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REVIEW ARTICLE

Gynecology

Proposal for a new classification of intrauterine adhesions by sites

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Abstract

The authors propose a new classification of intrauterine adhesions (IUAs) to facilitate understanding for both the gynecologist and the patient, documenting the location and characteristics of the adhesions in a single image. This tool significantly improves surgical planning and patient outcomes in the treatment of intrauterine adhesions. In addition, having a simple and consistent method of describing IUAs will facilitate longitudinal studies tracking the outcomes of various surgical techniques, adhesion barriers and the impact of hormonal treatment. The proposed new classification system may represent a significant advancement in the field of gynecology. Its adoption may facilitate and simplify the representation of intrauterine adhesion sites, allowing for better communication between doctors and more effective management of intrauterine adhesions.

KEYWORDS
classification, infertility, intrauterine adhesions

1 | INTRODUCTION

Intrauterine adhesions (IUAs) were first described in 1894.[1] They are characterized by fibrous bridges developing from the opposing walls of the uterine cavity or cervix that alter the anatomy and the quality of the endometrial lining.[2] The prevalence of IUAs in recurrent pregnancy loss ranges from 1.3% to 9.6%, depending on the study, being encountered in one in five women (20%) after repeated curettages for miscarriage, with 42% of cases being rated as moderate to severe adhesions.[3–10]

Intrauterine adhesions can be responsible for hypomenorrhea or amenorrhea and can significantly impact fertility. Their main cause is trauma to the endometrial basal layer of the endometrium, mainly post-dilation and curettage in cases of retained products of conception or incomplete abortion.[11] They can also occur after hysteroscopic surgical procedures breaching the basal layer of the

This article does not include any interaction or intervention with human subjects or include any access to identifiable private information, then the project was not submitted to IRB review.

endometrium or the myometrium, especially in hysteroscopic myomectomy and hysteroscopic adenomyomectomy.[12-15]

2 | HOW TO ASSESS INVOLVEMENT OF THE UTERINE CAVITY BY ADHESIONS?

The assessment of intrauterine adhesions (IUAs) involves various imaging techniques, with or without intracavitary contrast, as well as the use of hysteroscopy for direct visualization.[16] Ultrasonography can raise suspicions of IUAs due to differences in density and blurring of the endometrial echo. Three-dimensional ultrasonography enhances the detection capabilities, providing more detailed information on the presence, extent, location, and density of adhesions. Hysterosonography and hysterosalpingography are effective in demonstrating the presence and location of adhesions within the uterine cavity, although they do not provide information on the density of the fibrous tissue. Magnetic resonance imaging (MRI) may suggest the presence of adhesions but lacks the ability to precisely localize and determine their density. Hysteroscopy remains the definitive method for diagnosis, allowing direct visualization of the uterine cavity and detailed evaluation of adhesions, including their extent, location and density.

Hysteroscopy also allows for a "see and treat" approach to IUAs, enabling the diagnosis and lysis of adhesions in the same procedure.

In 1983, Hamou et al.[17] expanded the hysteroscopy-based classification system, including the extent and histologic nature of adhesions, as well as the evaluation of surrounding glandular endometrium and the degree of cavity distortion. They described three distinct types of adhesions in their study:

1. Endometrial adhesions: These appeared white with vascularization like the surrounding endometrium.
2. Fibrous or connective tissue adhesions: These were transparent, bridge-like, and poorly vascularized.
3. Myometrial adhesions: These were thicker, highly vascular, and extensive in nature.

Surgical intervention is recommended for patients with amenorrhea who desire to resume menstruation and particularly for those seeking to conceive, as IUAs are associated with infertility, affecting both fertilization and implantation.[18] The preferred surgical approach is hysteroscopic lysis of adhesions, ideally performed using minimal or no energy to preserve the endometrial structure and function. Post-surgical recovery of the uterine cavity may lead to the formation of new adhesions due to exposed raw areas on the opposing walls.

