

Case Report

Application of platelet-rich plasma in treating refractory wounds following hemorrhoid surgery: a case report

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Abstract: This case report presents the successful application of autologous Platelet-rich Plasma (PRP) in treating a 53-year-old male patient with a nonhealing perianal wound that persisted for 71 days following surgery for mixed hemorrhoid and anal fistula, despite conventional therapies, including topical traditional Chinese medicine, antibiotics, and wound care. A series of three PRP treatments, administered on October 25, October 27, and November 1, 2023, accelerated healing, resulting in complete closure of the 1.6 cm wound within 14 days. This was accompanied by reduced pain and no recurrence at follow-up, demonstrating PRP's effectiveness in promoting tissue regeneration, controlling infection, and relieving pain in a refractory post-surgical wound.

Keywords: Hemorrhoids, platelet-rich plasma, nonhealing wound

Introduction

Hemorrhoids refers to a condition in which the anal cushions develop symptoms such as bleeding or prolapse, often leading to secondary symptoms, including pain, pruritus, and mucus discharge [1]. This common condition typically affects the anorectal region and is categorized as internal or external based on its proximity to the dentate line [2]. Notably, several coexisting physiologic disorders, including chronic constipation, pelvic floor dysfunction, increased anal resting tone, defecation difficulties, and childbirth, can lead to the progression of hemorrhoidal disease [3]. Surgical intervention remains the most effective approach, particularly for prolapsed hemorrhoids that require manual reduction during defecation or for irreducible hemorrhoids [4]. However, complications including defecation-related issues and infections may arise due to the proximity of the surgical wound to the anus, often delaying the healing process.

Platelet-rich plasma (PRP), a blood-derived substance comprising platelets and growth factors, has been widely used to treat various non-hemostatic conditions. Several studies have

explored the use of PRP in facilitating prompt restoration, recuperation, and rehabilitation after diverse injuries [5-7]. Notably, PRP promotes the healing and rejuvenation of tissues damaged by various ailments [8]. When administered directly to an injury site, PRP primarily activates platelets to release key growth factors, including platelet-derived growth factor [9], insulin-like growth factor [10], and transforming growth factor- β 1 [11], which act on cells within the affected tissue. These growth factors support the development of resilient tissue by promoting the differentiation of precursor cells and enhancing the proliferation of terminally differentiated cells [12]. Additionally, PRP contains significant levels of fibrinogen, which aids in forming a biocompatible fibrin scaffold that facilitates cellular activity [13, 14]. PRP also exhibits anti-infection [15, 16] and analgesic [6] properties.

This study presented a case report of successful PRP treatment for a nonhealing perianal wound following hemorrhoid surgery.

Refractory perianal wounds persisting for more than 70 days post-hemorrhoidectomy are exceptionally rare, with typical healing occur-

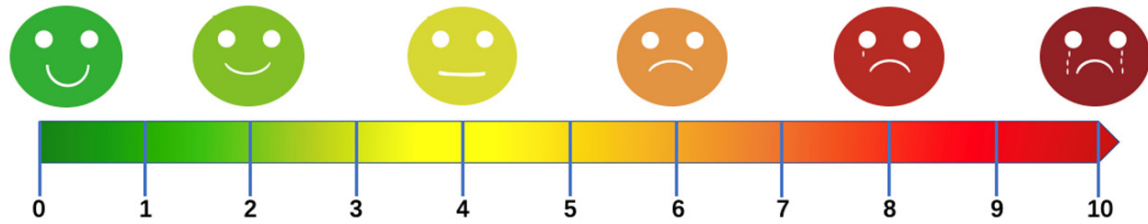


Figure 1. Significance of VAS score: 0 point - no pain; 1-3 points - slight pain, does not affect sleep; 4-6 points - pain and affects sleep; 7-9 points - the pain is unbearable, affecting sleep; 10 points - severe pain, unbearable.

ring within 2-4 weeks under standard care [17]. The prolonged nonhealing in this case, despite multimodal therapy, underscores its clinical uniqueness.

