

Beyond hysteroscopic metroplasty: time to distinguish fundal from ampliative procedures

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ABSTRACT

Functional intrauterine surgery has recently been proposed as a conceptual framework shifting the focus from anatomical correction alone toward restoration of uterine function and reproductive competence. However, hysteroscopic treatment of congenital uterine anomalies continues to be described under the umbrella term metroplasty, despite substantial differences in uterine morphology, surgical targets, and reconstructive objectives. In this Opinion Paper, we propose distinguishing two categories of hysteroscopic reconstructive procedures: fundal metroplasty and ampliative metroplasty. Fundal metroplasty primarily addresses midline fundal anomalies, most commonly the septate uterus, through a subtractive approach aimed at restoring normal uterine architecture. Conversely, ampliative metroplasty addresses globally restricted or dysmorphic uterine cavities through an expansive approach aimed at enlarging and reshaping the cavity. The use of a single term for these distinct procedures may contribute to conceptual ambiguity in surgical terminology. Rather than proposing a new classification system, we suggest terminology based on the anatomical target and reconstructive objective of hysteroscopic surgery. Distinguishing fundal from ampliative metroplasty may facilitate more precise communication and research and provide a clearer framework for hysteroscopic reconstructive surgery within the broader concept of Functional Intrauterine Surgery.

Keywords: Functional intrauterine surgery, hysteroscopic metroplasty, fundal metroplasty, ampliative metroplasty, septate uterus, dysmorphic uterus

Premise

Functional intrauterine surgery has recently emerged as a new conceptual framework in reproductive gynaecological surgery, shifting the focus from purely anatomical correction toward restoration of uterine function and reproductive competence.¹ Within this perspective, hysteroscopic surgery should not be regarded merely as a tool for removing intrauterine pathology or correcting uterine shape abnormalities,

but rather as a functional intervention aimed at optimising implantation, placentation, and pregnancy development.

Among the conditions most commonly associated with impaired reproductive outcomes are congenital uterine anomalies, particularly septate and dysmorphic uteri. Both conditions have been associated with infertility, pregnancy losses, implantation failure, and obstetric complications, although through

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potentially different anatomical and pathophysiological mechanisms. Hysteroscopic treatment of these abnormalities has become embedded in clinical practice. Despite the heterogeneity of the underlying uterine morphologies and surgical techniques, these procedures have traditionally been grouped under the single term “metroplasty.”

The Limits of Current Terminology

Historically, the term “metroplasty” has been closely associated with the treatment of the septate uterus, presumably because this is the most commonly encountered congenital uterine anomaly. The procedure is conceptually straightforward: a midline structure is incised or resected² in order to unify the uterine cavity. This approach is reflected in the way uterine anomalies are classified and studied.

Both the American Society for Reproductive Medicine (ASRM) and the European Society of Human Reproduction and Embryology/European Society for Gynaecological Endoscopy (ESHRE/ESGE) classification systems emphasise fundal morphology as a key diagnostic feature.^{3,4} As a consequence, the conceptual model of metroplasty has remained anchored to the idea of correcting a fundal defect. However, contemporary hysteroscopic practice has evolved beyond this paradigm. Increasingly, surgeons are confronted with uterine cavities that are not divided by a septum, but rather globally restricted, narrow, or dysmorphic. These include T-shaped uteri, tubular cavities, and other forms of subtle uterine cavity dysmorphism, which are classified as dysmorphic uterus within the ESHRE/ESGE system but are not acknowledged by the ASRM classification. In such cases, the surgical objective is not to incise or remove a central part, but rather to reshape and remodel the cavity. Despite this fundamental difference, both types of interventions continue to be labelled under the same term: metroplasty.

Fundal Metroplasty: Restoring Uterine Architecture—Need for a Second Step?

Fundal metroplasty refers to hysteroscopic procedures aimed at correcting midline fundal anomalies, most notably the septate uterus (Figure 1A, B).

