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CASE REPORT

Non-invasive Stainless Steel Hook Anchor Dynamic Traction Technique for Reduction of Interphalangeal Joint Injuries: A Low-Cost Innovative Method

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ABSTRACT

Interphalangeal joint injuries remain challenging because of the small articular surface and the high propensity for post-immobilization stiffness. Conventional dynamic traction systems commonly utilise transosseous Kirschner wire fixation, which increases procedural complexity, soft tissue trauma, and implant-related complications. We describe a novel non-invasive dynamic traction technique utilizing stainless steel hook anchors externally mounted over adhesive bandages using silk sutures reinforced with cyanoacrylate adhesive. The construct serves as an external traction anchor system for elastic rubber band-mediated distraction across the PIP joint. Reduction is achieved through ligamentotaxis without the need for skeletal fixation. The technique is inexpensive, reproducible, minimally invasive, and particularly suitable for low-resource settings.

KEYWORDS

• Traction • Interphalangeal Joint • Low-Cost • Innovative • Method

INTRODUCTION

Interphalangeal joint injuries remain challenging because of the small articular surface and the high propensity for post-immobilization stiffness. Conventional dynamic traction systems commonly utilise transosseous Kirschner wire fixation, which increases procedural complexity, soft tissue

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trauma, and implant-related complications. We describe a novel non-invasive dynamic traction technique utilizing stainless steel hook anchors externally mounted over adhesive bandages using silk sutures reinforced with cyanoacrylate adhesive. The construct serves as an external traction anchor system for elastic rubber band-mediated distraction across the PIP joint. Reduction is achieved through ligamentotaxis without the need for skeletal fixation. The technique is inexpensive, reproducible, minimally invasive, and particularly suitable for low-resource settings.

Dynamic traction systems have significantly improved management of interphalangeal joint fracture-dislocations by permitting maintenance of reduction while allowing early mobilization. Conventional techniques such as the Suzuki frame require transosseous Kirschner wire placement, which may be associated with pin tract infection, wire loosening, soft tissue trauma, and technical complexity. The present technical innovation introduces a completely non-invasive dynamic traction construct utilizing externally mounted stainless steel hook anchors secured over adhesive bandages.[1]

METHODOLOGY

This study was conducted in the department of Plastic Surgery in a tertiary hospital in India after approval from department's scientific & ethical approval.

Figure 1: Subluxation of 2nd proximal interphalangeal joint

This study was conducted on a 14 year old male patient, a case of post high voltage electrical burn non healing wound of left index finger with subluxation of 2nd proximal interphalangeal joint (figure 1& 2).

Figure 2: Post high voltage electrical burn non healing wound of left index finger

Patient's wound was managed with standard method wound management. To manage subluxation sterile adhesive bandages were reinforced using stainless steel hook anchors secured with silk sutures and cyanoacrylate adhesive. The reinforced adhesive construct was applied over approximately three-fourths of the finger circumference proximal and distal to the injured PIP joint to prevent distal edema and venous congestion. The externally projecting hook anchors functioned as attachment points for elastic rubber band traction. Controlled dynamic distraction generated across the PIP joint maintained reduction through the principle of ligamentotaxis while permitting early mobilization (figure 3). For traction a U-shaped traction device was made using a malleable 2mm k-wire which was fixed to plaster of paris on dorsal slab over the left index finger (figure 4).