Case presentation

Patient

A 53-year-old male patient presented to the Proctology Department of our hospital on August 7, 2023, with a five-year history of anal pain of unknown etiology. This pain typically worsened after bowel movements and lasted for approximately 1-2 h, occasionally accompanied by anal pruritus. Recently, the patient's symptoms had worsened, and clinical examination led to the diagnosis of mixed hemorrhoids and an anal fistula. Proctoscopy revealed congested and elevated mucosal changes in the hemorrhoidal region. On August 15, 2023, the patient underwent open surgical procedures under spinal anesthesia, including anal fistulectomy, hemorrhoidectomy, and transanal stapled hemorrhoidopexy. Once anesthesia was successfully induced, the patient was placed in the left lateral decubitus position. A curvilinear incision was made along the intersphincteric groove at the left posterior quadrant of the anus, extending to the abscess cavity, from which a small amount of purulent discharge was drained. A probe was inserted through the external opening and advanced to the corresponding internal opening. Under probe guidance, the internal opening and partial fistula tract were excised up to 1.5 cm above the dentate line. The wound edges were trimmed, and hemostatic ligation was performed. Mixed hemorrhoids were excised, and the prolapsed mucosa was ligated. Resected tissues were sent for histopathologic analysis, which revealed chronic inflammation of the skin and subcutaneous tissue in the perianal

region. Postoperatively, the patient received topical traditional Chinese medicine, routine dressing changes, intravenous cefazolin sodium (1 g q8 h as an anti-infection agent), and symptomatic management. The topical herbal treatment included Compound Huangbai Liquid Dressing, composed primarily of *Forsythia suspensa*, *Phellodendron amurense*, *Taraxacum mongolicum*, and *Scolopendra*. This formulation has been found to possess properties that alleviate discomfort and accelerate wound healing [18]. Previous studies have confirmed its anti-inflammatory and antibacterial properties and the ability to reduce neutrophil sensitivity to inflammatory factors [19]. Procedure for topical application: After wound disinfection with povidone-iodine, a gauze strip soaked in Compound Huangbai Liquid was applied externally to the wound, followed by coverage with Vaseline gauze.

After discharge, the patient was instructed to avoid spicy food, use compound Huangbai liquid for external wound washing, apply one Puji hemorrhoid suppository every morning and evening (externally), take two Meizhline tablets twice daily, and visit the outpatient clinic for dressing change twice a week. On October 25, 2023, the patient sought medical attention due to the wound's prolonged nonhealing and persistent pain. A physical examination revealed a 1.6 cm wound at the riding position, precisely at 12 o'clock, with surface redness, swelling, and bleeding fluid discharge. The patient experienced pain, with a score of 2 on the visual analog scale (VAS) [20]. **Figure 1** presents the VAS scoring criteria. Given the limited efficacy of conventional wound care (cleaning, disinfection, and regular dressing changes), PRP therapy was recommended as an alternative. The patient signed an informed consent form, and the treatment protocol was approved by the



Figure 2. Preparation of PRP gel. A PRP gel was successfully obtained by mixing PRP and activator at a 10:1 ratio.



Figure 4. Securing the PRP gel with medical tape. After applying the PRP gel, sterile gauze was placed over the wound and secured with medical tape to hold the gel in place and protect the area.



Figure 3. Application of PRP gel to the wound area. The wound and anal regions of the patient were thoroughly disinfected with 0.5% iodophor solution in the anorectal treatment room, followed by applying PRP gel onto the wound area.

hospital's ethics committee (approval number: QDFY WZLL 29312).

PRP treatment

On October 25, 2023, 200 mL of whole blood was collected from the patient and transferred to a sterile triple-bag blood collection system. Subsequently, platelet plasma was separated

into a second bag using a large-capacity refrigerated centrifuge (CFL6R, Hunan Xiangli Scientific Instrument Co., Ltd.) operated at 382 g for 12 min at 22°C. Subsequently, platelets were centrifuged at 2,602 g for 15 min at 22°C to facilitate sedimentation and flocculation. The resulting upper platelet-poor plasma was transferred to a third bag, which was then used to adjust the volume of the final PRP product to approximately 30 mL. The final PRP product was depolymerized for 2 h at 22°C. The final PRP product exhibited a platelet count of $686 \times 10^9/L$ (Shenzhen Mindray hematocrit, BC-2600), representing an approximately 3.7-fold increase over the baseline concentration. The PRP activator was prepared using 500 units of freeze-dried thrombin powder (Changchun Leiyunshang Pharmaceutical Co., Ltd.; lot number: 025211003) and 7 mL of 10% calcium chloride (Hebei Tiancheng Pharmaceutical Co., Ltd.; lot number: 321072931) on sterile Vaseline gauze. Finally, a PRP gel was obtained by mixing PRP and activator in a 10:1 ratio. The PRP gel produced is illustrated in **Figure 2**. The wound and anal areas of the patient were disinfected using a 0.5% iodophor solution in the anorectal treatment room. Subsequently, the PRP gel was applied to the wound area, covered with sterile gauze (**Figure 3**), and secured in place using medical tape (**Figure 4**). On October 27, 2023, the patient underwent a sec-

