Intrauterine Adhesions: Classification Systems

4

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4.1 Background

Intrauterine adhesions (IUA) were first reported by Heinrich Fritsch in the late nineteenth century. However, its etiology, symptoms, and diagnosis were later described in detail by Joseph Asherman in 1948 [1].

The term intrauterine adhesion is often used interchangeably with Asherman syndrome. But having said that, there is still a very subtle difference between the two terms. IUA refers to the fibrotic bands that form between the walls of the uterus as a result of trauma to the endometrium. Asherman syndrome incorporates the complete spectrum of disease, which includes the formation of intrauterine adhesions resulting in the clinical manifestations like menstrual dysfunction with or without cyclical abdominal pain, infertility, and poor reproductive outcomes.

It has long been known that endometrial injury (especially of the gravid uterus) is the leading cause of Asherman syndrome. It causes damage to the basal layer of the endometrium, which gets subsequently replaced with fibrous tissue. This is the key event in the development of intrauterine adhesions and associated symptoms [2]. The main risk factors causing this injury include curettage of pregnant uterus, mullerian anomaly, infections, uterine surgeries, and compressive sutures for postpartum hemorrhage [1].

Previously, HSG was widely used for the diagnosis of Asherman syndrome. The role of ultrasound, saline infusion sonography, and MRI has also been evaluated.

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R. Manchanda (ed.), *Intra Uterine Adhesions*,
https://doi.org/10.1007/978-981-33-4145-6_4

However, with the advent of hysteroscopy, it has become the gold standard and the investigation of choice for the diagnosis of Asherman syndrome.

Classification of Asherman syndrome according to its severity was necessary, to ensure better prognostication of patients and for better postoperative follow-up and for assessing the adequacy of treatment.

4.2 HSG-Based Classification

Initial attempts to classify Asherman syndrome were based on the individual HSG findings. It started in 1978 with **Toaff and Ballas** conducting a study to determine the impact of the extent of adhesions as well as their location in the uterus on the menstrual pattern of patients by using HSG [3]. Their findings were classified as follows:

- **Grade 1**: a single, small, filling defect, well inside the uterine cavity, occupying up to about one-tenth of the uterine area (Fig. 4.1)
- **Grade 2:** a single, medium-sized filling defect occupying one-fifth of the uterine area, or several smaller defects adding up to the same degree of involvement, located inside the uterine cavity, whose outline may show minor indentations but no gross deformation (Fig. 4.2)
- **Grade 3**: a single, large or several smaller, filling defects involving up to about one-third of the uterine cavity, which is deformed or asymmetrical because of marginal adhesions (Fig. 4.3)
- **Grade 4**: large-sized filling defects occupying most of the severely deformed uterine cavity (Fig. 4.4)

