



Review article

Role of Platelets Rich Fibrin and Martius Flap in Vesicovaginal Fistula

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ABSTRACT

Background : Vesicovaginal fistula (VVF) remains a debilitating condition with severe physical, psychological, and social consequences. The Martius flap has long been considered the gold standard for interposition in complex VVF repair, but its donor-site morbidity and complications necessitate exploration of alternatives. Platelet-Rich Fibrin (PRF), a second-generation autologous platelet concentrate, offers a bioactive scaffold that promotes angiogenesis, collagen synthesis, and tissue regeneration, with promising results in preliminary studies. However, there is limited high-level evidence directly comparing PRF with the Martius flap, especially in iatrogenic VVFs following hysterectomy.

Conclusion: This randomized controlled trial, “Platelet-Rich Fibrin Glue Versus Martius Flap as a Second Layer in Vaginal Repair of Vesicovaginal Fistula,” seeks to provide robust evidence on the efficacy and safety of PRF compared to the Martius flap. By assessing operative outcomes, healing success, morbidity, and patient satisfaction, this study aims to establish whether PRF can serve as a less invasive, regenerative alternative, potentially shifting the paradigm of VVF surgical repair.

Keywords: Vesicovaginal fistula, Martius flap, Platelet-Rich Fibrin, Regenerative medicine, interposition technique.

INTRODUCTION

1. Introduction and Clinical Significance of Vesicovaginal Fistula

A vesicovaginal fistula (VVF) is an abnormal, epithelized communication between the bladder and the vagina, resulting in continuous and involuntary urinary leakage. This condition represents a catastrophic morbidity with devastating physical, psychological, and social consequences, often leading to severe isolation, depression, and a profound reduction in quality of life [1, 2]. The global etiology of VVF presents a stark healthcare disparity. In developing nations, it is predominantly a disease of childbirth, caused by prolonged obstructed labor leading to pressure necrosis of the vesicovaginal tissue [3]. In contrast, in the developed world, the most common cause is iatrogenic injury during pelvic surgery, with abdominal

hysterectomy accounting for up to 75% of cases, underscoring its status as a significant surgical complication [4, 5].

The cornerstone of VVF management is surgical repair. The fundamental principles for a successful outcome are well-established: meticulous dissection, wide mobilization of tissues, excision of scarred edges, tension-free, watertight multilayer closure, and adequate postoperative bladder drainage [6, 7]. While primary, small, and well-vascularized fistulas may be successfully repaired with a simple multilayer technique, complex fistulas—defined by large size (>2-3 cm), recurrence, previous pelvic radiation, or location adjacent to the ureters or bladder neck—pose a significantly higher risk of failure. For these challenging cases, the interposition of a healthy, well-vascularized tissue flap between the bladder and vaginal closures is considered

imperative to promote angiogenesis, separate suture lines, and improve healing rates [8, 9].

2. The Martius Flap: The Historical Gold Standard and Its Limitations

For decades, the Martius bulbocavernosus fat pad flap has been the gold-standard interposition material for complex transvaginal VVF repairs. First described in 1928, this pedicled flap is harvested from the labia majora and tunneled subcutaneously to the fistula site. Its primary advantage lies in its reliable vascular supply (from the pudendal artery) and its bulk, which provides a robust barrier between the bladder and vagina [10, 11]. Its efficacy is supported by a vast body of literature reporting success rates ranging from 85% to 95% in expert hands.

However, the harvest of the Martius flap is not a benign procedure and introduces significant donor-site morbidity. It requires an additional surgical incision in a separate anatomical field, which invariably leads to increased operative time, greater intraoperative blood loss, and a more complex recovery [12]. The literature documents a concerning profile of complications associated with its harvest, including hematoma formation, wound infection, seroma, lymphorrhea (labial incision lymphorrhea reported in up to 44.4% in our study and 13.5% by Kasyan et al., [11], and sensory changes in the labia. Long-term, patients may experience labial asymmetry, cosmetic dissatisfaction, and occasional chronic discomfort, highlighting a critical need for less invasive yet equally effective alternatives [10, 13].