Table 1. The VAS score for patients' pain

Date	VAS score (1-10)
October 25, 2023	3
October 27, 2023	1
November 1, 2023	0
November 8, 2023	0
April 28, 2025	0



Figure 5. The patient presented with a wound measuring approximately 1.6 cm on October 25, 2023.



Figure 6. The patient presented with a wound measuring approximately 1.5 cm on October 27, 2023.

and PRP treatment. Although the treatment resulted in minimal improvement in wound healing, the patient reported a reduction in



Figure 7. The patient presented with a wound measuring approximately 0.5 cm on November 1, 2023.



Figure 8. The wound was completely healed on November 8, 2023.

swelling and pain. The third PRP treatment was administered on November 1, 2023. Notably, a significant reduction in wound size was observed on examination, and the patient reported no pain or swelling. Re-examination on November 8, 2023, revealed complete wound healing, without any apparent exposed areas, and no pain or swelling reported by the patient. Furthermore, during a telephonic interview on April 29, 2024, and April 28, 2025, the patient reported no pain or recurrence of the wound after it had healed. **Table 1** presents the pain experienced by the patient during treatment, while **Figures 5-8** illustrate the wound-healing process.

Table 2. Summary and comparison of similar studies

Study (Year)	Case Type	Cases	Nonhealing Duration	PRP Preparation	Sessions	Follow-up	Outcomes	Reference
Current (2024)	Refractory hemorrhoid wound	1	> 70 days	Double centrifugation (382 g/12 min + 2602 g/15 min)	3	17 months	Healing in 14 days, no recurrence	/
Liang et al. (2023)	Pseudohealing abscess	1	> 90 days	Double centrifugation (Unspecified)	5	Not specified	Healing in 15 days	[27]
Goulas et al. (2025)	Complex fistula (Crohn's included)	4	Intraoperative	Double centrifugation (270 g/7 min + 1000 g/5 min)	1	24 months	2 complete closures, 2 symptomatic improvements	[28]
Amor et al. (2019)	Recurrent complex fistula	1	Intraoperative	Double centrifugation (Unspecified)	1	24 months	Complete healing	[29]

Discussion

This case demonstrates the efficacy of PRP in treating refractory post-hemorrhoidectomy wounds, offering a promising approach for managing delayed healing complications. The accelerated healing timeline (complete closure within 14 days) highlights its potential to reduce patient morbidity and the healthcare costs associated with prolonged wound management.

Wound healing is a complex, multi-phase process involving inflammation, proliferation, angiogenesis, tissue remodeling, and scar formation [21, 22]. After hemorrhoid surgery, wounds are susceptible to mechanical stress during defecation and infection due to their anatomic location, which ultimately affects healing. In this case, PRP treatment was applied because the wound did not completely heal approximately 70 days after the surgery, despite the debridement procedure and regular dressing changes, and symptoms such as increased pain and swelling of the wound site appeared. We prepared PRP with a high platelet concentration using the patient's blood. Upon activation, these platelets release various bioactive factors, including platelet-derived growth factor, vascular endothelial growth factor (VEGF), fibroblast growth factor, transforming growth factor- β 1, epidermal growth factor, insulin-like growth factor, connective tissue growth factor, hepatocyte growth factor, osteocalcin, fibrinogen, vitronectin, and fibronectin [12, 23]. These growth factors contribute to wound healing by promoting cellular proliferation, migration, angiogenesis, and the remodeling of the extracellular matrix. In a prospective, randomized controlled trial, Driver et al. compared the efficacy of PRP gel to saline gel in treating refrac-