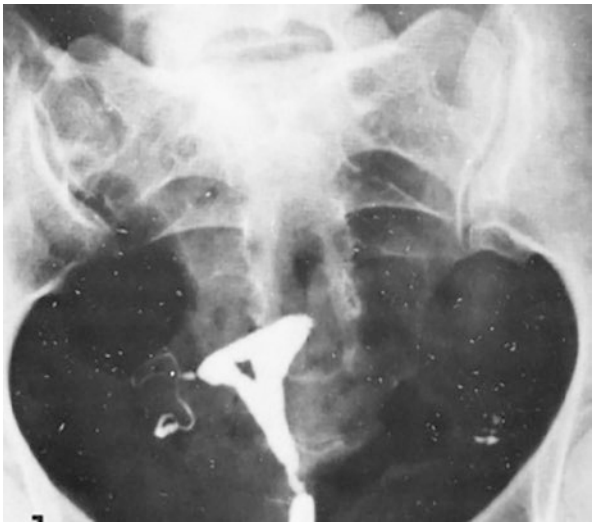


Fig. 4.1 Grade 1 corporeal adhesions

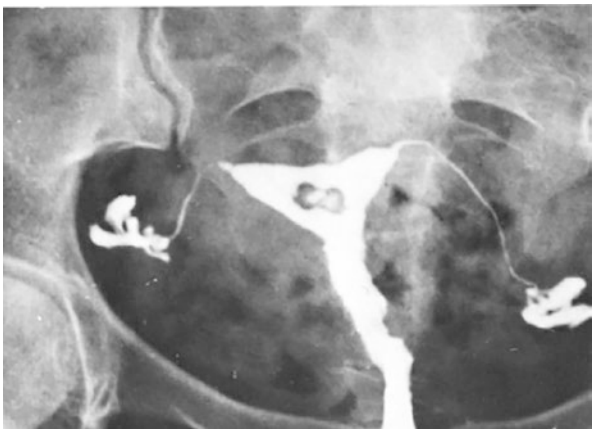


Fig. 4.2 Grade 2 corporeal adhesions

Fig. 4.3 Grade 3 corporeal adhesions

Later, with the increasing use of hysteroscopy, by virtue of its advantages over HSG, it was anticipated to be a better classification tool. Over the subsequent years, all efforts were focused to build an ideal hysteroscopy-based classification system.

4.3 Hysteroscopy-Based Classification

In 1978, **March** became the pioneer in developing a hysteroscopy-based classification system [4]. His aim was to grade the severity of Asherman syndrome according to the extent of coverage of endometrial cavity by adhesions and the degree of occlusion of the uterine cavity. According to this classification system, Asherman

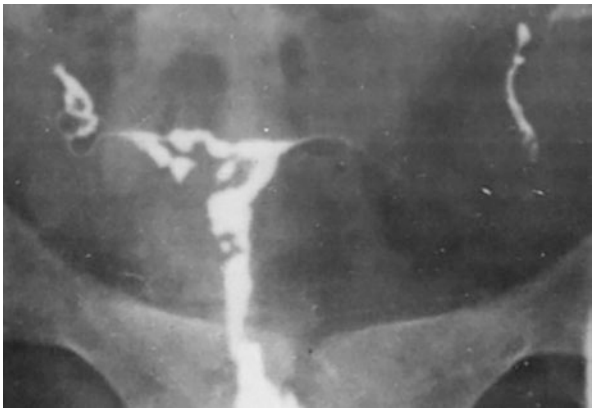


Fig. 4.4 Grade 4 corporeal adhesions

Table 4.1 Classification of Asherman syndrome by March 1978

Classification	Involvement
Severe	>3/4th uterine cavity involved, agglutination of walls or thick bands, ostial areas and upper cavity occluded
Moderate	1/4th to 3/4th uterine cavity involved, no agglutination of walls, adhesions only, ostial areas and upper fundus only partially occluded
Minimal	<1/4th uterine cavity involved, thin or flimsy adhesions, ostial areas and upper fundus minimally involved or clear

syndrome can be of minimal, moderate, and severe category. The simplicity of its use makes it a popular classification used in clinical settings even to this day (Table 4.1).

He argued that hysteroscopy-based classification was better for standardization of individual findings, for ease of comparison between the different dissection techniques, and that choice and extent of treatment can be decided on the basis of this classification. He further advocated that in severe Asherman syndrome, second-look hysteroscopy should be performed, as adhesiolysis in such cases can be difficult at once.

The drawback of his study was that he made no attempt to correlate this severity of the disease with the degree of success of treatment.

In 1983 **Hamou et al**. declared that only identifying the degree of uterine cavity involvement was not sufficient for classification of Asherman syndrome and that the size and histologic nature of adhesions as well as the assessment of the surrounding glandular endometrium were equally important and should be included in the classification system [5] (Table 4.2).

In his study he used a micro-hysteroscope with 4 mm diameter and 30-degree fore-oblique lens with CO_2 distension media for hysteroscopic adhesiolysis. At first the endometrial cavity was examined under panoramic view to determine the extent of intrauterine adhesions. This was then followed by contact hysteroscopy for assessment of size and histologic nature of adhesions under 20× magnification. The thickness, extension, and glandular nature of the surrounding endometrium were later inspected under 60× and 150× magnification (after methylene blue staining).

