

Extensor Indicis Proprius to Extensor Pollicis Longus Tendon Transfer under Local Anesthesia. Surgical Technique

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ABSTRACT

Rupture of the extensor pollicis longus (EPL) tendon at the wrist has been described after fracture of the distal radius at Lister's tubercle, in synovitis, tenosynovitis, or rheumatoid arthritis. The most common procedure for the treatment of irreparable ruptures of the extensor pollicis longus (EPL) tendon is the extensor indicis proprius (EIP) transfer. The main challenge of this technique is the correct tension setting of the transfer. The wide-awake technique allows patients to be awake during the operation and to retain full motor control of the hand. It provides the surgeon the ability to make clinical observations, adjust the tendon transfer tension according to active hand movement in order to make sure the transfer has the right tension before the skin closure. Hereby we present a technique for an EIP to EPL transfer for patients with irreparable rupture of the EPL tendon with the use of local anesthetic and tourniquet. This technique provides the surgeon the ability to assess properly the tension of the transfer by asking the patient to extend and flex his thumb during the operation.

KEY WORDS: Wide-awake; Local anesthesia; Extensor pollicis longus; Extensor indicis proprius transfer.

Introduction

Rupture of the extensor pollicis longus (EPL) tendon is a rare clinical finding [1,2]. It has been described after fracture of the distal radius at Lister's tubercle, in synovitis, tenosynovitis, or rheumatoid arthritis [3]. Especially, nondisplaced fractures of the distal radius have been a well-established risk factor of EPL rupture with an incidence of 0.2-5% [4]. Steroid treatment and misplaced external fixator pins, amongst others, have also been reported as various causes of EPL spontaneous rupture [5,6]. Furthermore some researchers report cases of spontaneous

EPL tendon rupture caused by repeated movement of the wrist joint in association with occupational work activity, without a history of severe trauma, rheumatoid arthritis, or tenosynovitis [2,7].

The most common procedure for the treatment of chronic ruptures of the extensor pollicis longus (EPL) tendon is the extensor indicis proprius (EIP) transfer [8]. In order for this transfer to be successful, proper tensioning is an important aspect of the operation⁹. One way to assess the tensioning of the transferred tendon is to perform the operation while the patient is awake [10,11].

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The wide-awake technique allows patients to be awake during the operation and to retain full motor control of the hand. It also provides the surgeon the ability to adjust the tendon transfer tension and check the integrity of the suture weave with active movement before the skin closure [10]. Hereby we present an alternation of the wide awake technique described by Bezuhly M et al. and Lalonde DH in which we use local anesthesia for pain free operation and tourniquet for haemostasis.

Surgical Technique

Operation takes place under sterile environment in an operating room dedicated to minimal invasions. The patient lies supine on the operating table and a tourniquet is applied above elbow. The local anesthetic consists of a blend of 18 mL of 1% lidocaine and 2 mL of 8.4% bicarbonate in order to bring the pH up from 4.7 to 7.4 [12]. Also in order to reduce the injection pain, a 27-gauge needle is used and the anesthetic mixture is divided in two 10ml syringes. Local anesthetic is slowly injected below the dermis, with the needle oriented 90° to the skin. An area of, at least, 2cm beyond the three incision sites must be injected [13]. Then a 220 mmHg pressure is applied to the tourniquet after the limb has been exsanguinated with a sterile bandage.

First, a longitudinal incision is made over the dorsal side of the first metacarpal, approximately 2 cm proximal of the metacarpophalangeal joint, in line with the anatomical course of EPL. The distal part of the EPL is identified and the tendon is marked with a needle (**Fig.1a**). Then a second 1.5-cm-long transverse incision is made over the dorsal side of the metacarpophalangeal joint of the index finger in order to expose the EIP, which is located on the ulnar side of the extensor digitorum (**Fig.1b**) Finally, a 1.5-cm-long longitudinal incision is made ulnar to Lister's tubercle. After dissecting the soft tissue, the EIP is recognized into the 4th extensor compartment and marked with a vessel loop. Usually, it is the only tendon with muscle belly at this zone. (**Fig.1c**). The EIP tendon is transected just proximal to the sagittal band of the extensor hood and retrieved at the level of the the wrist joint through the proximal incision. Afterwards, EIP tendon is transferred, sub-



Fig1. a. Longitudinal incision at the ulnar border of first metacarpal, proximal to MCP joint

b. Transverse incision over the second metacarpal head

c. Longitudinal incision ulnar to Lister's tubercle, proximal to extensor retinaculum.

