



Clinical Management of Thin Endometrium: A Case-Based Approach for Enhanced Reproductive Outcomes

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Abstract

Thin endometrium is one of the key challenges in assisted reproductive technology (ART), often resulting in implantation failure and compromised pregnancy rates[1]. This case-based study presents an integrative approach to managing thin endometrium (≤ 7 mm) through a combination of pharmacological interventions, regenerative therapies, and personalized treatment protocols[2]. Our aim is to provide insights into a tailored, evidence-based management plan, enhancing endometrial receptivity and improving ART outcomes in women with thin endometrium[3]

Keywords: Thin endometrium, assisted reproductive technology (ART), regenerative medicine, PRP, stem cell therapy, endometrial receptivity, fertility

1. Introduction

Thin endometrium is a recognized obstacle in achieving successful pregnancy outcomes during ART. An optimal endometrial thickness of ≥ 8 mm is typically required for successful embryo implantation. However, many women present with endometrial measurements ≤ 7 mm, which is insufficient for implantation[4]. Thin endometrium may result from various factors, including hormonal imbalances, uterine scarring, or idiopathic causes. This case study outlines the clinical management of a patient diagnosed with thin endometrium, exploring the use of both conventional and novel therapies to improve uterine receptivity[5].

2. Case Presentation

Patient Information:

- **Age:** 34
- **Diagnosis:** Persistent thin endometrium (≤ 6 mm)



- **Clinical History:** Multiple failed ART cycles with no evidence of uterine pathologies
- **Previous Treatments:** Estradiol valerate therapy, vaginal progesterone supplementation, and human chorionic gonadotropin (hCG) trigger were ineffective in previous cycles.

Clinical

Examination:

Upon initial consultation, the patient's transvaginal ultrasound confirmed an endometrial thickness of 6 mm in the mid-luteal phase. Doppler flow studies indicated reduced blood flow to the endometrium, suggesting suboptimal vascularity—a critical factor for endometrial receptivity. There was no history of uterine surgery, infection, or endometrial pathologies such as chronic endometritis, making the case idiopathic in nature.

3. Pathophysiology of Thin Endometrium

The pathophysiology of thin endometrium is multifactorial. Factors such as insufficient estrogen stimulation, impaired endometrial growth, reduced vascularization, and deficient expression of implantation markers (e.g., VEGF, LIF) contribute to suboptimal endometrial receptivity. In this patient, molecular analysis revealed a significant reduction in the expression of VEGF, indicating compromised angiogenesis. Additionally, the endometrial tissue lacked the necessary integrins and cytokines essential for successful embryo implantation.

4. Management Strategy and Interventions

4.1 Hormonal Therapy (Phase 1)

Initial treatment consisted of high-dose estradiol valerate (6 mg/day), aiming to promote endometrial growth. However, after a 12-day course, there was minimal improvement, with the endometrial thickness remaining at 6 mm. Although estrogen priming is typically first-line therapy, this patient's response was insufficient, prompting the exploration of alternative therapeutic options.

4.2 Platelet-Rich Plasma (PRP) Therapy (Phase 2)



In light of the patient's inadequate response to conventional therapy, intrauterine infusion of autologous platelet-rich plasma (PRP) was introduced. PRP is known to be rich in growth factors, such as PDGF, VEGF, and TGF- β , which have been shown to promote angiogenesis and cellular regeneration. Following PRP infusion, a follow-up ultrasound showed a significant increase in endometrial thickness to 7.5 mm, with improved blood flow.

4.3 Stem Cell Therapy (Phase 3)

After observing moderate improvement in endometrial thickness, we incorporated stem cell therapy using bone marrow-derived stem cells. Menstrual blood-derived stem cells (MenSCs) were harvested, processed, and administered intrauterinely. These cells secrete a range of cytokines and growth factors that support tissue regeneration, angiogenesis, and immunomodulation. The stem cell treatment resulted in a further increase in endometrial thickness to 8 mm, with continued improvement in vascularization.

4.4 Personalized Embryo Transfer (ET) Protocol

Given the positive response to PRP and stem cell therapy, a personalized embryo transfer was scheduled. The patient underwent the Endometrial Receptivity Array (ERA) test, which provided personalized insights into the optimal window of implantation. The ERA test confirmed that the endometrial lining was receptive, and the embryo transfer was scheduled accordingly.

5. Outcome and Follow-Up

Pregnancy

Outcome:

Two weeks after the embryo transfer, the patient tested positive for pregnancy. Ultrasound imaging at 6 weeks of gestation confirmed a viable intrauterine pregnancy with a detectable fetal heartbeat. The patient continued with standard progesterone supplementation throughout the first trimester.

Long-term

Follow-up:

The pregnancy continued without significant complications. Routine prenatal care was maintained, with ultrasounds at 12 and 20 weeks showing normal fetal growth. The patient delivered a healthy baby at term, which was a successful outcome after multiple failed ART attempts due to thin endometrium.



6. Discussion

This case underscores the importance of a multidisciplinary and personalized approach in the management of thin endometrium. Despite the conventional approach of hormonal therapy, our patient's response was suboptimal. By integrating regenerative medicine therapies such as PRP and stem cell therapy, we were able to significantly improve endometrial thickness and blood flow, resulting in a successful pregnancy outcome. The use of the ERA test for personalized embryo transfer timing further optimized the likelihood of implantation.

Although these therapies are still under investigation, they represent a promising addition to ART protocols. The use of stem cells and PRP could offer viable solutions for patients with refractory thin endometrium, where traditional therapies fail.

7. Conclusion

Thin endometrium remains a significant barrier to successful ART, but emerging regenerative therapies offer hope for improved clinical outcomes. This case illustrates how combining hormonal therapy with advanced techniques like PRP and stem cell therapy, alongside personalized protocols like ERA testing, can enhance endometrial receptivity and increase the chances of pregnancy. Continued research and clinical trials will be essential to refine these methods and expand their accessibility to a broader patient population.

References

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