Table 4.2 Classification of Asherman syndrome by Hamou, 1983

Location of adhesions	Isthmic
	Marginal
	Central
Size of adhesions	<1 cm^2
	>1 cm^2
Type of adhesions	Endometrial adhesions
	Fibrous/connective tissue adhesions
	Myometrial adhesions

Table 4.3 Classification of Asherman syndrome by Valle, 1988

Type of adhesion	Mild
	Moderate
	Severe
Extent of uterine cavity occlusion	Partial
	Total

It was upheld that hysteroscopy-based classification system was more useful than HSG-based classification, in planning treatment and guiding further follow-up.

He identified three different varieties of adhesions in his study:

- *Endometrial adhesions*: white, vascularization similar to surrounding endometrium
- *Fibrous or connective tissue adhesions*: transparent, bridge-like, and poorly vascularized
- *Myometrial adhesions*: highly vascular and extensive adhesions

In 1988, **Valle** likewise devised another hysteroscopy-based classification system including the extent of uterine cavity involvement as well as the type of adhesions [6]. In addition to this, for the first time he suggested that success of treatment (identified by improvement in menstrual pattern and reproductive outcomes) should also be correlated with the severity of disease.

The different types of adhesions were defined as follows:

- *Mild:* flimsy adhesions, composed of endometrial tissue producing partial or complete uterine cavity occlusion
- *Moderate*: fibromuscular adhesions, composed of endometrium causing partial or total occlusion of the uterine cavity, can bleed on adhesiolysis
- *Severe*: dense connective tissue adhesions, lacks endometrial tissue and causes partial or total occlusion of the uterine cavity, not likely to bleed on adhesiolysis

He reported that the best results were obtained in case of mild adhesions and partial occlusion of uterine cavity and less satisfactory results were achieved with severe adhesions and complete occlusion of the cavity (Table 4.3).

Table 4.4 Classification of Asherman syndrome by Donnez and Nisolle, 1994

Degree	Location
I	Central adhesion
	(a) Thin flimsy adhesion (endometrial adhesions)
	(b) Myofibrous (connective adhesions)
II	Marginal adhesions (always myofibrous or connective)
	(a) Wedge-like projection
	(b) Obliteration of one horn
III	Uterine cavity absent on HSG
	(a) Occlusion of the internal os (upper cavity normal)
	(b) Extensive coaptation of the uterine walls (absence of the uterine cavity, true Asherman syndrome)

In 1994, Donnez and Nisolle proposed yet another classification system which reinstated the role of HSG along with hysteroscopy in the classification system. He broadly divided Asherman syndrome into three groups and six subgroups depending on the type of adhesion and the extent of uterine involvement [7] (Table 4.4).

4.4 Clinico-Hysteroscopic Classification

Prior to this time, the classification systems formulated were subjective which chiefly relied on the diagnostic modality used, i.e., HSG or hysteroscopy. None of these included the clinical symptoms of the patient in categorizing the severity of the disease.

In 1988, the American Fertility Society (AFS) provided a comprehensive classification system for Asherman syndrome which has become the most widely accepted classification system over the years [8]. It was the first to include clinical symptom (menstrual pattern) as a part of the categorization. Assessment of menstrual function of the patient was important as it gave a clue to how much of the endometrium was available for post-adhesiolysis regeneration.