The local anesthetic is injected only around the area of the three skin incisions. After the transfer of EIP in the EPL stump, tourniquet is released

cutaneously, to the level of the first incision in order to follow the EPL path. The EIP is then weaved end to side to distal stump of EPL with wrist fully flexed. The two tendon ends are pulled by 2 different mosquito clamps to maintain the thumb in full passive extension, as in the regional anesthesia technique. Two temporary 3.0 nylon sutures are placed between the tendons and the tourniquet is released. The mean time of tourniquet application is 20-25 min. The patient is asked to actively extend his or her thumb and actively flex it till it reaches the fifth finger in order to test the tension of the transfer. If the tension is correct, a standard Pulvertaft weave technique with 3 passes is used to complete the EIP to EPL transfer. The same action is once more asked to be performed after finishing the weave and before closing the skin. The patient is able to fully



Fig 2. A 64 yrs old male suffered EPL rupture after distal radial fracture. Two weeks post operatively patient is able to keep his thumb in extended position



Fig 3. 48 yrs old man with EPL rupture during manual work. 14 months post operatively extending his thumb. The course of EIP tendon under the skin can be visualized.

recognize the newly acquired movement of his/her thumb.

After thorough hemostasis and cleaning, skin is closed with 4.0 nylon sutures. The hand is immobilized in a thumb spica plaster splint, with wrist extended to 30° and thumb in 10° of extension.

Patient is discharged from hospital the same day, immediately after completion of the operation. Removal of the stitches takes place 12-14 days after the operation and the splint is preserved for 5 weeks. After cast removal, gradual movement in combination with sessions of physiotherapy commences, usually for 30 days.

Discussion

Tendon transfer consists a well-established treatment for chronic ruptures of the EPL as it provides satisfactory outcomes while it is a relatively simple technique [9]. The tendon that is preferred for this transfer is the EIP as it has an appropriate direction and excursion compared with the EPL while the tendon transfers using the EIP have demonstrated excellent outcomes in the past [10,14-16].

This procedure has historically been performed with good results using general and regional anesthesia. However, wide awake local anesthesia no tourniquet (WALANT) technique described by Lalonde DH [10,11] avoids the risks to the patient associated with these methods of anesthesia, is more time efficient and shows significantly better results, especially in the early stages [17]. Nevertheless, there is a rather serious complication of the use of epinephrine for hemostasis and that is the white


thumb, which is associated with significant risk of vascular compromise of the digit. This situation can be treated with injection of 1 mg of phentolamine in 5 to 10 mL of saline wherever epinephrine has been injected, to reverse vasoconstriction, usually within 1 hour [11,18]. However, in Greece, phentolamine it is not available for use and thus the use of epinephrine for hemostasis could become dangerous since there is no antidote available in case of a white thumb complication occurrence.

The technique described above is an alteration and it differs at the method of hemostasis by using tourniquet instead of epinephrine. By lifting tourniquet pressure before completing the tendon weave patients' discomfort is minimized. The main advantage is the ability of the surgeon to assess properly the tension of the transfer by asking the patient to extend and flex his thumb during the operation. In both of these techniques the surgeon is able to assess the range of motion of the affected thumb by asking the patient to extend it after placing a temporary positioning suture to the transferred tendon. That way he can observe its motion and even compare it to the contralateral thumb. All these can be done before the skin is closed and the surgeon can be even more certain about the transferred tendon and its tension. Second, the patients learn immediately how to use their thumb which results in faster re-learning after the cast removal.

Conclusion

The wide awake local anesthesia no tourniquet (WALANT) approach in treatment of irreparable

EPL ruptures is a well-established method with better early results in terms of functional and subjective outcomes. The presented alternative surgical technique by using tourniquet control for a short period

of time is a safe and equally efficient method. 

Conflict of Interest Disclosure:

The authors declare that there is no conflict of interest

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