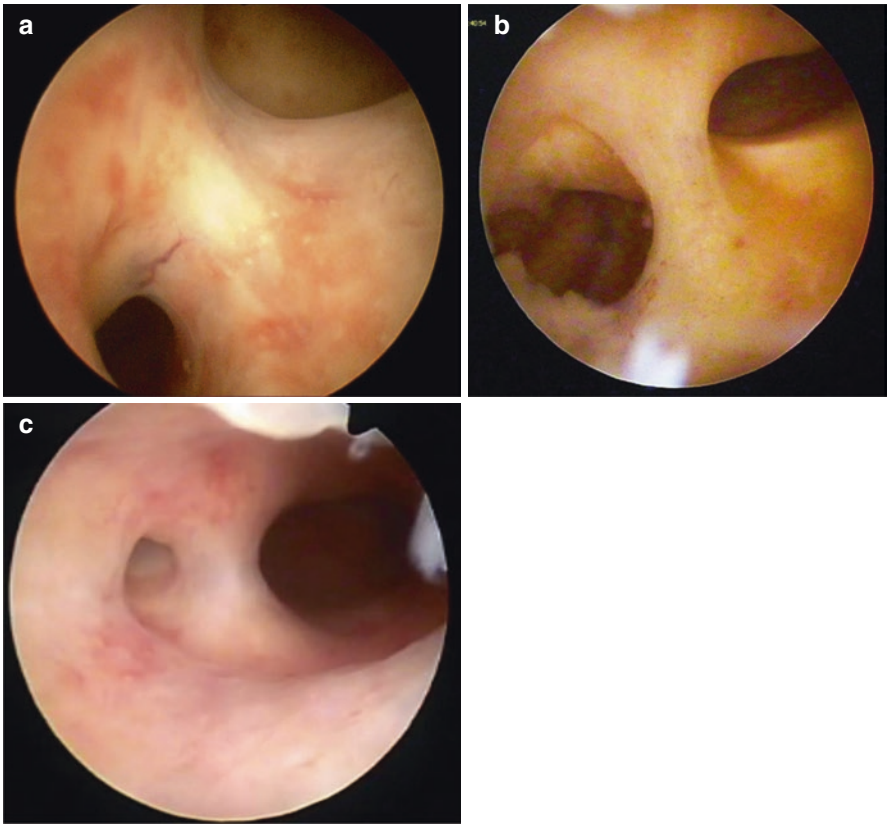

Fig. 10.4 (**a**, **b**) Hysteroscopy showing dense adhesions involving 2/3rd cavity. (**c**) Dense adhesions involving >2/3rd cavity

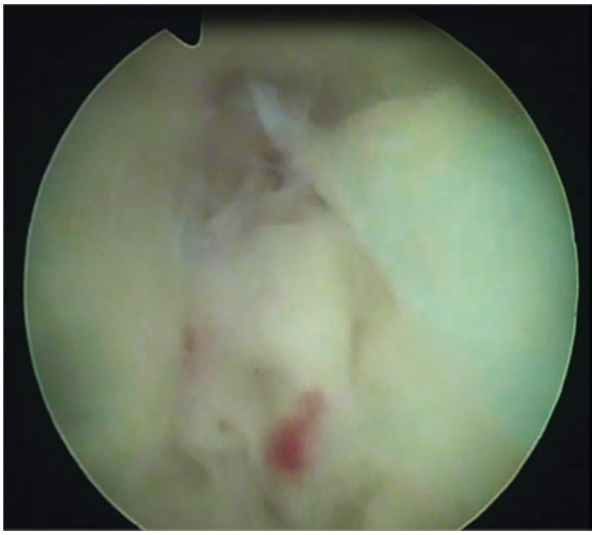

Fig. 10.5 Adhesions involving the entire cavity

which six to eight, 4 mm deep incisions are made within the uterine cavity, from the fundus to the isthmus, using a Collings knife electrode. The cervical os is dilated up to Hegar's size 12–18 in order to perform the procedure.