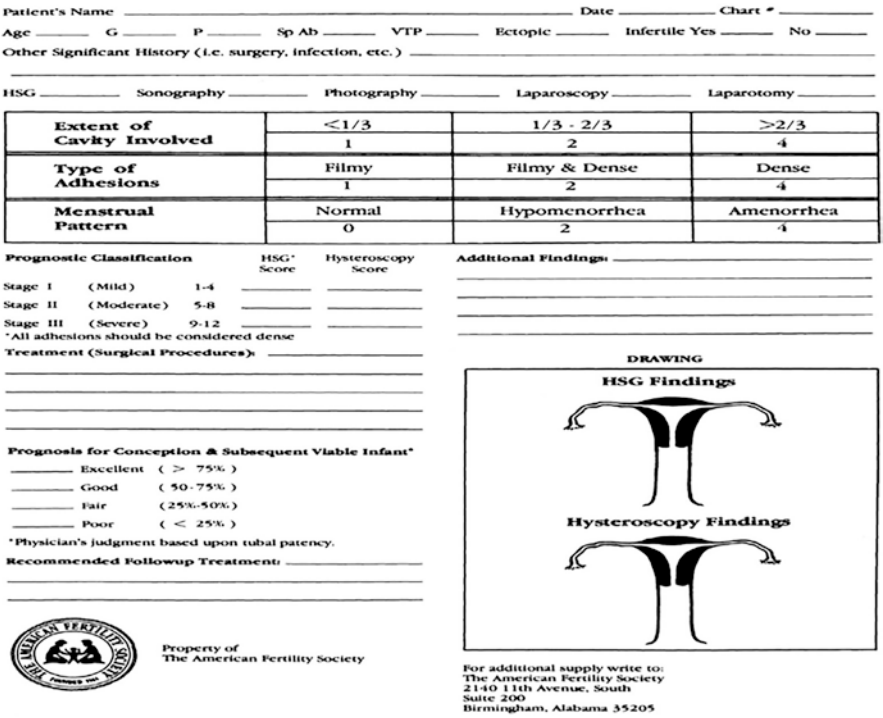
Scoring points (1–3) were assigned to each of the included characteristics and staging of Asherman was done as stage 1/2/3 (mild/moderate/severe) according to the score obtained. Additionally, prognostic scoring can be carried out for each patient using this system. Hence, this was a more objective way of classification (Table 4.5, Fig. 4.5).

The European Society of Hysteroscopy (ESH) further designed a classification system including the menstrual pattern in 1989 [9]. However, reproductive outcome of patients was once again not included as a separate entity in this classification. It is a more complex grading system in which Asherman syndrome was categorized under six groups as tabulated below. As it is more cumbersome to use, it did not gain as much popularity as the AFS classification (Table 4.6).

More recently, **Nasr** (in 2000) gave the clinico-hysteroscopic scoring system [10]. It is the most exhaustive and so far an ideal classification system because it includes the clinical symptoms (both menstrual pattern and reproductive outcome)

Table 4.5 Classification of Asherman syndrome by the American Fertility Society, 1988

	Characteristics		
Extent of cavity involved	<1/3	<1/3–2/3	>2/3
	1	2	4
Type of adhesions	Flimsy	Flimsy and dense	Dense
	1	2	4
Menstrual pattern	Normal	Hypomenorrhea	Amenorrhea
	0	2	4
Prognostic classification		HSG score	Hysteroscopy score
Stage I (mild)	1–4		
Stage II (moderate)	5–8		
Stage III (severe)	9–12		


Patient's Name _____ Date _____ Chart # _____

Age _____ G _____ P _____ Sp Ab _____ VTP _____ Ectopic _____ Infertile Yes _____ No _____

Other Significant History (i.e. surgery, infection, etc.) _____

HSG _____ Sonography _____ Photography _____ Laparoscopy _____ Laparotomy _____

Extent of Cavity Involved	<1/3	1/3 - 2/3	>2/3
	1	2	4
Type of Adhesions	Filmy	Filmy & Dense	Dense
	1	2	4
Menstrual Pattern	Normal	Hypomenorrhea	Amenorrhea
	0	2	4

Prognostic Classification — HSG* Score — Hysteroscopy Score

Stage I (Mild) 1-4 _____ _____

Stage II (Moderate) 5-8 _____ _____

Stage III (Severe) 9-12 _____ _____

*All adhesions should be considered dense

Treatment (Surgical Procedures): _____

Prognosis for Conception & Subsequent Viable Infant*

_____ Excellent (> 75%)

_____ Good (50-75%)

_____ Fair (25%-50%)

_____ Poor (< 25%)

*Physician's judgment based upon tubal patency.

