

External Expander for Revision of a Leg Scar: A Case Report

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Summary: The main purpose of an extremity wound reconstruction is to provide long-lasting soft tissue coverage while minimizing consequences. Complex wounds sometimes necessitate skin grafting or flap reconstruction, which can be worsened by functional and aesthetic complications. Tissue expansion evolved as an ideal solution to a variety of reconstructive challenges. This technique prevents the possible complications frequently associated with tissue transfer reconstructions and offers a reconstructive option that does not require extensive surgical complexity. Unlike internal tissue expansion, which has been linked to a high rate of reconstructive problems, particularly when applied in the extremities, external tissue expansion is a simple procedure that generates durable skin for wound closure at low costs. This case reported a 35-year-old woman who presented with a partial skin loss from a scar on her left leg. Scar revision was performed using an external tissue expansion approach, which yielded good results in a short length of time. (*Plast Reconstr Surg Glob Open* 2025;13:e6690; doi: [10.1097/GOX.0000000000006690](https://doi.org/10.1097/GOX.0000000000006690); Published online 10 April 2025.)

INTRODUCTION

There are numerous surgical reconstructive procedures available for patients with posttraumatic soft tissue deformities to restore function and cosmetic structure.¹ Despite the fact that direct wound closure procedures, skin grafts, and skin flap procedures have been considered the gold standard for defect repair, these reconstructive modalities are not beneficial for extensive scar defects.² Tissue expansion is a preferable technique for large scar revision procedures. External tissue expansion has lately emerged as an attractive alternative to traditional tissue expansion methods.³ In this case, we demonstrate an efficient, quick, and cost-effective method of expanding skin after the excision of skin defects using an external tissue expander technique.

CASE PRESENTATION

We present a case of a 35-year-old woman, who is unknown to have any previous medical illnesses, who

came to our plastic surgery clinic complaining of a scar on her left leg. The patient had a car accident 2 years previously, resulting in a partial skin loss scar on the anterior aspect of her left leg, which was treated with a split-thickness skin graft. Upon examination, the patient had a hyperpigmented anterior leg scar measuring approximately 10 × 4 cm (Fig. 1).

Our approach for this case was a reconstruction in 2 stages (Fig. 2). The first stage involved measuring the scar precisely in the form of an ellipse incision, followed by a skin excision of the scar tissue tailored meticulously to avoid any healthy skin loss. Afterward, the lateral and medial aspects of the tissue were elevated to create a flap of skin, which was then approximated and fixed in place with 2 chest tube rods with a 3-0 absorbable monofilament suture made of polyester, which is called a polydioxanone (PDS) suture, and sutured to the dermis. Again, the rods were held in place externally by zip ties and internally by PDS, sized 3-0. The rods were covered by the skin at some parts and emerged in between and at both ends of the wound, the proximal and distal end. Those rods were wrapped externally with Vaseline gauze to prevent skin compression, which could lead to pressure necrosis.

The patient was hospitalized for observation of any symptoms of compartment syndrome and assessed every 1 hour for the first day and every 2 hours for the subsequent 2 days. Our patient was discharged on the second postoperative day. She followed up in our outpatient department, and the rods were kept approximated by tightening the zip for 2 visits. During her 2 visits, the zip ties were approximated 2–3 clicks of the zip tie per visit.

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Fig. 1. A hyperpigmented scar on the anterior side of the left leg.

She underwent the second stage of the reconstruction 2 weeks after the initial procedure (Fig. 3). The second stage of reconstruction included debridement of the nonviable skin edges, removal of the rods, and closure of the skin in subcuticular fashion, using PDS, size 3-0. After that, the patient was discharged home on the same day she had the surgery and seen in the clinic on day 7 after the second procedure (Fig. 4). Although there was a small dehiscence in the middle of the scar, it was managed conservatively with daily dressings with simple

Takeaways

Question: Is there an advantage to using external expansion through using chest tube rods compared with the traditional scar revision technique, ie, serial excision?

Findings: We demonstrate an efficient, quick, and cost-effective method of expanding skin after the excision of skin defects using an external tissue expander technique.

Meaning: We provide a simple approach for external tissue expansion that is inexpensive, easy to apply, widely available, and produces an excellent cosmetic effect with high patient satisfaction.

gauze and crepe bandage, which led to complete healing of the wound. Eventually, the patient was extremely satisfied with the outcome.

