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Innovative Use of a Modified Cloth Hanger as a Cost-Effective Axillary Splint Following Release of Post-Burn Axillary Contracture

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ABSTRACT

Background: Post-burn axillary contractures significantly restrict shoulder abduction and impair activities of daily living. Surgical release followed by appropriate postoperative splinting is crucial to prevent recurrence. The conventional aeroplane splint, though effective, is costly, bulky, and often unavailable in low-resource settings.

Case Presentation: We present a case of post-burn contracture of the left axilla involving both anterior and posterior axillary folds, resulting in severe restriction of shoulder abduction. Surgical management included excision of fibrotic bands and multiple Z-plasties. To maintain postoperative abduction, an innovative, low-cost axillary splint was fabricated using a standard wire cloth hanger.

Results: The improvised hanger axilla splint effectively maintained shoulder abduction, was well tolerated by the patient, caused no pressure-related complications, and provided results comparable to a conventional aeroplane splint at negligible cost.

Conclusion: The modified cloth hanger axilla splint is a simple, economical, and reproducible alternative to the aeroplane splint, particularly suitable for resource-limited settings.

Introduction

Burn scar contractures remain a major cause of long-term disability, particularly in developing countries. Among them, **axillary contractures** are especially debilitating due to their impact on shoulder mobility, hygiene, dressing, and occupational activities.

The axilla is anatomically complex, and contractures often involve:

- Anterior axillary fold
- Posterior axillary fold
- Central axillary dome

Surgical correction typically involves **contracture release with Z-plasty, skin grafting, or flap reconstruction**, followed by strict immobilization of the shoulder in abduction. Failure to maintain abduction postoperatively leads to recurrence, graft loss, and poor functional outcomes.

The **aeroplane splint** is the standard postoperative splint but has several drawbacks:

- High cost
- Limited availability
- Bulky and uncomfortable
- Requires specialized fabrication

This report describes a **novel, low-cost axillary splint** fabricated from a simple wire cloth hanger, designed to function as an effective alternative to the aeroplane splint.

CASE DESCRIPTION

A **32-year-old female** presented with post-burn scar contracture of the **left axilla** with involvement of both anterior and posterior axillary folds following flame burns sustained two years earlier. The patient complained of:

- Inability to abduct the left shoulder
- Difficulty performing overhead activities
- Functional and cosmetic discomfort

Clinical Examination

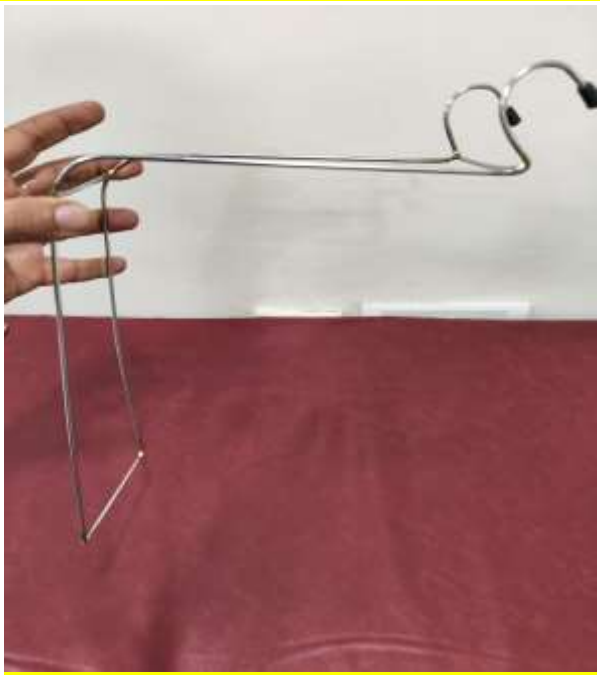
- Dense fibrotic bands involving both anterior and posterior axillary folds
- Shoulder abduction restricted to approximately **20°**
- No neurovascular deficit

SURGICAL TECHNIQUE

Under appropriate anesthesia, the following steps were performed:

1. **Release of Contracture**
   - Fibrotic scar bands were identified and excised.
   - Multiple **Z-plasties** were performed along the direction of maximal tension.
   - Transposition of the Z-plasty flaps resulted in lengthening of the contracted scar.
2. **Assessment of Release**
   - Complete passive abduction of the shoulder was achieved intraoperatively.
   - Adequate axillary depth and contour were restored.
3. **Wound Coverage**
   - **Primary skin closure was achieved entirely using Z-plasty techniques**, with no requirement for skin grafts or flap reconstruction.
   - Hemostasis was secured.

Fabrication of the Hanger Axilla Splint



Materials Used

- Standard metal wire cloth hanger
- Cotton padding
- Soft cloth or gauze
- Adhesive tape / bandage

Method of Fabrication

- The cloth hanger was reshaped manually to resemble an **aeroplane splint configuration**.
- The central curved portion was positioned at the axilla.
- The horizontal arm supported the upper limb in **90°–110° abduction**.
- All wire surfaces were adequately padded to prevent pressure injury.
- The splint was secured to the torso and arm using bandages.

Application

- Applied immediately postoperatively.
- Shoulder maintained in abduction continuously.
- Regular monitoring for pressure sores and comfort.

Postoperative Management

- Splint maintained for the initial healing period.
- The splint was periodically removed for wound inspection and hygiene.
- Early supervised physiotherapy initiated after adequate wound healing.
- Gradual mobilization while continuing night splinting.
- Patient education regarding compliance and positioning.

Results

- The splint effectively maintained shoulder abduction.
- No complications such as skin necrosis, pressure sores, wound dehiscene or neurovascular compromise were observed.
- Wound healing was satisfactory with well-settled Z-plasty scars.
- At follow-up, the patient achieved functional shoulder abduction with no early recurrence of contracture.
- The cost of the splint was negligible compared to a conventional aeroplane splint.

Discussion

The prevention of recurrence following axillary contracture release is highly dependent on **postoperative splinting**. While the aeroplane splint remains the gold standard, its limitations in low-resource settings necessitate alternative solutions.

Advantages of the Hanger Axilla Splint

- Extremely **low cost**
- Easily available materials
- Simple & Rapid fabrication
- Lightweight and comfortable
- Effective immobilization

Limitations

- Requires careful padding to avoid pressure injury
- May need customization for different body types
- Not suitable for very long-term immobilization without modification

This innovation reflects the importance of **context-appropriate surgical solutions** and highlights how simple improvisation can bridge gaps in healthcare delivery.

Ethical Considerations

- Informed consent was obtained from the patient.
- No identifying patient information is disclosed.
- The procedure adhered to institutional ethical standards.

Conclusion

The modified cloth hanger axilla splint is a **safe, effective, and economical alternative** to the aeroplane splint for postoperative management of axillary burn contractures. It is especially valuable in resource-constrained settings and can significantly improve functional outcomes when conventional splints are unavailable.

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