Recommended Followup Treatment: _____

Property of
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Additional Findings: _____

DRAWING

HSG Findings

Hysteroscopy Findings

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Fig. 4.5 The American Fertility Society Classification of Intrauterine Adhesions

of the patient and the hysteroscopy findings and also gives a prognostic correlation (Table 4.7).

In this new system of classification, greater emphasis is given to the type of adhesions and the ability to visualize the tubal ostia over the involvement of rest of the cavity.

The types of adhesions were classified as flimsy/dense/tubular cavity. Here tubular cavity signifies the most severe form of the disease, which indicates dense adhesions obliterating the entire uterine cavity, thereby obscuring both the tubal ostia.

Table 4.6 Classification of Asherman syndrome by the European Society of Hysteroscopy, 1989

Grade	Extent of intrauterine adhesion
I	Thin or flimsy adhesion
	Easily ruptured by hysteroscope sheath alone
	Corneal areas normal
II	Singular firm adhesions
	Connecting separate parts of the uterine cavity
	Visualization of both tubal ostia possible
	Cannot be ruptured by hysteroscope sheath alone
IIa	Occluding adhesions only in the region of internal cervical os
	Upper uterine cavity normal
III	Multiple firm adhesions
	Connecting separate parts of the uterine cavity
	Unilateral obliteration of ostial areas of tubes
IIIa	Extensive scarring of the uterine cavity wall with amenorrhea or hypomenorrhea
IIIb	Combination of III and IIIa
IV	Extensive firm adhesion with agglutination of uterine walls
	At least both tubal ostial areas occluded

Table 4.7 Classification of Asherman syndrome by Nasr, 2000

Hysteroscopic findings		Score
Isthmic fibrosis		2
Flimsy adhesions	Few	1
	Excessive (>50% of the cavity)	2
Dense adhesions	Single band	2
	Multiple bands (>50% of the cavity)	4
Tubal ostium	Both visualized	0
	Only one visualized	2
	Both not visualized	4
Tubular cavity (sound <6)		10
Menstrual pattern		
Normal		0
Hypomenorrhea		4
Amenorrhea		8
Reproductive performance		
Good obstetric history		0
Recurrent pregnancy loss		2
Infertility		4
0–4 = mild (good prognosis) 5–10 = moderate (fair prognosis) 11–12 = severe (poor prognosis)		

In addition to this, isthmic fibrosis has been included as a separate entity as it can initiate a neuroendocrine reflex and can cause amenorrhea even when the rest of the cavity is free of adhesions.

4.5 Recent Updates

In India, recently in 2016, another hysteroscopy-based classification system was introduced which is known as the **MEC (Manchanda's Endoscopic Center) classification of Asherman syndrome** (Table 4.8). It also categorized Asherman syndrome as mild, moderate, and severe disease owing to the extent of involvement of the uterine cavity. It incorporates both dense and flimsy adhesions in all the categories. The core advantage of using this system is that it is a relatively simple classification and can be easily applied in the clinical settings while performing hysteroscopy. It makes the planning of treatment and follow-up of patients even more convenient [11].

A retrospective study done in 2018 by Sharma et al. based on the MEC classification correlated the reproductive outcome of women with the severity of the disease and reported an increased number of live birth rates in moderate and severe category of adhesions. In this study the direction and degree of hysteroscopic adhesiolysis were guided by the preoperative assessment of myometrial thickness of fundal, anterior, and posterior walls using the "RR" method [12].

4.5.1 Guidelines for Classification of Intrauterine Adhesions

AAGL in collaboration with ESGE, in 2017, formulated the following guidelines on intrauterine adhesions:

1. Intrauterine adhesions should be classified, as prognosis is correlated with severity of adhesions: Level B.
2. The various classification systems make comparison between studies difficult to interpret. This may reflect inherent deficiencies in each of the classification systems. Consequently, it is currently not possible to endorse any specific system: Level C [13].