Another reported technique involved the use of a sharp needle called the Tuohy needle. The needle, which is a 16-gauge type, is introduced alongside a 5 mm hysteroscope. The surgeon then probes areas beyond the adhesion using the needle. A contrast medium, Ultravist 76.9%, is injected via the needle under fluoroscopic and hysteroscopic control. Hidden pockets of endometrium are seen radiographically and subsequent division of the adhesions using hysteroscopic scissors ensures that a passageway is created. All the patients in this series required more than one procedure (one had six procedures performed). While all the 55 women treated with this technique regained normal menstrual function, the authors were silent about the fertility outcome.

A third technique involved the introduction of two 13 French Pratt cones under laparoscopic guidance, via the cervix and towards the ipsilateral tubal cornu, thereby creating a central residual septum. The septum was then hysteroscopically cut with scissors, thus creating a cavity. The technique is not recommended due to the associated morbidities.

In a case series involving seven patients, one or two laminaria tents were introduced to dilate the cervix. After 24 hours of insertion, these were replaced with three or four laminaria tents, now inserted up to the fundus and left for another 24 hours. The procedure was concluded with the hysteroscopic adhesiolysis under laparoscopic guidance and an intrauterine device left within the uterine cavity. The patients were subsequently placed on estrogen and progesterone preparations. The authors reported normal menstrual flow in all seven patients with three pregnancies, including a miscarriage and two live births [7].

10.2 Role of Assisted Adhesiolysis

Modalities such as ultrasound scan, laparoscopy, and fluoroscopy have been proposed for the prevention of uterine perforation during hysteroscopic treatment of severe Asherman's syndrome (Fig. 10.6).

10.3 Preoperative USG Assessment of Myometrial Thickness: To Guide the Amount of Adhesiolysis

Preoperative Ultrasound-Guided (USG) measurement of the myometrial thickness along the fundal, anterior, and posterior walls can guide the degree and direction of hysteroscopic adhesiolysis, obviating the need for concomitant laparoscopy. Sharma et al. [8] introduced "RR method" (named after main authors' names); this refers to the measurement of myometrial thicknesses at the fundal, anterior, and posterior walls that guides the amount and direction of hysteroscopic adhesiolysis and lateral metroplasty. They analyzed 21 women with Asherman's syndrome; all underwent preoperative USG measurement of the myometrial thickness; none required laparoscopic assistance during hysteroscopic adhesiolysis; and no perforation or false passage occurred.