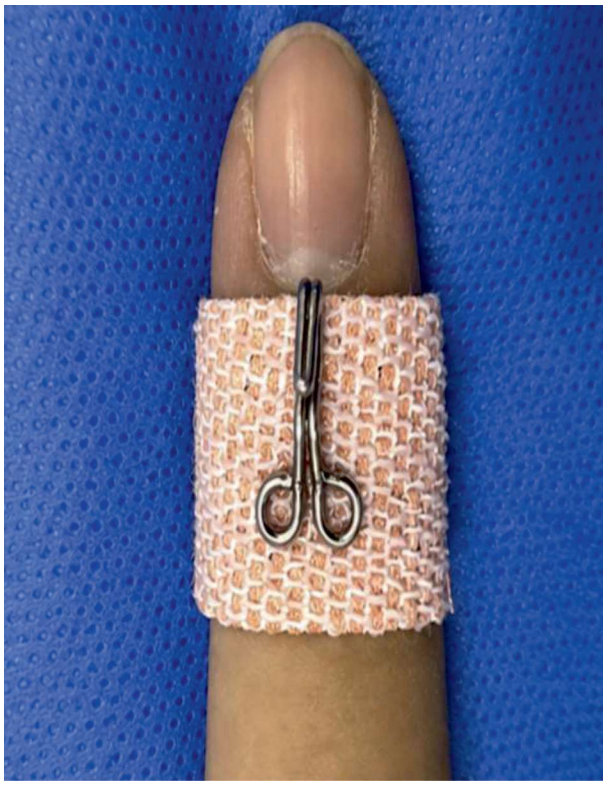

Figure 3: Application of hook-on adhesive tape on a finger of a normal patient for demonstration of hook fixation

Figure 4: Showing a U-shaped traction device made using a malleable 2mm K-wire, which was fixed to plaster of Paris on the dorsal slab over the left index finger

RESULTS

Reduction of the subluxated PIP joint was achieved following application of this traction device (figure 5).

Figure 5: X-Ray of the left 2nd digit showing reduction of previously subluxated proximal interphalangeal joint with hook and K-wire in place.

DISCUSSION

Biomechanical Principle

Elastic traction generated by rubber bands creates controlled distraction across the PIP joint. This facilitates reduction and stabilization through ligamentotaxis while minimizing stiffness associated with rigid immobilization.[2]

Advantages

- Completely non-invasive external traction system
- Avoids transosseous skeletal fixation
- Economical and easily reproducible
- Reduced soft tissue trauma
- Useful in low-resource healthcare settings
- Allows controlled dynamic mobilization

Dynamic traction remains an established method for management of unstable interphalangeal joint injuries. Existing systems primarily rely on skeletal fixation methods for maintaining traction. The present technique introduces a simplified non-invasive alternative utilizing externally mounted stainless steel hook anchors. Elimination of transosseous fixation may reduce implant-

related complications and improve patient comfort. Furthermore, the simplicity and affordability of the construct may enhance applicability in peripheral healthcare centers and resource-constrained environments. Further prospective clinical evaluation is necessary to establish long-term functional outcomes and biomechanical stability.[3,4]

CONCLUSION

The non-invasive stainless steel hook anchor dynamic traction technique represents a simple, economical, and reproducible method for PIP joint traction and reduction for subluxation of joint. By utilizing externally mounted adhesive traction anchors, the construct avoids skeletal fixation while maintaining reduction through ligamentotaxis. The technique may serve as a useful alternative for selected IP joint injuries, particularly in low-resource settings.

Disclosures: None

Conflict of Interests: None

REFERENCES

1. Suzuki Y, Matsunaga T, Sato S, Yokoi T. The pins and rubber traction system for treatment of comminuted intra-articular fractures and fracture-dislocations in the proximal interphalangeal joint. J Hand Surg Am. 1994;19(1):98-107.
2. Hynes MC, Giddins GE. Dynamic external fixation for pilon fractures of the interphalangeal joints. J Hand Surg Br. 2001;26(2):122-124.
3. Ruland RT, Hogan CJ, Cannon DL, Slade JF. Use of dynamic distraction external fixation for unstable fracture-dislocations of the proximal interphalangeal joint. J Hand Surg Am. 2008;33(1):19-25.
4. Bain GI, Mehta JA, Heptinstall RJ, Bria M. Dynamic external fixation for injuries of the proximal interphalangeal joint. Tech Hand Up Extrem Surg. 1998;2(4):199-203.