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Revisiting the Role of Hysteroscopy in Infertility: A Clinical Perspective

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Abstract

Hysteroscopy is pivotal in assessing and managing intrauterine abnormalities that impact fertility. Although it is the gold standard for uterine cavity evaluation, it is often relegated to a secondary role due to its invasive nature and cost. This article provides a comprehensive review of the indications, benefits, and outcomes associated with hysteroscopy in infertility, focusing on recurrent implantation failure (RIF) and operative interventions. The review also integrates current evidence and global guidelines while emphasizing the need for individualized, evidence-based fertility care.

Keywords: Hysteroscopy; Infertility; Recurrent Implantation Failure; Polyps; Fibroids; Asherman's Syndrome; Endometrial Receptivity; Dydrogesterone; ART

Introduction

The successful implantation of an embryo is influenced by endometrial receptivity, embryo quality, and a conducive intrauterine microenvironment (Evans et al., 2014). While initial assessments use TVS, HSG, or SIS, hysteroscopy allows direct visualization, offering unmatched diagnostic accuracy (NICE, 2014). Despite being the gold standard, it is underutilized due to its perceived invasiveness and cost (Cochrane Review, 2013).

Diagnostic and Office Hysteroscopy

Hysteroscopy should be considered early in the infertility work-up, particularly in unexplained infertility, repeated IVF failures, or recurrent miscarriages. Indirect imaging techniques may miss subtle abnormalities that can compromise implantation. Though uterine factors are evident in only 2-3% of infertile women, intrauterine lesions are found in up to 40% (ASRM, 2012; ESHRE, 2018).

Studies (Di Spiezio Sardo et al., 2016; Cochrane 2013) suggest that hysteroscopy prior to IVF, especially after failed attempts, may increase clinical pregnancy and live birth rates, although evidence quality is low.

Operative Hysteroscopy: Therapeutic Interventions

Endometrial Polyps

Detected in 20-40% of infertile women, endometrial polyps can impair implantation. Surgical removal improves outcomes, particularly when located near the uterotubal junction (Yanaihara et al., 2008). About 25% regress spontaneously, but hysteroscopic removal is the gold standard (AAGL, 2012).

Submucosal Fibroids

Present in 5-10% of infertile women, submucosal fibroids distort the endometrial cavity, disrupting implantation (Taylor & Gomel, 2008). Retrospective studies confirm that hysteroscopic myomectomy improves fertility outcomes (Piekarska et al., 2021).

Intrauterine Adhesions (Asherman's Syndrome)

IUA presents with infertility, menstrual abnormalities, and RIF. Hysteroscopic adhesiolysis using cold scissors is effective and safer than electrosurgery, reducing thermal injury and recurrence (AAGL, 2010; Hanstede et al., 2015). Hyaluronic acid gels and cyclic estrogen therapy aid recovery.

Septate Uterus

Linked to subfertility and miscarriage, hysteroscopic septoplasty is supported by ASRM (2016), though ESHRE and NICE caution against routine use due to insufficient evidence.

Hysteroscopy and Recurrent Implantation Failure (RIF):

RIF involves failure after multiple IVF attempts and is influenced by:

- Anatomical issues: Polyps, fibroids, adhesions, hydrosalpinges.
- Endometrial thickness:<7 mm correlates with lower success (Von Wolff et al., 2018).
- Microbiome: Lactobacillus-dominated flora correlates with better outcomes (Franasiak et al., 2018).
- Immunological and genetic factors: Autoantibodies (ANA, APA), thrombophilia, HLA-G polymorphisms (Motak-Pochrzest et al., 2018; Azem et al., 2004).
- Male factor infertility: Sperm DNA fragmentation is higher in infertile men (Simon et al., 2012).

Comprehensive Investigations in RIF:

Evaluation includes:

- Hormonal: AMH, thyroid profile, prolactin.
- Uterine: 3D USG, hysteroscopy, receptivity assay.
- Sperm: DNA fragmentation, epigenetics.
- Immunology: NK cells, cytokines, autoantibodies.
- Genetics: PGT-A, karyotyping, thrombophilia panel.

Management Strategies for RIF

1. Embryo Optimization: Blastocyst transfer and frozen embryo protocols show improved LBR (Coates et al., 2017; Acharya et al., 2018).
2. Progesterone Support: Oral dydrogesterone offers high bioavailability, low side effects, and immunomodulation (Griesinger et al., 2018; Raghupathy et al., 2015). It modulates Th1/Th2 balance and improves endometrial receptivity.

3. Adjuvant Therapies:
   - Antithrombotics: LMWH improves LBR and reduces miscarriage in women with thrombophilia (Potdar et al., 2013).
   - Immunotherapy: Tacrolimus, PBMC, G-CSF, and PRP infusions enhance implantation rates (Nakagawa et al., 2015; Zamaniyan et al., 2021).
   - Antibiotics: Treatment of chronic endometritis significantly improves IVF outcomes (Cicinelli et al., 2015).

Conclusion

Hysteroscopy, though often underutilized, remains indispensable in identifying and correcting intrauterine abnormalities that impede conception. Its targeted use, especially in cases of RIF and unexplained infertility, offers considerable improvement in pregnancy outcomes. Personalized evaluation and treatment plans—integrating anatomical, immunological, and microbiological insights—are vital for optimizing ART success.

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