

Functional intrauterine surgery: restoring uterine potential to enable natural fertility

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Hysteroscopic surgery has long been established as the gold standard in managing intrauterine pathology. However, an evolution in conceptual understanding is now needed, namely that beyond the technical removal of lesions lies the broader clinical goal of restoring uterine function to enable natural fertility.

The uterus is not only a target for surgical access, but it is also a hormonally responsive, structurally complex, and functionally dynamic organ. Congenital and/or acquired uterine anomalies such as uterine septa, uterine dysmorphism, intrauterine adhesions, endometrial polyps, submucosal fibroids, focal adenomyosis, endometrial hyperplasia or early endometrial cancer and retained pregnancy tissue may impair fertility and reproductive outcomes. Following imaging, these pathologies are typically approached hysteroscopically for diagnostic clarification and treatment prior to assisted reproductive technology (ART). However, an increasing body of evidence supports the notion that surgical correction of uterine factors alone can lead to natural conception, particularly when the surgery is conducted with a "functional intent" —that is, intending to restore the endometrial environment in a way that supports embryo implantation and pregnancy maintenance.¹⁻⁵

This shift in perspective gives rise to the emerging concept of functional intrauterine surgery —a

discipline that brings together operative hysteroscopy, reproductive endocrinology, imaging-guided techniques, and fertility-oriented surgical decision-making. The goal is no longer simply anatomical normalisation, but reconstruction of a functional and receptive uterine cavity, while minimising trauma and preserving endometrial and myometrial integrity.

Several studies have demonstrated that hysteroscopic treatment of intrauterine pathologies may lead to significantly improved reproductive outcomes in women with unexplained infertility or repeated implantation failure.^{2,5,6} For example, hysteroscopic resection of fibroids, polyps, and adhesions⁷ has been shown to increase clinical pregnancy and live birth rates, both in spontaneous cycles and in women undergoing ART, although high-quality data are still scarce. Moreover, hysteroscopic metroplasty for uterine anomalies^{3,4} may reduce miscarriage rates and improve take-home baby rates, although data are conflicting and debate still rages.⁸⁻¹¹

Importantly, functional intrauterine surgery is not merely a preparatory step for ART. In many cases, it prevents or delays the need for ART entirely by restoring natural reproductive capacity. For women facing uterine factor infertility, functional surgical correction may represent an opportunity to conceive spontaneously —an option often overlooked in

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the current fertility care model that prioritises *in vitro* fertilisation. Beyond its medical implications, this approach also empowers women to pursue conception in a less invasive, more physiologically aligned way, with lower emotional and economic burdens.

The concept of elective uterine preservation¹² within the context of reproductive ageing further reinforces the importance of maintaining and restoring uterine function as part of a long-term reproductive health strategy. Much like elective oocyte cryopreservation, uterine care could become a pillar of proactive fertility medicine. In this scenario, the uterus is no longer treated only when symptomatic or overtly dysfunctional; rather, its reproductive potential is proactively evaluated, and carefully selected interventions are considered when a meaningful reproductive benefit is expected.

To translate this vision into practice, several challenges must be addressed. First, the field needs clear definitions of functional success. Anatomical correction is not always equivalent to restored function. Outcome measures should include spontaneous conception rates, time to pregnancy, and quality of the endometrial lining. Secondly, comparative studies are needed to assess whether functional intrauterine surgery offers superior outcomes to early referral to ART. Thirdly, interdisciplinary surgical training should incorporate fertility-preserving principles and functional objectives into hysteroscopic education.

This also requires a cultural shift: to consider the uterus not only in terms of pathology but in terms of potential—a restorable organ whose function can be actively rehabilitated. With technological advances in imaging, minimally invasive instruments, and personalised surgical planning, we now have the means to do so.

The next generation of intrauterine surgery must align with the broader goals of reproductive health: sustainability, personalisation, and restoration. Functional intrauterine surgery represents an evolution—not only in technique, but in purpose. It reframes surgical success as reproductive restoration rather than simply lesion removal. And in doing so, it broadens the possibilities for women to conceive, carry, and complete their reproductive goals—naturally.

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