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Case Presentation

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Concentrated Growth Factor without Scarring Repair in a Tendon Exposed Patient: A Case Report

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Abstract

Background: The repair of exposed tendon is one of the most challenging problems in the treatment of tendon injuries. In wound repair, concentrated growth factors (CGF) are one of the most effective biologic agents that can be used.

Case summary: In March 2022, a female suffered trauma to the extensor tendon longus and extensor toe brevis of the fourth and fifth phalanges of her left foot. In the treatment of tendon injuries, traditional dressing changes take a long time to heal and do not provide adequate results. Despite the effectiveness of surgical intervention, the cost is too high. The patient's general condition is healthy, and the quantity and quality of platelets are in line with the platelet parameters for the preparation of platelet concentrate. We consider outpatient treatment for concentrated growth factors (CGF). To conclude, CGF was used to efficiently and economically repair the exposed tendon on the left foot of the patient.

Conclusion: Exposed tendons can be effectively repaired with CGF treatment.

Keywords: Concentrated growth factor; Tendon repair

Introduction

There are approximately 30 million people worldwide who suffer from tendon injuries every year. In the absence of a blood supply and because the tendon has a limited capability of healing itself, the process of recovering from an injury is slower than it should be. Its structural integrity is difficult to restore. Approximately $156 billion is spent annually on the treatment of this problem, making it a clinical treatment problem **[1,2].** Platelet concentrate is a platelet concentrate extracted from whole blood by centrifugation, rich in platelets and related growth factors. As a third-generation platelet concentrate - Concentrated Growth Factor (CGF). It is easy

to prepare, and contains more growth factors than Platelet-Rich Plasma (PRP) and Plasma-Rich Fibrin (PRF), and has been widely used in the oral and maxillofacial areas **[3].** In this case, we hope to repair the exposed tendon effectively with concentrated growth factors.

Case Presentation

In March 2022, a 52-year-old female was admitted to hospital with 1-week bruising of her left foot with an abscess for 4 days. The patient developed a fever on the day of admission (maximum temperature 39°C); After the emergency department performed the left foot abscess incision and drainage, the extensor tendon longus and extensor toe brevis of the fourth and fifth phalanges of the left foot were visible, and part of the tendon was liquefied **(Figure 1A).** The wound base is rosy following seven days of anti-infection, debridement, and dressing changes, but the exposed tendons are still visible. It is common for exposed tendons to be repaired with flaps or with the aid of biological materials such as artificial dermis. However, flap transfer repair wounds often cause certain damage to the donor skin area **[4].** Artificial dermal materials are expensive and have certain requirements for wounds **[5].** Therefore, patients reject the above treatment methods.

Combined with the patient's own condition: hemoglobin 105 g/L, albumin 32 g/L, white blood cell count 5.44×109/L, ankle humeral index 1.1, all in acceptable condition. Platelet count (PLT): 281×109/L; Plateletocrit (PCT): 0.30%; Mean Platelet Volume (MPV): 10.6Fl; Platelet Distribution Width (PDW): 11.6%; All of these values correspond to the platelet parameters for the preparation of platelet concentrates **[6,7].** The patient consented to receive CGF treatment as a means of sealing the wound.

The CGF production steps are roughly as follows: in the CGF special blood collection tube (containing silica additive), 36 mL of autologous blood was collected, and the second layer of CGF gel **(Figure 1B)** was separated in a special CGF centrifuge for approximately 10 minutes without interruption.

The CGF gel was pressed into a diaphragm, placed on the outside of the tendon to expose the wound. 5 days after the tendon was opened, a patch of fresh granulation tissue was found around the tendon **(Figure 1C).** Following the second CGF treatment, it can be seen **(Figure 1D)** that the wound base has become rosy, and the exposed tendon has been totally encased in granulation tissue. A general recommendation for the patient is that after treatment with the third, fourth and fifth outpatient treatments **(Figure 1E-G),** and the patient should be discharged from the hospital. Following a number of subsequent dressing changes **(Figure 1H),** Scar-free healing is shown in **(Figure 1I).** It is worth noting that after a follow-up of 4 weeks, the patient was able to perform daily activities as normally as he did before, without experiencing any specific discomfort.

Figure 1: A) The abscess incises the wound after the flow; B) Concentrate growth factor (CGF) gel; C) 1st treatment wound; D) 2nd treatment wound; E) 3rd treatment wound; F) 4th treatment wound; G) 5th treatment wound; H) Nearly healed; I) Healing wound.

Discussion

Tendon repair is complex and is typically divided into three stages **[8,9].** During the inflammatory phase, inflammatory cells such as neutrophils, monocytes, and macrophages infiltrate, release inflammatory factors, and stimulate fibroblasts to produce type III collagen. Platelet-Derived Growth Factor (PDGF) in CGF promotes the proliferation and migration of tendon stem cells. In addition, CGF contains a certain amount of white blood cells, which can produce more collagen and form more tendon-like tissue. At the time of cell proliferation, CGF provides a large number of growth factors that help synthesize a large number of Extracellular Matrix (ECM) components. As an example, CGF contains high concentrations of Vascular Endothelial Growth Factor (VEGF), which promotes the migration, proliferation, and vascularization of endothelial cells. After remodeling and maturation, CGF can increase the content of local type I collagen in the wound. A reduction in the ratio of type I collagen to type III collagen and a reduction in scarring can also be achieved with this treatment **[10-13].** Moreover, CGF can reduce the rate of wound infection and reduce the number of dressing changes **[14].**

With the characteristics of CGF, tendon exposure can be effectively repaired in the outpatient setting. In this case, the number of hospital stays was reduced, the number of dressing changes was reduced, and the cost of treatment was reduced as well.

Conclusion

We report a case of successful tendon exposure repair using CGF in a simple, efficient and cost-effective manner, providing a potentially viable conservative treatment for acute wound repair, but more studies are needed to confirm this.

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