To enhance the chances of restoring the internal shape of the uterus, several strategies may be employed. Hormone therapy, mainly estrogen, aims to accelerate endometrial growth and reduce raw areas that could lead to the formation of new synechiae.[19] The application of an anti-adhesion barrier after surgery, which would form a physical barrier for a short period to keep the uterine walls apart, reducing the chances of bridge formation for new adhesions.[19] The intrauterine balloon, as well as the Foley catheter, also aim for mechanical separation of the uterine walls but their use is usually limited to 7 days due to patient discomfort and the risk of infection. Insertion of an IUD after hysteroscopic lysis of adhesions uses the same principle of mechanically separating the uterine walls, and can be retained for a longer duration, potentially for months or years, and may be associated with hormone use, but these also act as contraceptives.

In our practice, synechiae lysis is routinely performed sharply using scissors, or employing electrosurgery using a Collins electrode in the presence of dense fibrotic adhesions. A second look ambulatory hysteroscopy is scheduled 30–60 days post-procedure to ensure the normality of the uterine cavity and address any newly formed early thin adhesions.

Surgical scheduling, planning and patient counseling depend on precise and detailed preoperative evaluation, identifying the extent, locations and density of fibrotic areas, frequently engaging the patient during the office hysteroscopy, as the physician-patient partnership is essential to the success of the procedure.

Various classifications of synechiae complicate the comparison of cases and outcomes,[16,20-23] making it challenging to determine when to implement adjunct treatments such as hormone therapy, anti-adhesion barriers, mechanical separation devices, or IUDs.[24-28] Regular ambulatory hysteroscopies, conducted between 30 and 60 days post-treatment, are crucial for monitoring and maintaining uterine health. It allows the correct assessment of the cavity for adhesions and at the same time is the therapeutic procedure of choice, for performing lysis of the new and early fibrinous, not dense, adhesions.[29]

3 | SURGICAL DECISION MAKING FOR INTRAUTERINE ADHESIONS: UTILIZING A NOVEL CLASSIFICATION SYSTEM

3.1 | Decision framework for surgical and non-surgical interventions

The choice of surgical intervention and the application of adjunct methods such as endometrial growth promotion or anti-adhesion barriers are significantly influenced by a thorough evaluation of the uterine cavity. This evaluation considers the specific location and the types of intrauterine adhesions (synechiae), that can be differentiated by hysteroscopy and sometimes by ultrasound or magnetic resonance:

- E—endometrial: Indicate more superficial, endometrial mucosa involvement.
- F—fibrotic: Connective tissue involvement.
- M—muscular: Indicate deep involvement, myometrial tissue involvement, adhesions with a substantial risk of impairing endometrial function.

3.2 | Surgical implications based on adhesion characteristics

Adhesions located in critical areas such as the cornual and fundal regions may particularly benefit from the placement of an intrauterine device (IUD) post-lysis, especially in cases of dense, fibrotic lesions. A clinically useful classification system would ideally categorize adhesion sites and density, aid in tailoring the surgical approach and adjunct therapeutic measures and would be simple to report, easy to communicate and would be reproducible among physicians.

1	2	3
4	5	6
7	8	9

FIGURE 1 "Tic-tac-toe."

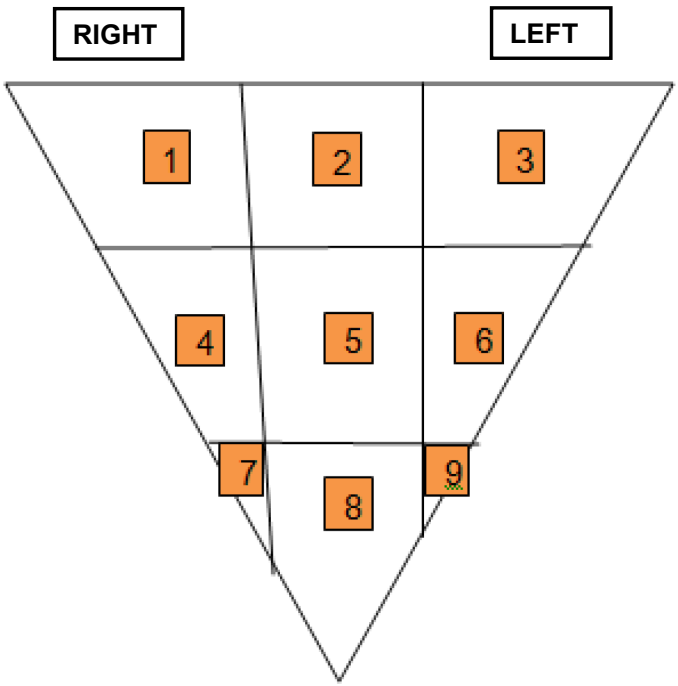
We propose a new classification system for intrauterine adhesions (IUAs) that aims to achieve these goals.

