

## Case Report

# Forearm injury reconstruction with split-thickness skin graft: a case report

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## ABSTRACT

Nowadays, automobile accidents have become one of the leading causes of death and functional, as well as aesthetic, repercussions in the young population. These accidents often result in a significant loss of skin surface, posing a challenge for reconstructive surgeons to cover the wounds. As a result, in the last few decades, various techniques such as negative pressure therapy, partial and full-thickness skin grafts, and the use of different flaps have been implemented. This article aims to discuss the use of skin grafts for wound coverage and the differences between the two types of grafts. It will also present a case study of a 43-year-old patient who suffered trauma while driving his vehicle, resulting in an injury to his left forearm's posterior region from the level of the elbow joint to 6 cm proximal to the radiocarpal joint. The wound was covered with a partial-thickness skin graft, which showed good evolution and excellent aesthetic results.

**Keywords:** Forearm injury, Split-thickness graft, Skin graft, Reconstructive surgery

## INTRODUCTION

Automobile accidents often result in common and severe injuries that require more than simple techniques to repair. Therefore, reconstructive surgeons' resort to employing more complex closure techniques, such as skin grafts and various types of skin flaps. In this discussion, we will focus on skin grafts. The most ideal substitute for missing skin remains the skin itself. Despite ongoing research, no permanent artificial cover has yet fully replicated the physical and physiological functions of human skin.<sup>1</sup> Skin grafting has a long history, dating back to the third century after Christ, with the initial use of full-thickness grafts and gradual evolution to employing split-thickness grafts, even in combination with suction technology instruments. This article will explore the advantages and disadvantages of different types of autografts in detail.

## CASE REPORT

A 43-year-old male with a history of type 1 diabetes mellitus, treated with glargine insulin, suffered trauma three hours before his admission to the hospital. He was driving his vehicle when he sustained a direct injury to his left forearm, resulting in an exposed bone, on first contact he was treated by paramedics who were covered with bandages. The bandages had hematic staining and the patient reported intense pain and an inability to move his elbow joint. Upon removing the bandage, a substantial loss of skin was observed on the lateral aspect of the forearm, along with muscle laceration and active bleeding (Figure 1). However, wrist extension movements were preserved. X-ray trauma series revealed no relevant information except for a loss of bone continuity at the distal third of the diaphysis of the left radius. As a result, he was referred to both the orthopedic

and plastic and reconstructive surgery departments. The orthopedic surgery department performed an osteosynthesis of the left distal radius. Simultaneously, the reconstructive surgery department conducted a tendon exploration, wound washing, and debridement. A partial thickness skin graft was placed, anchored with 5-0 nylon single sutures, with the donor area being the skin from the anterior aspect of the right thigh. After the surgery, the wound was covered with oily gauze. When uncovered five days later, 80% of the graft had integrated successfully (Figure 2). The process was repeated twice more, and on the 15<sup>th</sup> day of hospitalization, most of the sutures were removed, showing significant clinical improvement.



**Figure 1: Image showing forearm lesion with muscle exposure, evidencing almost complete cutaneous loss on the anterior aspect. Of special attention is bone exposure on the antecubital fossa.**



**Figure 2: Skin split-thickness graft showing an 80% of integration.**

## DISCUSSION

The reconstructive ladder is a well-known principle in reconstructive surgery that ranks various treatment strategies for skin defects in increasing order of

complexity. The goal is to choose the option that offers the best result with the simplest procedure. Examples of these options include secondary intention closure, vacuum-assisted closure, primary closure, skin grafts, and flaps.<sup>2</sup> Skin grafts find application in diverse clinical situations such as traumatic injuries, post-resection defects, burn reconstruction, scar release, and vitiligo, among others.<sup>3</sup> The outermost layer of the skin is known as the epidermis. Lesions limited to the epidermis regenerate through the regeneration of epidermal cells and peripheral structures.<sup>4</sup> There are two types of skin grafts based on the extent of the dermis; they include split-thickness skin grafts and full-thickness skin grafts.<sup>3</sup> Both types require a vascularized bed. While full-thickness skin grafts offer better cosmetic results and less shrinkage, they have limitations in terms of usable surface area.<sup>4</sup> Among autologous split-thickness skin grafts, various forms are used in plastic surgery, including mesh skin grafts, stamp skin grafts, and chip skin grafts based on their shape.<sup>3</sup> The indication for the use of split-thickness grafts is the inability to close the wound primarily; while if there's an active infection, cancer, or lack of direct coverage over tendons, vessels, bones, or nerves they should not be used.<sup>5</sup> They can be of different thicknesses depending on the level at which they are obtained through the dermis, typically varying between 0.15 to 0.30 mm thick.<sup>2,4</sup> Using split-thickness skin grafts has advantages such as a larger donor surface, as they can be taken from any part of the body, and a higher rate of engraftment due to their lower metabolic rate compared to full-thickness grafts.<sup>3</sup> However, the donor site may show discoloration and scarring. Therefore, whenever possible, donor sites should be concealed by clothing, making thighs, buttocks, and trunk preferred donor sites.<sup>4</sup> Before dressing is applied, it is essential to inspect the graft for any hematoma formation.<sup>3</sup> Postoperative care includes covering the lesions with oily gauze, and immobilizing the recipient site, especially joints, for the first 5-10 days to minimize movement.<sup>4</sup> The success of the graft also depends on other factors; for instance, comorbidities such as diabetes can increase the risk of complications.<sup>2</sup> Grafts should be closely monitored due to the predisposition they have to infections; specific bacteria at the site can produce proteolytic enzymes that may result in failure, but full-thickness grafts have more susceptibility than split-thickness grafts.<sup>6</sup>

## CONCLUSION

Despite full-thickness grafts remaining a form of reconstruction that provides an acceptable aesthetic result as well as being less disposed to contractures or scarring, split-thickness grafts are still a prime reconstructive surgery. They are prime for reconstruction and can simulate the original skin almost indistinguishable, even though this is dependable on the thickness of it. Also, as they are obtained from sites that can be hidden with clothes thus, they don't become a burden regarding aesthetic appearance. Split-thickness grafts also have the

advantage of being less inclined to infections. Overall, they're an acceptable option for also having a wide disponible, they may be obtained from (almost) anywhere in the body, unlike full-thickness grafts that are very limited in this regard.

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## REFERENCES

1. Metcalfe AD, Ferguson MWJ. Tissue engineering of replacement skin: the crossroads of biomaterials, wound healing, embryonic development, stem cells and regeneration. J Royal Society Interface. 2006;4(14):413-37.
2. Khan AZ, Utheim TP, Byholt M, Fiabema T, Sylvester-Jensen HC, Tønseth KA et al. Skin grafting. Tidsskrift for Den norske legeforening. 2022;30.
3. Shimizu R, Kishi K. Skin graft. Plastic Surg Int. 2012;2012:1-5.
4. Orgill D, Blanco C. Biomaterials for treating skin loss. Woodhead Publishing Limited. 2009.
5. Taylor BC, Triplet JJ, Wells M. Split-Thickness Skin Grafting: A Primer for Orthopaedic Surgeons. J Am Acad Orthop Surg. 2021;29(20):855-861.
6. Khan AA, Khan IM, Nguyen PP, Lo E, Chahadeh H, Cerniglia M et al. Skin Graft Techniques. Clin Podiatr Med Surg. 2020;37:821-35.

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