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CASE REPORT

A solution for EPL ruptures in pediatric forearm fractures fixed with intramedullary devices: a case series on EIP to EPL transfer

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ABSTRACT

Delayed rupture of the extensor pollicis longus (EPL) tendon is a rare complication following pediatric forearm fractures, particularly after intramedullary fixation. We present a series of three cases managed with extensor indicis proprius (EIP) to EPL tendon transfer, highlighting surgical outcomes. All three patients, aged between 10 and 13 years, presented with inability to extend the thumb between four to eight months after fixation of both bone forearm fractures with intramedullary devices. EPL rupture was diagnosed clinically and confirmed by ultrasonography. Surgical management involved removal of intramedullary devices and EIP to EPL tendon transfer using the Pulvertaft weave technique in a single setting. Postoperative recovery was uneventful in all patients, with restoration of thumb extension and return to normal activities. This case series underscores the importance of maintaining a high index of suspicion for EPL rupture in children with loss of thumb extension following pediatric forearm fixation with an intramedullary device and the efficacy of timely tendon transfer in restoring function.

INTRODUCTION

Extensor pollicis longus (EPL) tendon rupture is a recognized but uncommon complication following distal radius fractures, especially in adults.[1] However, EPL rupture in pediatric patients is rare and less documented. It commonly results from ischemic attrition or mechanical damage caused by orthopedic implants such as Titanium Elastic Nailing System (TENS) or Rush Pins for intramedullary fixation of forearm fractures. [2]

This case series presents three paediatric patients with delayed EPL rupture after fixation of midshaft or distal radius fractures using intramedullary devices. All were successfully treated with extensor indicis proprius (EIP) to EPL tendon transfer, a reliable reconstructive technique that yields excellent functional results.[3,4]

CASE PRESENTATIONS

Three children aged 10 (male), 12 (male) and 13 (female) years presented with painless loss of active thumb extension several months post-fixation of both bone forearm fractures with intramedullary devices. Two patients had Rush Pin fixation and one was treated with TENS. None had systemic illness or prior tendon pathology.

Clinical examination revealed inability to extend the interphalangeal joint of the thumb actively, with preserved passive range of motion and intact neurovascular status. Ultrasonography confirmed complete EPL tendon rupture. Intraoperatively, EPL discontinuity was identified, presumed secondary to mechanical attrition from dorsal implant placement near Lister's tubercle: a well-known anatomical risk area for EPL injury. [2]

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Surgical Technique and Postoperative Care

All patients underwent implant removal followed by EIP to EPL transfer in the single setting under brachial plexus block and sedation. Primary end-to-end EPL repair was not possible because the tendon ends were found to be severely retracted with unhealthy fibrotic stumps. Through a dorsal approach, the EIP tendon was harvested and transferred to the distal EPL stump using the Pulvertaft weave technique with three passes to ensure strong attachment.[4,5] Postoperatively, the limb was immobilized in a dorsal slab for four weeks with suture removal at two weeks. Rehabilitation started afterward, focusing on gradual thumb mobilization.

At 10 to 12 weeks follow-up, all patients regained full active thumb extension with near-normal strength with power > 4 according to the Medical Research Council (MRC) grading.[6] They returned to normal daily activities without donor site morbidity, preserving index finger function.

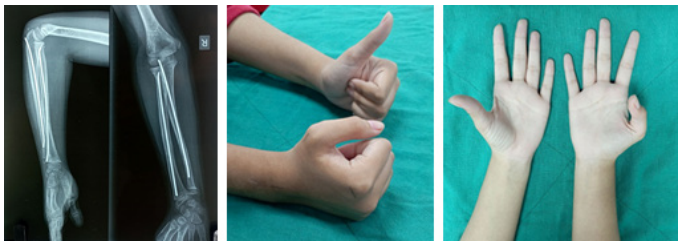

Figure 1: 13/F, fixation of both bone fractures done with TENS. She could not extend her interphalangeal joint of right thumb after 6 months of fracture fixation

Figure 2: Implant removal followed by EIP to EPL transfer was done in the single setting

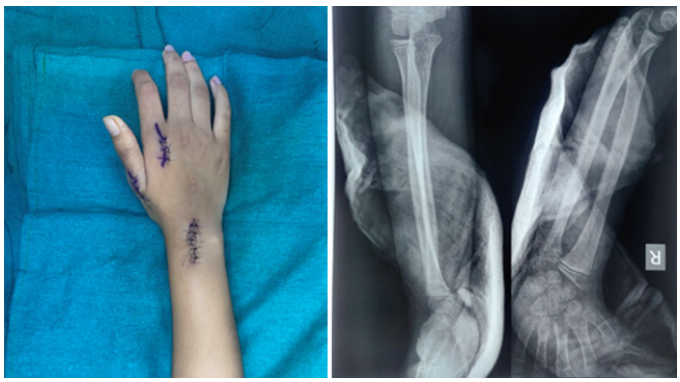

Figure 3: Final closure and post operative Xray after implant removal

Figure 4: Full active extension of interphalangeal joint of right thumb: 10 weeks post tendon transfer

DISCUSSION

Delayed EPL rupture following pediatric forearm fracture fixation is a rare but disabling complication. The EPL tendon's anatomical course around Lister's tubercle predisposes it to injury from dorsally placed implants, particularly intramedullary devices such as Rush Pins or TENS.[1,3]

Early diagnosis can be challenging due to the insidious onset and absence of acute inflammatory signs, necessitating a high index of suspicion when patients present with painless loss of thumb extension months after fixation.[1,2]

EIP to EPL tendon transfer is the gold standard for restoring thumb extension in cases where direct tendon repair is impossible.[5] The EIP tendon is an excellent donor due to its anatomical proximity, similar excursion, and minimal donor site morbidity.[8] Multiple studies support the effectiveness of this transfer in pediatric and adult populations, demonstrating restored thumb function, minimal complications and good patient satisfaction.[2,4,7,8] Alternative methods like tendon grafts or other tendon transfers carry higher complexity and variable outcomes.[9] The Pulvertaft weave technique provides secure tendon coaptation, allowing

early mobilization and excellent functional recovery.[10]

Orthopedic surgeons must maintain vigilance for this complication by educating patients and caregivers about warning signs post-implant fixation. Ultrasonography or MRI can aid early diagnosis.[2] Prophylactically, avoiding dorsal implant placement near Lister's tubercle and timely implant removal once fracture healing occurs are recommended strategies to prevent EPL rupture.[7]

CONCLUSION

EPL rupture after pediatric forearm fracture fixation with intramedullary devices is rare but functionally disabling. EIP to EPL transfer effectively restores thumb extension with minimal morbidity. Early diagnosis and careful implant placement are essential to prevent this complication.

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CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

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