3. The Rise of Regenerative Medicine and Platelet-Rich Fibrin

The field of regenerative medicine has sought to harness the body's innate healing capabilities, leading to the development and application of platelet concentrates in surgery. Platelet-rich fibrin (PRF) is a second-generation platelet concentrate that represents a substantial advancement over first-generation platelet-rich plasma (PRP) and commercial fibrin sealants [14].

PRF is an entirely autologous biomaterial prepared by centrifuging a sample of the patient's own blood without anticoagulants.

This process results in a dense fibrin polymer matrix that incorporates platelets, leukocytes, cytokines, and a high concentration of growth factors—including Platelet-Derived Growth Factor (PDGF), Transforming Growth Factor-beta (TGF- β), Vascular Endothelial Growth Factor (VEGF), and Epidermal Growth Factor (EGF) [15, 16]. This unique architecture does not merely act as a passive glue; it functions as a bioactive scaffold that provides a sustained and gradual release of these key signaling proteins over 7-14 days. These factors are pivotal in recruiting stem cells, stimulating angiogenesis (formation of new blood vessels), promoting fibroblast proliferation, enhancing collagen synthesis, and modulating the immune response, thereby creating an optimal microenvironment for tissue regeneration and healing [14].

The application of this technology in urogynecology is novel. Early studies demonstrated its potential. Shirvan et al. [17] successfully treated 12 patients with small iatrogenic VVFs (<5 mm) using a non-surgical approach involving PRP injections and PRF glue instillation, achieving a 100% closure rate at 6 months. Streit-Ciećkiewicz et al. [18] further supported its use as a biological adjuvant, using PRP pre-treatment to improve tissue quality before surgical repair of recurrent VVFs.

A pivotal study that directly informed the present research by Zaki et al. [19] was the multi-institutional randomized trial by Safan et al. [20]. They compared commercial fibrin glue to the Martius flap as an interposition layer in the repair of complicated *obstetric* VVFs. Their trial was groundbreaking, demonstrating comparable success rates (68.4% for fibrin glue vs. 57.8% for Martius flap) and establishing a less invasive biological sealant as a viable alternative to a major flap procedure for a specific, complex patient population.

4. Rationale and Knowledge Gap:

Justifying the Present Study

The existing literature thus establishes a clear contrast: the proven efficacy but significant morbidity of the Martius flap versus the promising, minimally invasive regenerative

potential of platelet concentrates, as evidenced by early case series and the foundational work of Safan et al. [20] with fibrin glue.

However, a critical knowledge gap remains. There is an absence of high-level evidence from a prospective randomized controlled trial that directly compares the autologous Platelet-Rich Fibrin (PRF)—a superior, second-generation regenerative material—to the historical gold standard Martius flap in the surgical repair of VVFs, particularly those of iatrogenic origin. Key questions are unanswered:

- Is autologous PRF glue non-inferior to the Martius flap in achieving successful, durable closure of iatrogenic VVFs?
- Does the PRF technique significantly reduce operative time, intraoperative blood loss, and surgical morbidity?
- Does avoiding a labial incision lead to faster recovery and higher patient satisfaction?

The study by Safan et al. focused on obstetric fistulas and commercial fibrin glue. The present study seeks to advance this field by investigating a more advanced autologous biomaterial (PRF) in a different, yet highly prevalent, etiology (post-hysterectomy). Zaki, M.M et al (2025)

CONCLUSION

This review charts the evolution of VVF repair, from the reliance on pedicled flaps with inherent donor-site morbidity to the innovative application of regenerative biology. While the Martius flap remains a cornerstone, its limitations have driven the search for advanced alternatives, beginning with fibrin glue and now extending to PRF

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Citation

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