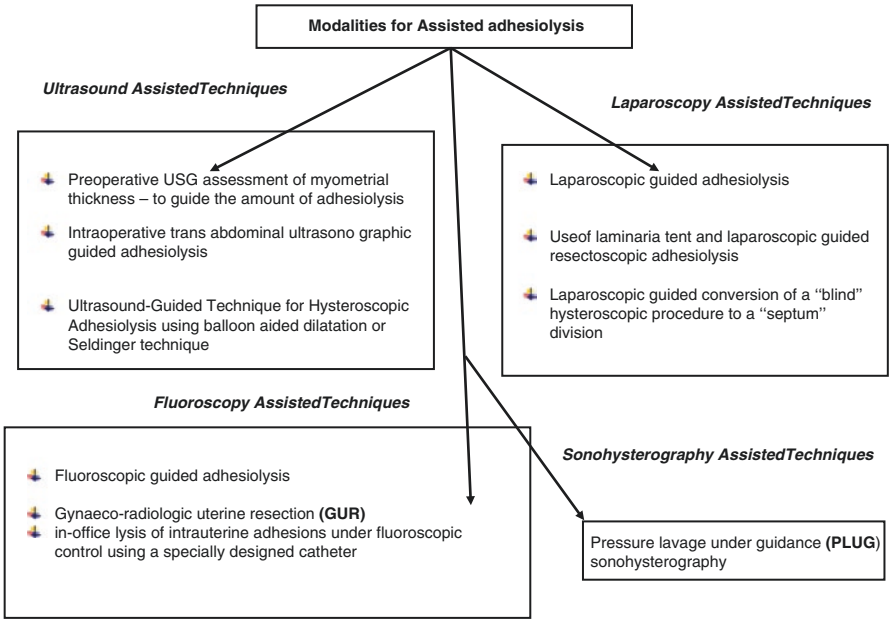

Fig. 10.6 Modalities for assisted adhesiolysis

10.4 Intraoperative Transabdominal Ultrasonographic Guided Adhesiolysis

Transabdominal ultrasound guidance has been increasingly used to replace laparoscopic guidance during hysteroscopic division of intrauterine adhesions, especially in women with severe intrauterine adhesions. When there are severe adhesions in the uterine cavity, it may be very difficult to identify the cavity without ultrasound.

Transabdominal ultrasonography provides efficient monitoring of the hysteroscopic procedure and guides the telescope towards the uterine cavity, even when the adhesions may have completely or almost completely obliterated the uterine cavity.

10.4.1 Advantages

1. The availability of ultrasound scan and its noninvasive nature; however, uterine perforation has been reported in as many as 5% of cases.
2. Can aid hysteroscopically directed division of severe IUAs and enable concurrent inspection of the pelvic organs.
3. Reduces iatrogenic perforation and false passages.

10.5 Laparoscopic Guided Adhesiolysis

Laparoscopic guided hysteroscopic adhesiolysis is commonly performed, particularly if the adhesions are dense. Lateral perforation of the uterus may cause significant bleeding, compared with central perforations. When the uterine wall becomes unduly thin, it will permit transmission of light across the uterine wall, and there will be a bulge over the remaining serosal layer, which signifies that further hysteroscopic surgery must immediately stop. However, with laparoscopic guidance, it is often too late to prevent the perforation. Nevertheless, it has the advantage of detecting the perforation immediately, preventing any further trauma to pelvic organs. Laparoscopy may also provide an opportunity to inspect the pelvis and to diagnose and treat any concurrent pathology such as endometriosis or adhesions and might reduce damage to the intestines as these are seen and moved out of the way.

10.6 Laparoscopic Guided Conversion of a "Blind" Hysteroscopic Procedure to a "Septum" Division

Conversion of a "blind" hysteroscopic procedure to a "septum" division: McComb and Wagner [9] used a variant hysteroscopic technique in six patients with severe intrauterine adhesions. The indication in all the cases was lack of communication between the cornua and the cervical canal as shown by hysterosalpingography (HSG). This method was performed hysteroscopically with concomitant laparoscopic guidance. A 5 mm hysteroscope was introduced with fluid used as the

distending medium. A Pratt cervical dilator (gauge 13F) was passed through the cervix with the curved tip pointing laterally towards the uterine cornu. The dilator was aligned with the plane of the uterine corpus. The limit of passage was determined by the bulging of the cornua as seen by laparoscopy. This maneuver was performed bilaterally for a completely obliterated cavity. Thus, bilateral passage of the cervical dilator converted the obliterated uterine cavity into the configuration of a uterine "septum." The scar was cut with hysteroscopic scissors in side-to-side swaths, from one lateral passage to the other, until the fundus was reached and the uterine cavity had been liberated. In all six patients, regular menstruation was restored. Five women achieved conception, of whom four had live births. Three perforations and one hemorrhage were encountered among the six women. All the perforations were central. Postoperative HSG showed that the uterine cavity was normal.