Table 4.8 MEC classification of Asherman syndrome

Grade	Category	Characteristics
Grade 1	Mild	Less than 1/3rd of uterine cavity obliterated (flimsy/dense adhesions)
Grade 2	Moderate	1/3rd to 2/3rd of uterine cavity obliterated (flimsy/dense adhesions)
Grade 3	Severe	More than 2/3rd of uterine cavity obliterated (flimsy/dense adhesions)

4.6 Conclusion

Changes in the menstrual pattern of a woman or poor reproductive outcomes in a woman with a history of endometrial trauma point to the diagnosis of Asherman syndrome. In all suspected cases, attempt should be made to classify the disease according to its severity and treatment plan should be formulated accordingly. An ideal classification system should include comprehensive analysis of the disease symptoms along with the extent of uterine involvement. Additionally, prognostic scoring should be done and further follow-ups should be scheduled along those lines.

Gradually over a period of time, a variety of classification systems were proposed, each having its own benefits and disadvantages. Having said that, none of the classifications specify the impact of severity of Asherman syndrome on the reproductive outcome of the patient. Moreover, these systems have not yet been validated through clinical studies and hence further research must be done to predict the clinical application of these classification systems. The summary of various classification systems used is shown in Table 4.9.

Table 4.9 Classification systems for Asherman syndrome/IUA

Source	Summary of classification
Toaff and Ballas	Classification into 4 grades to determine the impact of the extent of adhesions as well as their location in the uterus on the menstrual pattern of patients by using HSG
March et al.	Adhesions classified as minimal, moderate, or sever based on hysteroscopic assessment of the degree of uterine cavity involvement
Hamou et al.	Adhesions classified as isthmic, marginal, central, or severe according to hysteroscopic assessment
Valle and Sciarra	Adhesions classified as mild, moderate, or severe according to hysteroscopic assessment and extent of occlusion (partial or total) at HSG
European Society for Hysteroscopy	Complex system classifies IUAs as grades I through IV with several subtypes and incorporates a combination of hysteroscopic and HSG findings and clinical symptoms
American Fertility Society	Complex scoring system of mild, moderate, and severe IUAs based on the extent of endometrial cavity obliteration, appearance of adhesions, and patient menstrual characteristics based on hysteroscopy or HSG assessment
Donnez and Nisolle	Adhesions classified into 6 grades on the basis of location, with postoperative pregnancy rate the primary driver. Hysteroscopy or HSG is used for assessment
Nasr et al.	Complex system creates a prognostic score by incorporating menstrual and obstetric history with IUA findings at hysteroscopic assessment
Chitra et al.	A simple and easy-to-use classification system dividing Asherman into 3 grades: mild, moderate, and severe according to the extent of uterine involvement on hysteroscopy (MEC classification)

Key Points

1. Classification of Asherman syndrome is necessary to evaluate the extent of intrauterine adhesions, selecting the best treatment option and analyzing the postoperative success of adhesiolysis.
2. The various classification systems include HSG-based classification, hysteroscopy-based classification, and clinico-hysteroscopic classification.
3. Currently HSG-based classifications have become obsolete and there has been a shift towards using hysteroscopy-based classification.
4. The most widely accepted among these is the AFS classification which is a clinico-hysteroscopic classification.
5. On the other hand, the most comprehensive classification system was developed by Nasr in 2000 which is the most ideal one, to include prognostic scoring as well as the reproductive outcome of the patients.
6. The most recent classification system has been developed in 2016 in India, known as MEC classification, which is hysteroscopy based and is relatively simple and easy to implement under clinical settings.
7. Further clinical studies are required to validate the clinical application of these classification systems and to prognosticate the patients about their posttreatment reproductive outcomes according to the severity of the condition.

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