3.3 | Classification and graphical representation

To enhance clarity in identifying adhesion locations within the uterus, we employ a numerical system analogous to a "tic-tac-toe" grid (Figure 1):

- Upper third of uterus: Numbered 1 to 3, from the right cornual region (1), through the fundus (2), to the left cornual region (3).
- Middle third of uterus: Numbered 4 to 6, from the right margin (4), through the central area (5), to the left margin (6).
- Lower third of uterus: Numbered 7 to 9, from the right margin (7), through the internal OS (8), to the left margin (9).

This system simplifies the documentation and communication of adhesion sites, making the surgical planning and collaboration more straight forward and reproducible. By categorizing the uterus into nine distinct quadrants; three each in the upper, middle, and lower thirds. This method facilitates easy memorization and application in



Intrauterine Adhesions

Locations = 1, 2, 3, 4, 5, 6, 7, 8, 9

Types – E (Endometrial), F (Fibrotic), M (Myometrial)

FIGURE 2 Intrauterine adhesions classification "tic-tac-toe."

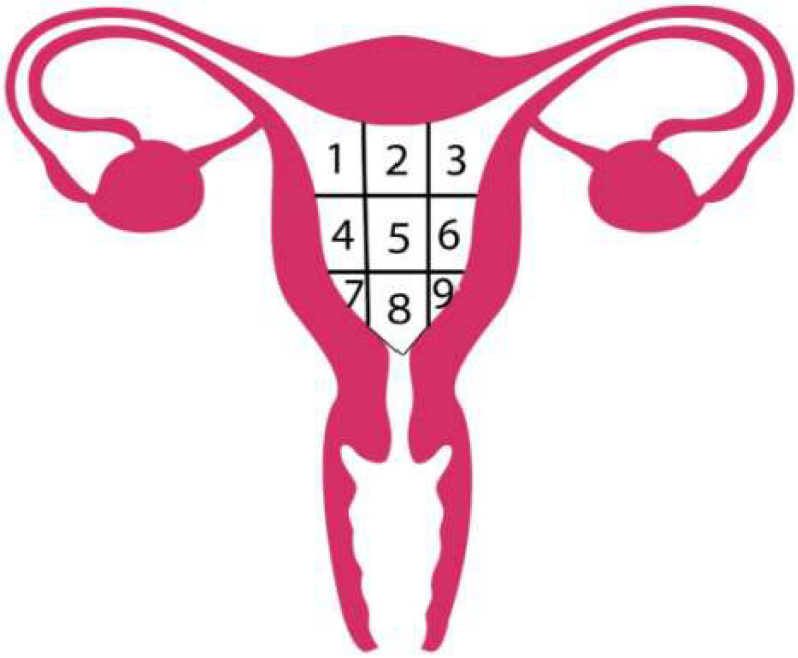


FIGURE 3 Intrauterine adhesions with "tic-tac-toe" grid.

clinical practice and the graphical representation is simple to understand and chart (Figures 2 and 3).

3.4 | Clinical implications of adhesion locations

- Adhesions 1 and 3: Adhesions in the cornual regions may impact the tubal ostia, often associated with infertility, but likely to be associated with normal menstrual cycles.
- Adhesions 5 and 8 (central and lower uterine regions): More likely to cause decreased or absent menstrual flow and may contribute to infertility.
- Adhesions 4, 6, 7, and 9 (lateral aspects sparing the tubal ostia): Typically have less pronounced clinical implications and show better outcomes with hysteroscopic management.

3.5 | Utilizing the classification for enhanced patient care

Associating the adhesion sites with the "tic-tac-toe" board makes the location easy and reproducible to report and communicate, as it divides the uterine cavity into nine quadrants, three on each side and three centrals, and each is further categorized into upper, middle, and lower thirds. Thus, memorizing the sites by recalling the "tic-tac-toe" game makes it easy for the patient and the gynecologist to visualize the correct location, with numerical indication (Figure 1). This innovative "tic-tac-toe" classification not only aids in the precise assessment of surgical management needs but also enhances the understanding of IUAs among patients and healthcare professionals. This approach ensures accurate monitoring and intervention, optimizing the prevention of new adhesions and the selection of suitable barrier methods or IUD placements tailored to specific adhesion characteristics (Figure 4) (the patients consented for publication of the images of their cases).

