# Trauma-Induced Thin Endometrium: Clinical Management and Innovative Approaches to Improve Reproductive Outcomes

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**Abstract**

Endometrial injury, resulting from trauma or surgical interventions, remains a significant factor in the development of thin endometrium, which is a major challenge in assisted reproductive technology (ART)[1]. This case study presents the clinical management of a patient with thin endometrium secondary to previous intrauterine trauma and evaluates the use of advanced therapies, including platelet-rich plasma (PRP) and stem cell therapy, for endometrial regeneration and ART success[2]. By addressing trauma-induced endometrial insufficiency, we aim to demonstrate how an individualized approach can improve endometrial receptivity and optimize pregnancy outcomes in ART[3].

**Keywords:** Thin endometrium, trauma, assisted reproductive technology (ART), PRP therapy, stem cell therapy, endometrial regeneration, fertility

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## 1. Introduction

Thin endometrium is often seen in women undergoing ART, and it is a critical determinant of implantation success. In many cases, endometrial thinning results from underlying factors such as chronic inflammation, uterine surgeries, or trauma[4]. Trauma-induced thin endometrium, commonly arising from procedures like dilation and curettage (D&C), myomectomy, or endometrial biopsies, can severely affect the chances of successful implantation[5]. This case study examines the management of a patient with trauma-related thin endometrium and the clinical interventions used to address this issue.

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## 2. Case Presentation

**Patient Information:**

- **Age:** 35

- **Diagnosis:** Thin endometrium secondary to intrauterine trauma (post-D&C)
- **Clinical History:** The patient had a history of miscarriage at 8 weeks of gestation, followed by a D&C procedure, after which she developed thin endometrium. Despite multiple ART cycles, implantation failure was recurrent.
- **Previous Treatments:** Hormonal therapy with estradiol valerate, vaginal progesterone, and intrauterine hCG administration did not improve endometrial thickness beyond 5 mm.

**Clinical Examination:**
Upon initial evaluation, transvaginal ultrasound revealed a consistently thin endometrium measuring 5 mm in the mid-luteal phase. Doppler ultrasound studies showed poor blood flow to the uterine lining. The patient's medical history indicated that the trauma caused by the D&C was likely the primary contributing factor to the compromised endometrial thickness.

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### 3. Pathophysiology of Trauma-Induced Thin Endometrium

Trauma to the endometrium, such as that resulting from surgical procedures, disrupts the normal regenerative capacity of the uterine lining. The damage can lead to scarring, reduced vascularity, and impaired cellular repair mechanisms. Following trauma, the endometrial tissue may show decreased expression of vascular endothelial growth factor (VEGF) and integrins, which are essential for angiogenesis and implantation. In this patient, intrauterine trauma disrupted the normal endometrial healing process, resulting in a thin, non-receptive endometrial lining.

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### 4. Management Strategy

Given the patient's history of trauma-induced thin endometrium and previous ART failures, a comprehensive treatment plan was designed, combining both traditional and advanced therapies.

#### 4.1 Hormonal Therapy (Phase 1)

Initially, high-dose estradiol valerate (6 mg/day) was administered to stimulate the endometrium. However, after 14 days of therapy, the endometrial thickness showed minimal improvement, remaining at 5.5 mm. This suggested that while hormonal therapy can support endometrial growth, it was insufficient in this case, particularly due to the previous trauma.

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

Given the lack of response to hormonal therapy, intrauterine infusion of autologous PRP was introduced. PRP contains several growth factors, including VEGF, PDGF, and TGF-β, which are known to promote tissue healing, angiogenesis, and regeneration. After PRP administration, a follow-up ultrasound demonstrated an increase in endometrial thickness to 7 mm, with significant improvement in uterine blood flow.

### 4.3 Stem Cell Therapy (Phase 3)

Given the history of intrauterine trauma and limited response to PRP, stem cell therapy was considered. The patient underwent a stem cell procedure using autologous menstrual blood-derived stromal cells (MenSCs). These stem cells release paracrine factors that promote endometrial regeneration and angiogenesis. Following the administration of MenSCs, endometrial thickness improved to 8 mm, with enhanced vascularity.

### 4.4 Personalized Embryo Transfer Protocol

After successful endometrial regeneration, a personalized embryo transfer was scheduled. The patient underwent the Endometrial Receptivity Array (ERA) test, which identified the optimal window for embryo implantation. Based on the ERA results, the embryo transfer was performed at the time of maximal receptivity, leading to a successful implantation.

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## 5. Outcome and Follow-Up

**Pregnancy Outcome:**
Two weeks after embryo transfer, the patient had a positive pregnancy test. Follow-up ultrasound at 6 weeks showed a viable intrauterine pregnancy with a detectable fetal heartbeat. The patient was prescribed progesterone supplementation to support the pregnancy through the first trimester.

**Long-term Follow-up:**
The pregnancy progressed uneventfully, and at 20 weeks, the ultrasound showed normal fetal development. The patient continued regular prenatal care, and a healthy baby was delivered at term.

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## 6. Discussion

Trauma-induced thin endometrium presents a unique challenge in ART, particularly when conventional therapies fail to provide the necessary improvements. This case demonstrates how a multi-modal approach, incorporating PRP, stem cell therapy, and personalized embryo transfer timing, can offer a viable solution for patients with endometrial damage due to trauma. The use of regenerative therapies has shown promising results in stimulating tissue regeneration, improving endometrial thickness, and enhancing uterine vascularity.

The integration of stem cells and PRP into ART protocols is an innovative approach that has the potential to significantly improve outcomes for patients with trauma-induced endometrial insufficiency. However, further studies are required to fully understand the mechanisms behind these therapies and to establish standardized protocols for their use in clinical practice.

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## 7. Conclusion

Trauma-induced thin endometrium remains a significant barrier to successful ART. By combining conventional treatments with regenerative therapies like PRP and stem cell therapy, it is possible to improve endometrial receptivity and enhance ART success rates in women with this condition. As more evidence emerges, these therapies could become integral parts of ART protocols, offering new hope to women with trauma-related infertility.

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## References

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