10.7 Use of Laminaria Tent and Laparoscopic Guided Resectoscopic Adhesiolysis

Chen et al. [7] described the use of a laminaria tent followed by laparoscopic guided hysteroscopic adhesiolysis in seven patients. The laminaria tents consisted of a 6 cm length of dried kelp stalk, approximately 2 mm in diameter, with a string attached through a hole drilled 6 mm from the larger end. It was used to distend the short, narrow, scarred cervical cavity, thus facilitating the insertion of the transcervical resectoscope. Initially one or two of the tents were inserted into the cervix and left in situ with a vaginal pack for 24 hours. At the end of this time, the tents were replaced with 3–4 new tents, which were now placed within the uterine cavity itself and were removed 24 hours later. Gentle and gradual dilation of the cervical canal ensued as the laminaria absorbed fluid and gradually swelled after insertion. Hysteroscopic lysis of intrauterine adhesions was then performed under general anesthesia with a continuous-flow resectoscope. Simultaneous laparoscopy was used to guide the surgery. No intraoperative complications were recorded among the small number of women who participated in the study ($n = 7$). All their patients achieved normal menstruation after treatment, and a normal uterine cavity was demonstrated on repeat HSG.

They concluded that the management of severe uterine synechiae with a laminaria tent and transcervical laparoscopic guided resectoscope is a safe and appropriate treatment for severe adhesions.

10.8 Fluoroscopy-Guided Adhesiolysis

10.8.1 Advantages

1. It helps to delineate free areas above or behind the adhesions and reduce the incidence of a false passageway, and can be performed simultaneously with hysteroscopy.

2. It includes use of a narrow hysteroscope, reduced risk of uterine perforation, and reduced risk of visceral damage should perforation occur, because no energy source is applied.

10.8.2 Disadvantages

1. This technique exposes the patient to ionizing radiation.
2. It is costly and technically challenging.

Broome JD et al. [10] performed fluoroscopically guided hysteroscopic division of adhesions in severe Asherman's syndrome. Since 1984, approximately 55 women with severe Asherman's syndrome had undergone this procedure. All patients required at least two procedures, and one woman required six. There have been two cases of uneventful perforation with the Tuohy needle, and all women resumed menstruation. No serious complications have occurred.

Severe Asherman's syndrome refers to stage III disease according to the American Fertility Society, with obliteration of the uterine cavity and inability to visualize isolated pockets of the intrauterine cavity, which makes safe and effective hysteroscopic division of adhesions difficult, if not impossible.

Thomson AJ et al. [11] included 30 patients with Asherman's syndrome (13% AFS grade I, 43% AFS grade II, and 43% AFS grade III) for fluoroscopic assisted adhesiolysis. Prior to treatment, 60% of patients were amenorrheic. The median number of procedures per patient was 1.5 (range 1–6), and the mean length of the procedure was 42 min (range 10–70 min). After treatment, 96% had regular menses. Seventeen patients attempted to conceive after surgery, and 9 (53%) were successful. They concluded that hysteroscopic synechiolysis under image intensifier control appears to be an effective treatment for Asherman's syndrome.

10.8.3 Technique

A 16-gauge, 80 mm Tuohy needle is introduced into the endocervical canal alongside a 5 mm diagnostic hysteroscope. The surgeon probes the area beyond the adhesion with the needle. Ultravist 76.9% is injected through the needle under fluoroscopic and hysteroscopic control. Hidden pockets of endometrium can be located radiographically, a passageway is created using the needle, and subsequent division of adhesions is performed under direct vision with hysteroscopic scissors.

10.9 Gynecoradiologic Uterine Resection (GUR)

Seth Levrant et al. [12] described in-office lysis of intrauterine adhesions under fluoroscopic control using a specially designed catheter. The initial hysterosalpingography was performed with a commercially available uterine catheter that seals

off the uterine cavity before injection of contrast. If intrauterine adhesions were diagnosed, an immediate attempt at lysis was made using the catheter's balloon-tip or hysteroscopic scissors, which were inserted through the main port of the catheter. The procedures were carried out using a paracervical block or intravenous analgesia.