4 | CONCLUSION

By transforming the description and management of IUAs into a visually intuitive and easy-to-use format, we enhance the understanding of the condition for both patients and physicians, documenting and communicating the location and characteristics of IUAs in just one image. This tool may significantly improve surgical planning and

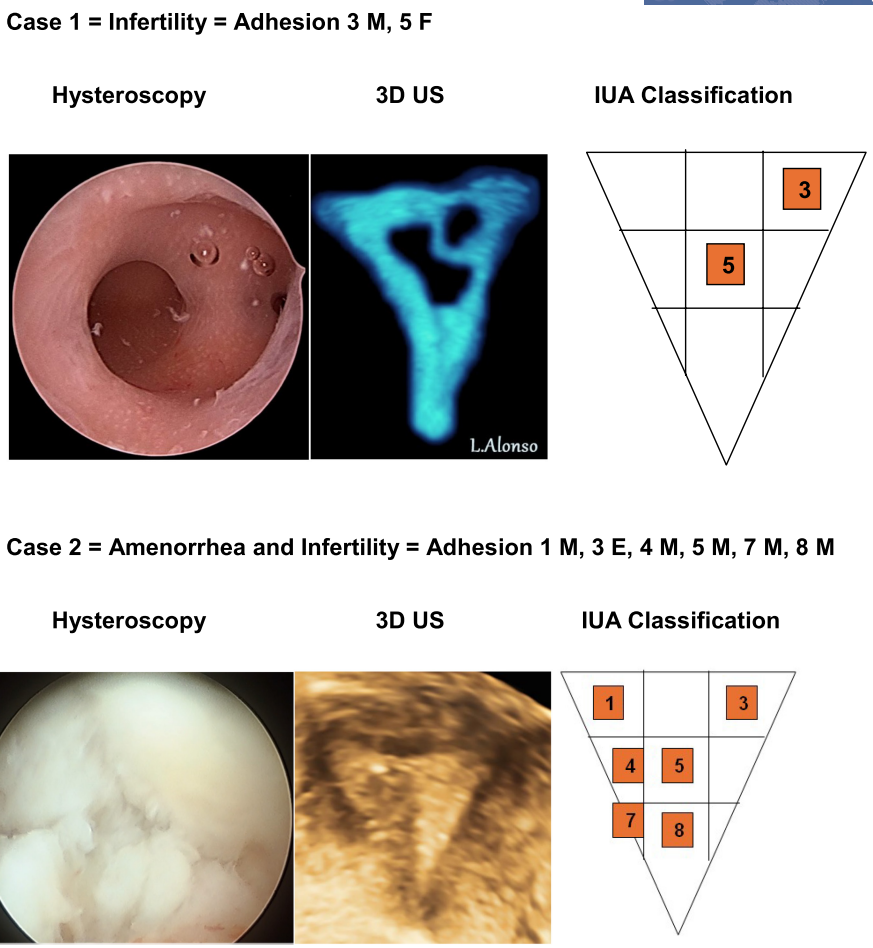


FIGURE 4 Examples.

patient outcomes in the treatment of intrauterine adhesions. In addition, having a simple and consistent method of describing IUAs will facilitate longitudinal studies tracking the outcomes of various surgical techniques, adhesion barriers and the impact of hormonal treatment. A clinical trial is necessary to validate this new tool, as it would provide empirical evidence regarding its effectiveness in improving surgical planning and outcomes. By testing the tool in a real-world clinical setting, the trial could assess how well it helps in classifying intrauterine adhesions, determining treatment plans, and ultimately improving patient results.

AUTHOR CONTRIBUTIONS

R. B. Lasmar and B. P. Lasmar: Conceived and designed the analysis. R. B. Lasmar, B. P. Lasmar, N. S. Moawad, S. Halmovich and L. A. Pacheco: Contributed data and wrote the paper.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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