Its defining characteristics are:

- a central anatomical target
- a subtractive surgical approach
- the goal of restoring a single unified cavity

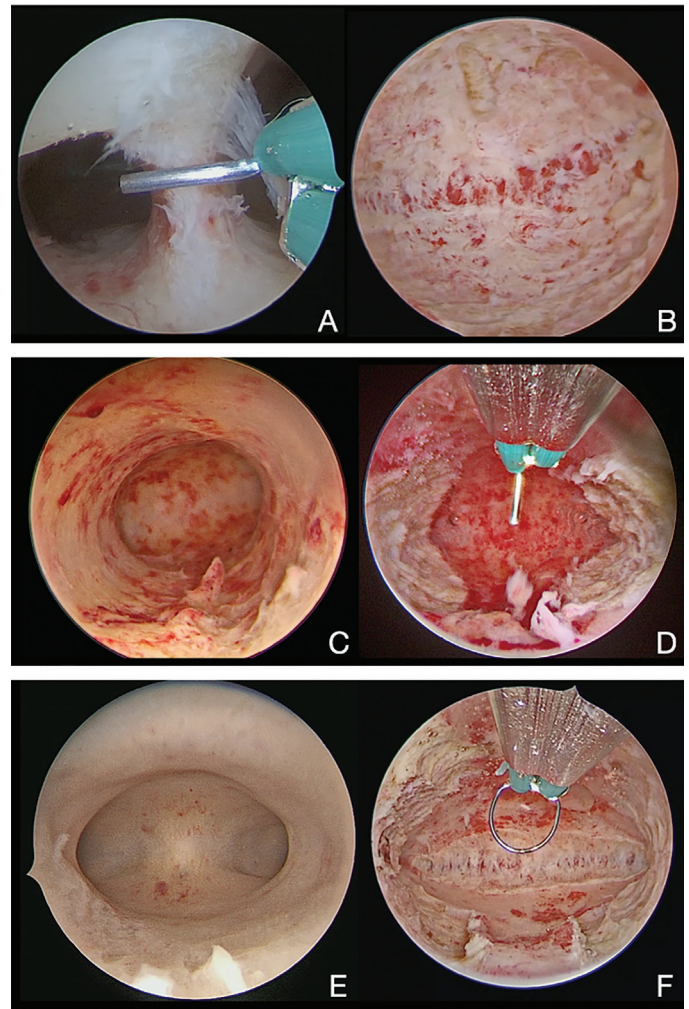


Figure 1. Pre- and post-operative appearance of uterine cavity after fundal, ampliative and combined techniques. (A) Pre-operative appearance of uterine septum. (B) Post-operative appearance of uterine cavity after fundal metroplasty. (C) Pre-operative appearance of T-shaped dysmorphic uterus. (D) Post-operative appearance of uterine cavity after ampliative metroplasty. (E) Pre-operative appearance of Y-shaped dysmorphic uterus. (F) Post-operative appearance of uterine cavity after combined metroplasty (lateral cavity expansion with fundal incision).

The underlying rationale is that a septum may impair implantation or early pregnancy development, and that its removal can improve reproductive outcomes by restoring uterine architecture and endometrial function.

This is the most extensively studied form of metroplasty. However, even in this “classical” indication, the evidence is far from unequivocal. A randomised controlled trial by Rikken et al.⁵ failed to demonstrate a significant improvement in live birth rates following septum resection, thereby challenging long-standing assumptions regarding the reproductive benefits of the procedure; however, despite its prospective design, this

study was subject to several potential sources of bias.^{6,7} At the same time, earlier observational studies and meta-analyses suggested improved reproductive outcomes in selected populations.⁸⁻¹⁰

These conflicting results highlight a key issue: even within a seemingly well-defined condition, variability in patient selection, anatomical definition, and type of septa (thin vs broad, vascularised or not) can profoundly influence outcomes.¹¹ Moreover, fundal metroplasty should not be regarded as a single-step procedure. Emerging evidence demonstrates that, following septum resection, the uterine fundus undergoes a process of myometrial remodelling, leading to progressive changes in cavity shape over time. In a prospective pilot study, Casadio et al.¹² showed that the uterine fundus continues to reorganise after hysteroscopic metroplasty, suggesting that the immediate postoperative anatomy does not represent the final structural outcome. In the framework of a functional intrauterine surgery,¹ this is an important observation because restoration of uterine architecture, rather than an increase in uterine cavity volume, is the key objective of fundal metroplasty.

This observation also has direct clinical implications. Fundal metroplasty should be conceptually reframed as a two-step procedure, in which the initial surgical correction is followed by a second-stage assessment to evaluate the completeness of cavity normalisation after tissue remodelling. Failure to recognise this dynamic process may lead to underestimation of residual anomalies or misinterpretation of surgical success.