Seventeen patients underwent lysis of intrauterine adhesions. In 13 patients (9 mild, 3 moderate, and 1 severe), the adhesions were lysed successfully (81.2%). Among those, nine procedures were performed with the balloon and four with scissors. In four cases (two moderate and two severe), lysis of adhesions was only partially successful. These procedures had to be abandoned prematurely because of patient discomfort before attempting the use of scissors ($n = 1$), extravasation of dye into the myometrium making visualization difficult ($n = 1$), and thick, fibrotic adhesions that were resistant to scissors ($n = 2$).

They concluded that in-office lysis of intrauterine adhesions under gynecoradiologic control could be carried out safely in the majority of patients, using minimally invasive techniques. The potential cost savings in comparison with endoscopic procedures, which require utilization of expensive operating room time, are especially relevant in today's cost-conscious managed care environment. Only failures of in-office procedures would reach the operating room under the algorithm proposed here.

10.10 Pressure Lavage Under Guidance (PLUG)

Coccia et al. [13] described a technique based on sonohysterography in which a continuous intrauterine injection of saline solution led to mechanical disruption of intrauterine adhesions. They included five patients with mild adhesions and obtained satisfactory lysis of the adhesions and restoration of menses. However, two patients with moderate adhesions underwent repeated treatment by hysteroscopy several months after the procedure because of the reformation of filmy adhesions. One out of the seven patients achieved pregnancy. They concluded that this technique is suitable for mild adhesions.

10.11 Ultrasound-Guided Technique for Hysteroscopic Adhesiolysis Using Balloon-Aided Dilatation or Seldinger Technique

Kriseman M et al. [14] described a novel approach of using ultrasound (US)-guided balloon dilation to safely and effectively treat intrauterine adhesions and to decrease the risk of perforation. They reported three patients, one with cervical stenosis and two with Asherman's syndrome, who underwent US-guided adhesiolysis. Access to the uterine cavity was obtained by either direct balloon-aided dilation or US-guided Seldinger technique, followed by balloon-aided dilation to enter the endometrial cavity and disrupt intrauterine/intracervical adhesions.

The treatment of Asherman's syndrome still poses a challenge. Since the condition most often follows the curettage of a pregnant or recently pregnant uterus, this

should be avoided where possible, with recourse to medical termination of pregnancy where feasible. If surgical evacuation is inevitable, the surgeon should be as gentle as possible. Hysteroscopy still remains the gold standard in the diagnosis and treatment of Asherman's syndrome. More research is needed regarding the optimum adhesion prevention strategy.

10.12 Prevention of Adhesion Reformation

Adhesion reformation is common following hysteroscopic adhesiolysis. Hanstede et al. [15] found a recurrence in 174 out of 638 patients (27.3%) who had hysteroscopic adhesiolysis. As expected, the recurrence rate was much higher in patients with more severe disease.

It is vital that steps are taken aimed at preventing the recurrence of IUA. There are various strategies but no single one has been proven to be effective.

10.13 AAGL and ESGE Practice Guidelines, 2017 [16]

Adjunctive interventions to aid adhesiolysis include ultrasound, fluoroscopy, and laparoscopy. There are no data to suggest that these prevent perforation or improve surgical outcomes and are likely dependent on clinical skills and availability. However, when such an approach is used in appropriately selected patients, it may minimize the consequences if perforation occurs: **Level B**.

Key Points

1. Hysteroscopic division of intrauterine adhesions may be technically difficult, especially if the adhesions are dense.
2. The efficiency and safety of hysteroscopic surgery for severe Asherman's syndrome may be improved if the procedure is done under guidance or assistance.
3. Modalities for assisted adhesiolysis are ultrasonography, laparoscopy, fluoroscopy, and sonohysterography.
4. Mild-to-moderate cases might be managed on an outpatient basis without any need for anesthesia, while severe cases are generally managed under general or regional anesthesia.
5. Cautery is more likely to cause damage to the endometrium compared with scissors but is associated with better ability to secure hemostasis.

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