DISCUSSION

Scar revision and reconstruction have been a particularly difficult challenge in the field of plastic surgery. Although small tissue defects are often repaired by direct closure procedures, larger scars require more advanced techniques for reconstruction to prevent excessive tension on the affected area.¹ The closure of large tissue defects can be achieved by a variety of reconstructive ladder techniques, starting with basic methods such as secondary intention and progressing to a technically challenging free vascularized tissue transfer. Broadly, skin grafts and flaps are common reconstructive procedures; however, they are associated with many complications. In comparison, tissue expansion provides an opportunity to reconstruct large wounds with native and durable tissues without causing scars of minor quality and donor site morbidity.^{1,2}

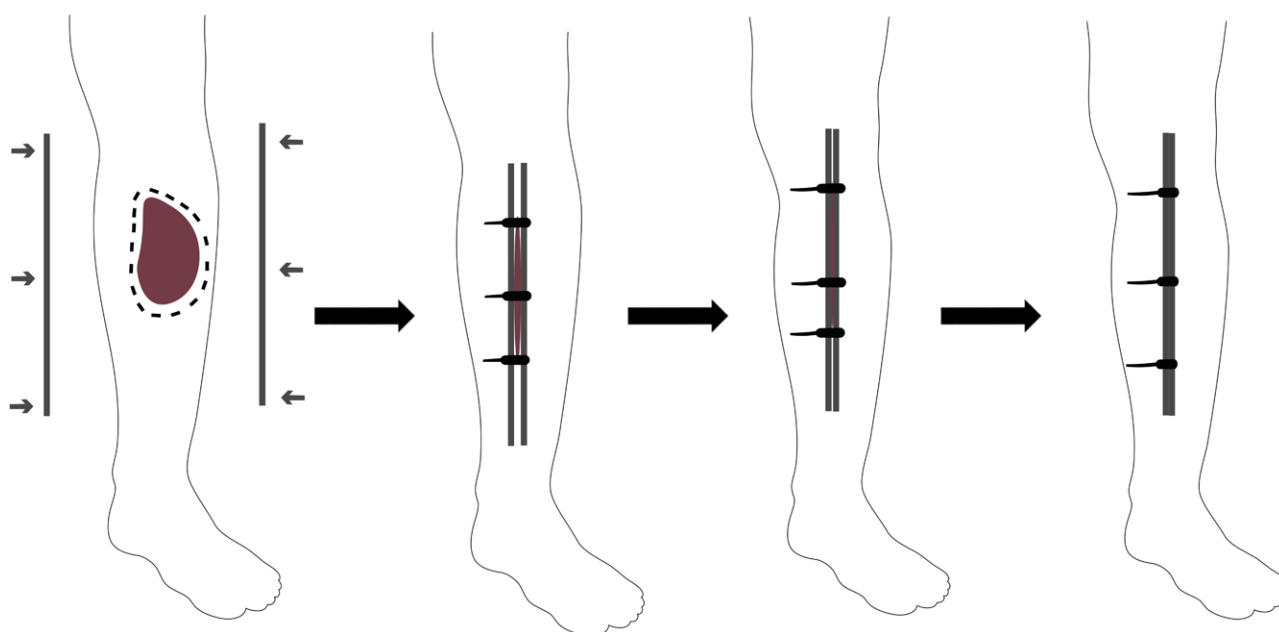


Fig. 2. Descriptive demonstration of the external expansion process.



Fig. 3. Week 2 after the first stage and after approximation in the clinic, before the second procedure.



Fig. 4. Day 7 after the second stage of the reconstruction operation.

The tissue expansion approach is based on the concept of mechanical creep, which involves extending the skin to create a greater surface area for covering adjacent soft tissues.^{1,3} Tissue expansion can be classified as internal or external. Internal tissue expansion involves implanting a device subcutaneously, gradually filled with saline; tension placed on the overlying and adjacent tissues increases as the volume inside the implant increases. This type of tissue expansion is associated with significant

rates of complications, particularly when applied over the extremities.³ External tissue expansion, on the other hand, is created by attaching a device or apparatus to the wound edge to promote tissue proliferation and skin stretching.

It has been reported that external tissue expansion has numerous advantages, including being a simple and cost-effective procedure.^{4,5} As in our study, the external expander device was created using readily available and inexpensive chest tube rods. The total treatment time with external tissue expansion usually does not exceed 2 weeks. Therefore, it takes a short time to achieve results with no prolonged stay in the hospital.³⁻⁶ Although it is not the best status for using the external expander, it is occasionally used for mildly infected wounds.⁷

The use of tissue expanders in the distal parts of the extremities is controversial due to the potential for complications. One of the most serious complications is compartment syndrome, a condition that arises when the pressure within a limb compartment increases. This may occur due to the narrowing of the wound edges during the external expansion approach.⁸ The first alarming sign of compartment syndrome is pain. Thus, serial pain assessments at multiple time intervals during the surgical procedure and postoperatively for 48 hours are essential.⁹ Furthermore, wound dehiscence is a potential drawback of using tissue expansion in scar revision; it can occur but can be managed by secondary intention.¹

Overall, the external tissue expansion approach is a safe way to manage soft tissue abnormalities, saving time and money for both hospitals and patients. Although the current literature highlights the benefits of external tissue expansion for scar revision, additional studies are needed

to support this technique's advantages compared with other options.

CONCLUSIONS

External tissue expansion is an effective technique for treating various significant posttraumatic scar deformities because it increases the area of normal tissues available for reconstruction while maintaining the color and texture of the defect area. We provided a simple approach for external tissue expansion that is inexpensive, easy to apply, widely available, and produces an excellent cosmetic effect with high patient satisfaction.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

Informed consent was obtained from the patient.

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