Ampliative Metroplasty: Altering Uterine Cavity Dynamics

In contrast, we introduce the concept of ampliative metroplasty, which represents a distinct surgical paradigm. In these cases, the uterine cavity is not divided but constrained. The morphology is often characterised by:

- reduced transverse diameter
- thickened or inwardly protruding lateral walls
- a T-shaped or tubular configuration
- limited endo-cavitary volume

Here, the problem is not the presence of excess tissue in the midline, but rather a globally restricted uterine cavity caused by increased thickness of the lateral and/or fundal uterine walls. Accordingly:

- the target is focused to the lateral walls and global architecture
- the surgical approach is expansive rather than subtractive incising the “excess” of the uterine wall thickness
- the objective is to reshape cavity improving its functional geometry

Procedures of this type have been described, particularly in the context of the T-shaped uterus and uterine dysmorphism (Figure 1C, D).^{13,14} However, they have never been clearly distinguished, at a conceptual level, from septum section.

This lack of distinction obscures a fundamental difference: ampliative metroplasty is not simply a variation of fundal surgery; rather, it is a reconstructive intervention based on a different pathophysiological premise, aimed at restoring uterine function by improving the spatial and biomechanical conditions required for implantation, placentation, and normal pregnancy progression.

Within the framework of functional intrauterine surgery,¹ ampliative metroplasty represents the most explicit example of a procedure aimed at restoring uterine function through spatial and biomechanical optimisation rather than simple anatomical correction.

Importantly, fundal and ampliative principles are not always mutually exclusive. In anatomical variants such as the Y-shaped uterus, the surgical approach may combine lateral cavity expansion with fundal incision, thereby incorporating elements of both procedures (Figure 1E, F).

One Term, Two Different Surgeries

The continued use of a single term “metroplasty” to describe these two procedures creates a structural problem in the literature. When studies evaluate the effectiveness of “metroplasty”, they may include heterogeneous populations comprising:

- patients with a septate uterus
- patients with a dysmorphic uterus

These conditions are biologically and anatomically distinct. The corresponding surgical interventions differ in their targets, techniques, and mechanisms of action. Fundal metroplasty involves incision and/or removal of tissue. Ampliative metroplasty creates space by reshaping the cavity. Fundal metroplasty aims at anatomical and architectural normalisation. Ampliative metroplasty aims at functional optimisation.

Moreover, fundal metroplasty is characterised by a postoperative myometrial reorganisation phase, reinforcing the need to conceptually separate it not only from ampliative procedures, but also from the notion of immediate surgical completeness.

Pooling these entities under a single label risk diluting true treatment effects, generating inconsistent results, and limiting the interpretability of clinical studies.

A Proposed Conceptual Framework

We therefore propose the formal introduction of the following definitions:

- **Fundal metroplasty:** A hysteroscopic procedure aimed at correcting a midline fundal anomaly, primarily the septate uterus, with the goal of restoring a single unified cavity, and requiring a second-step office evaluation due to postoperative myometrial reorganisation.
- **Ampliative metroplasty:** A hysteroscopic procedure aimed at expanding and reshaping a globally restricted or dysmorphic uterine cavity, with the goal of improving its functional geometry and reproductive potential.

This distinction reflects not only different surgical techniques, but also different underlying biological questions.

Implications For Research and Practice

Recognising this dichotomy has immediate implications. First, it calls for greater precision in study design. Clinical trials and observational studies should clearly distinguish between fundal and ampliative indications, rather than grouping them under a generic category. Second, it challenges the interpretation of existing evidence. Meta-analyses that combine heterogeneous forms of metroplasty may be inherently limited in their conclusions. Third, it refines patient selection and counselling. The expected benefits, risks, and mechanisms of action differ between the two procedures, and should be communicated accordingly. In addition, for fundal and combined metroplasty, postoperative office follow-up should be considered an integral part of the procedure itself, rather than an optional step, in order to capture the effects of uterine remodelling. Finally, it opens new avenues for research. In ampliative metroplasty, success may not be adequately captured by traditional endpoints such as cavity “normalisation,” but may require more nuanced assessments of uterine geometry, endometrial function, and implantation dynamics.

Reframing the Central Question

For many years, the field has focused on a single overarching question:

“Does hysteroscopic metroplasty improve reproductive outcomes?”

This question is no longer sufficient.

A more appropriate formulation would be:

“Which metroplasty, for which uterine morphology, and through which mechanism of action?”

Conclusion

Hysteroscopic metroplasty is not a single procedure, but a family of interventions that share an endoscopic approach while differing fundamentally in their anatomical targets and surgical objectives. By introducing the distinction between fundal metroplasty and ampliative metroplasty, we aim to provide a new conceptual framework that better reflects surgical reality and may help resolve long-standing inconsistencies in the literature. This distinction has not been formally described before. Yet, it is already embedded in daily practice.

Recognising it is not merely an exercise in terminology—it is a necessary step toward more precise science and better clinical care.

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