tory diabetic foot ulcers. Under a rigorous follow-up protocol, 16 cases treated with PRP gel and 19 cases treated with saline gel dressings were included. The results demonstrated that 81.3% of the wounds healed in the PRP gel group compared to 42.1% in the saline gel group. Notably, the PRP gel exhibited no adverse effects, confirming its ability to promote healing [24]. White blood cells and antibacterial proteins in PRP help defend against pathogen invasion [15, 16]. *In vitro* studies have reported the antibacterial effect of PRP against *Klebsiella* and *Staphylococcus aureus* [14]. Furthermore, 5-hydroxytryptamine (5-HT) released by platelet-dense granules following activation is crucial in pain regulation. Particularly, 5-HT affects nociceptive delivery to peripheral tissue sites through 5-HT₁, 5-HT₂, 5-HT₃, 5-HT₄, and 5-HT₇ receptors, which can reduce or increase the degree of pain after nociceptive stimuli [6]. In another prospective randomized controlled trial by K H et al., the effects of PRP therapy on pain, function, quality of life, and cartilage thickness were evaluated in 60 patients with knee osteoarthritis by comparing PRP injections with saline placebo injections. At 1- and 6-month post-treatment intervals, the PRP group exhibited significantly lower pain VAS scores than the control group. In the PRP group, only the pain sub-score was low in the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) in the first month after treatment. However, in the sixth month, all measures of the WOMAC score were lower than those of the placebo group ($P < 0.05$). This study highlights the positive impact of PRP on alleviating pain in patients [25].

A comparative literature review (**Table 2**) highlights the novelty of this study. Unlike Liang et al. (2023), who applied five sessions of double-

centrifuged PRP therapy for pseudohealing after perianal abscess drainage (15-day healing), or Goulas et al. (2025), who combined adipose-derived stem cells with PRP for complex anal fistulas (50% complete healing), our approach introduces a standardized PRP treatment protocol for refractory hemorrhoidectomy wounds. Using a double centrifugation method (382 g/12 min + 2602 g/15 min), we achieved a 3.7-fold platelet enrichment ($658 \times 10^{11}/L$). This protocol achieved wound healing within 14 days through three treatment sessions, which is faster than conventional therapies while maintaining low treatment costs. Notably, this study introduced a groundbreaking VAS pain scoring system, demonstrating a 50% reduction in pain by postoperative day 3. With zero recurrence observed during the 17-month follow-up, it provides a high-efficacy and cost-effective standardized solution for primary healthcare settings, filling the evidence-based medical gap in PRP applications for postoperative care of common anorectal procedures.

Yajie Wang et al. demonstrated that PRP therapy exhibits a favorable safety profile and therapeutic efficacy in managing anal fistulas [26]. Shuang Liang et al. indicated that PRP significantly enhances wound healing following perianal abscess surgery [27]. Consistent with our findings, these studies revealed that PRP facilitates perianal wound healing post-surgery by releasing abundant growth factors while exhibiting antimicrobial and analgesic properties. Collectively, these findings underscore the significant therapeutic potential of PRP in postoperative management.

As an autologous biological therapy, PRP offers three key clinical advantages in managing post-proctological refractory wounds: Accelerated tissue regeneration, enhanced microbial clearance, and significant analgesia. However, longitudinal cohort studies with ≥ 12 -month follow-ups are warranted to assess recurrence rates and long-term safety profiles. Future research should investigate PRP synergies with bioactive matrices (decellularized scaffolds) or targeted pharmacological agents (VEGF enhancers and metalloproteinase inhibitors) to address complex wound microenvironments characterized by chronic inflammation and impaired angiogenesis.

Currently, the clinical evidence supporting PRP therapy for post-hemorrhoidectomy wound healing remains limited, with only a few reported cases. The observed therapeutic outcomes may be subjected to individual variability, introducing a degree of contingency in interpreting efficacy. Notably, before PRP treatment, this patient received adjunctive topical herbal therapy. Consequently, the potential combined effects of these interventions cannot be excluded as contributors to the observed healing outcome. Further laboratory investigations and well-designed clinical trials are warranted to validate the isolated therapeutic role of PRP in promoting wound healing following hemorrhoidectomy.

Disclosure of conflict of interest

None.

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