Palmaris Longus Tendon Free Grafting in Neglected Extensor Pollicis Longus Tendon Rupture – case report

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ABSTRACT

A patient presented with inability to use his right thumb properly after work accident due to ruptured right Extensor Pollicis Longus (EPL). A tendon free grafting from the Palmaris Longus (PL) was performed to repair the ruptured EPL.

Keywords: Neglected tendon rupture, palmaris longus tendon-free grafting

ABSTRAK

Pasien datang dengan keluhan tidak mampu menggunakan ibu jari tangan kanan setelah kecelakaan kerja, dicurigai mengalami ruptur *Extensor Pollicis Longus* (EPL) kanan. Tindakan *free tendon graft* dari *palmaris longus* (PL) dilakukan untuk memperbaiki tendon EPL yang telah ruptur. **Nino Nasution, Muhammad Bayu Rizaldy. Palmaris Longus Tendon *Free Grafting* untuk Ruptur Tendon Extensor Pollicis Longus *'Neglected'* – laporan kasus**

Kata kunci: Free graft tendon palmaris longus, neglected tendon rupture

INTRODUCTION

Extensor hand tendon injuries are common, because of their superficial location and lack of overlying subcutaneous tissue on the dorsum site of the hand, and likely to form adhesions to the bone. The extensor tendons are thin, broad, and flat in structure.

Etiologies of injuries are lacerations, crush injury, avulsions, burn, blunt trauma, deep abrasions, associated with fractures and delayed rupture due to over friction with bony prominences (rheumatoid arthritis). Males in industrial or heavy labor are more common to have extensor injury due to accident,[1] as in this case report.

Most cases of extensor tendon injuries are lacerated wound, many patients didn't notice the ruptured tendon and only concern on the superficial wound, only to find difficulties later.[2]

Extensor tendons are divided into 6 compartments, 8 zones for fingers and 5 zones for thumb as recommended by Kleinert and Verdan.[2,3] In repairing the extensor tendons, the importance of different anatomical relationships of the extensor tendons and their attachments needs to be emphasized (**Figure 1 and 2**).

To diagnose extensor tendons injury, some points need to be determined:[2]

- Mechanism of injury
- Exact position of the cut
- Assesment of active and passive movements of the digits
- Radiographs if there is suspicion of fractures
- Surgical exploration of the wound

Not all extensor tendon injuries require surgery, close ruptures and partial lacerations respond well to splinting, unless there are associated fractures. Open injuries and complete lacerations typically require surgical treatment. Surgery is supposed to be performed as soon as possible, but should be delayed for up 7 to 10 days until eradication of infection. Delayed treatment can make repair difficult because the tendon will retract. Surgical repairs vary depending on zones and the extensor's thickness. Chronic or neglected extensor tendon injuries can be managed with a tendon graft or tendon transfer.[1-3]

The surgeon should inform the therapist on the type and quality of the repair, alterations in tendon length, integrity of the tissue, and any additional pathologic conditions that might alter the amount of controlled stress that healing tendon can accomodate. Tendon grafting can be performed with a palmaris longus (PL) or toe extensor.[2,3]

CASE

Male, 45 years old, an industrial worker, presented with inability to move his right thumb properly. His wrist joint had been cut at work 2 months ago, the wound was sutured immediately. He was unable to perform maximally at work. There was a 4 cm scar on radial dorsal zone VII, with the thumb stiff in 80^0 Interphalangeal Joint (IP). Because of joint flexion, 50^0 of metacarpophalangeal (MCP) joint flexion, he was completely unable to extend both joints. His Disability of the Arm Shoulder and Hand (DASH) score was 18.3 (**Figure3**).

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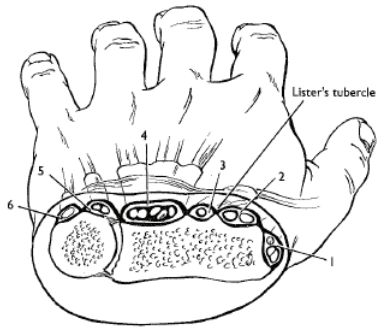

Figure 1. Anatomical relationships of the extensor tendons and their attachments

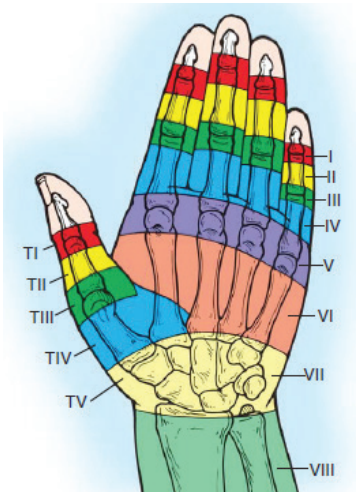

Figure 2. Compartments of extensor tendons

Figure 3a and b. Movement of thumb and fingers

An operation to explore and repair the ruptured tendon was performed, ruptured of Extensor Pollicis Longus (EPL) tendon was predicted. Under general anesthesia, forearm in prone position, a longitudinal incision was done on Lister's tubercle (**Figure 4**) and on zone T-III (**Figure 5**) to explore, identify, and preserve the proximal and distal stump of the ruptured EPL.

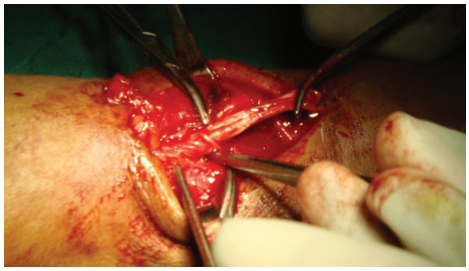

Figure 4. A longitudinal incision on Lister's tubercle

Figure 5. A longitudinal incision on zone T-III

Then the forearm was put in supine position, the PL was harvested (**Figure 6**) and then grafted it to the ruptured EPL with a *Pulvertaft side to side* technique (**Figure 7**)

Figure 6. The PL was harvested

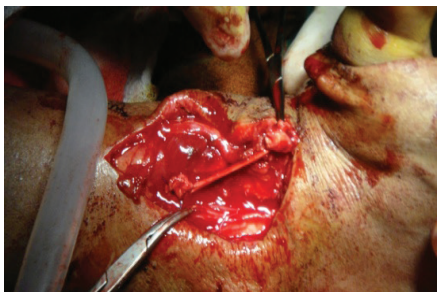

Figure 7. *Pulvertaft side to side* technique

We applied a dorsal slab with the wrist in 30^0 extension and thumb in 40^0 of radial abduction with full retroposition, with a modified Kleinert Dynamic splint so the patient was able to perform an active flexion and passive extension exercise .

Figure 8. Dorsal slab with a modified Kleinert Dynamic splint

After 1 month of rehabilitation, the splint was removed. The thumb IP joint was able to reach 0^0 extension and 60^0 flexion. The MCP joint was able to reach 10^0 extension and 50^0 flexion. The Carpometacarpal (CMC) joint was able to abduct 60^0, and wrist joint reached a 40^0 extension.[4] His DASH score was improved to 12.5.

Figure 9. Motions of joints

DISCUSSION

The proposed treatment of extensor pollicis longus tendon rupture generally falls into 3 categories; primary repair, tendon transfer, or tendon graft. Primary repair is rarely possible because of tendon substance loss or delay of treatment and subsequent muscle contracture.[1] Few literatures recommend end to end re-approximation with subcutaneous rerouting to gain length, bridging the defect with foreign material or fascia, or repair with nylon sutures leaving a gap in which scar tissue would restore continuity.[1,3]

Most literatures prefer tendon transfer for neglected extensor tendon rupture. The first described tendon transfer for this condition was the extensor carpi radialis longus (*Duplay*, 1876) and some authors still recommend this technique.[1] The tendon most commonly used is the extensor or indicis proprius. This tendon has the appropriate direction and excursion to replace EPL function. The disadvantages of this technique is a risk of permanent index finger lag, weakness, or deviation. The surgical technique is simple and the results in most series are good.

Some authors recommend other methods like tendon graft or other transfer for certain professions that need specific fingers capability. Some studies show that the Extensor Indicis Proprius (EIP) is sectioned proximally to the sagittal hood, and the result will be no permanent extension lag of the index finger, that claim that extensor lag after EIP transfer isn't caused by removal of the force of the tendon preservation, but by factors which cause either disruption of normal hood function or tethering of its normal excursion. Any technique that tightens or tethers the hood and constricts the sagittal fibers will limit index finger extension. Anatomical anomalies like intrinsic muscle variations, inadequate common extensor motors, or intertendinious bands are unpredictable factors responsible for index finger lag.

Tendon transfer will be need a rather complicated step and a longtime follow up for the hand rehabilitation, that in an uneducated patient may not be able to follow the whole rehabilitation.[1,2]

Tendon graft is the third general type of method for reconstruction of ruptured EPL tendon. The intercalated graft avoids the use of an adjacent motor tendon unit, and index finger function is not jeopardized. The disadvantages of this technique are more extensive dissection and 2 tendon junctures. Patients with free tendon grafts regained good function in a shorter period of time compared to those patient treated with tendon transfer.[1]

CONCLUSION

EIP tendon transfer in most cases of delayed rupture of EPL provides an acceptable outcome; tendon graft should be considered in patients who require independent extension of index finger, and prefer a shorter time for rehabilitation and regaining function.[1-3]

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