

## CASE REPORT

# Flexor tendon repair in local infiltration anaesthesia and a bloodless field – case report

## Zszywanie ścięgien zginaczy w lokalnym znieczuleniu nasiękowym i bezkrwawym polu operacyjnym – opis przypadku

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### Abstract

Local infiltration anaesthesia with a bloodless operation field allows for proceeding surgery within the hand with no need of use of the tourniquet. This effect is obtained through an injection of greater than standard volume of the anaesthetic solution composed of lignocaine and adrenaline. Adding adrenaline to the mixture induces spasm of small arteries within an infiltration area followed by bleeding inhibition which allows for visualization of most subtle but important structures in the hand and finger. This article reports a case of repair of delayed flexor pollicis longus tendon injury using this method of anaesthesia. A method of finding and retrieval of the flexor pollicis tendon from the wrist to the original point of injury with a drain is also shown. This report shows that local infiltration anaesthesia with adrenaline is a useful technique for repair of acute and delayed tendon injuries, possible to perform by a surgeon himself, with no need of anaesthetist engagement.

**Key words:** flexor tendons – repair, tendon suture, local infiltration anaesthesia, WALANT anaesthesia

### Streszczenie

Lokalne znieczulenie nasiękowe z niedokrwieniem operowanej okolicy umożliwia przeprowadzenie operacji w obrębie ręki bez użycia opaski uciskowej. Uzyskuje się to przez wstrzyknięcie większej niż standardowo stosowanej objętości roztworu, który oprócz lignokainy zawiera także adrenalinę. Dodatek adrenaliny powoduje skurcz drobnych naczyń tętniczych, co hamuje krwawienie i umożliwia uwidocznienie większości drobnych, ale istotnych struktur na palcu i ręce. W pracy opisano przypadek naprawy zastarzałego uszkodzenia ścięgna zginacza długiego kciuka przy zastosowaniu tej metody znieczulenia. Pokazano technikę odnajdywania cofniętego do nadgarstka kikutu bliższego ścięgna i przemieszczania go do rany na kciuku przy pomocy drenu. Opisany i zilustrowany przypadek pokazuje, że lokalne znieczulenie nasiękowe z dodatkiem adrenaliny jest przydatną techniką do naprawy świeżych i zastarzałych uszkodzeń ścięgien, możliwą do wykonania przez samego chirurga, bez konieczności angażowania anestezyjologa.

**Słowa kluczowe:** ścięgna zginacze – naprawa, szew ścięgna, znieczulenie nasiękowe, znieczulenie WALANT



## Introduction

For several years, a method of anaesthesia, referred to as “wide awake local anaesthesia no tourniquet”, WALANT [1, 2] has been gaining popularity. An important aspect of this technique is to obtain, apart from anaesthesia, also the ischaemia of the operated area, which allows the procedure to be performed without the use of a tourniquet. This is achieved by injecting more than the standard volume of the solution into the tissues, which in addition to lignocaine also contains adrenaline. The addition of adrenaline causes the contraction of arterioles, which reduces the bleeding sufficiently enough to allow the visualization of most of the small but important structures (digital nerves and arteries of the palmar arch) and safe operation. Ischaemic anaesthesia can be used for operating fractures and soft tissue injuries, e.g. repairs of cut tendons. In the latter case, it is possible to check intraoperatively how the repaired tendon moves and whether, for example, it does not interfere with the fibrous sheath during finger flexion or extension.

In the authors' centre WALANT has been used for 3 years for elective and trauma surgeries.

This article reports a case of the repair of delayed flexor pollicis longus tendon injury in zone 2 using this method of anaesthesia. A method of finding and retrieval of the flexor pollicis tendon from the wrist to the original point of injury with a drain is also presented.

## Case report

A 31-year-old man underwent surgery in the authors' centre, 3 weeks after injuring the flexor pollicis longus (FPL) at the interphalangeal joint. Immediately after the injury, the patient did not consent to the surgery because he did not have medical insurance. On admission the wound was healed and the patient presented with typical symptoms - no active flexion in the interphalangeal joint.

### a. Preparation of the solution for anaesthesia [1, 2]

- To perform anaesthesia with this technique one must prepare - in one syringe – 22 ml of a solution consisting of 1% lignocaine and adrenaline at 1: 100 000 dilution.
- To obtain this solution, one must prepare 2 syringes: one 10 ml syringe and one 20 ml syringe, 1 ampoule (1 ml) of adrenaline of standard dilution of 1: 1000, 10 ml of 2% lignocaine, 20 ml of 0.9% NaCl and 2 ml of 8.4% sodium bicarbonate solution.
- A dose of 1 ml of adrenaline (whole ampoule) is drawn to a 10 ml syringe and the syringe is filled with 9 ml of 0.9% NaCl solution. In this way, adrenaline at 1:10 000 dilution is obtained.

- Then 10 ml of 2% lignocaine, 8 ml of 0.9% NaCl and 2 ml of 8.4% sodium bicarbonate are drawn to a 20 ml syringe. In this way, 20 ml of a buffered 1% lignocaine solution is obtained.
- Now, 20 ml of a 1% lignocaine solution is mixed with 2 ml of 10 ml adrenaline solution of 1 : 10 000 dilution, prepared in a 20 ml syringe. In this way, 22 ml of a buffered 1% solution of lignocaine and adrenaline at 1: 100 000 dilution is obtained.

### b. Administration of anaesthesia during thumb surgery

- For the injection, thin needles, 0.4-0.5 mm in diameter, are used.
- The thumb is anaesthetized by injecting 2-3 ml of the solution superficially subcutaneously in three places: at the interphalangeal and metacarpophalangeal joints and at metacarpus, at half the length of the thenar (Fig. 1).



Fig. 1. Injection site for the anaesthetic solution.

- The needle should be inserted subcutaneously, and then the drug should be administered slowly, gradually advancing the needle further (not deeper). In this way, the incision site is anaesthetized - from the digital pulp to the mid metacarpus.
- In this case, the authors suspected that proximal tendon stump might translate proximally and it would be necessary to search it on the wrist. Therefore, the anaesthetic solution was injected once more at the proximal carpus line, along the flexor carpi radialis (FCR) tendon. In total, 12 ml of prepared solution of lignocaine with adrenaline and sodium bicarbonate was used.
- Because the injections are administered in a very sensitive part of the palmar digits and metacarpus, the skin can be frozen with ethyl chloride before the puncture.
- Immediately after the administration of the anaesthetic solution, the skin at the injection site becomes pale. The area of visible pale skin should stretch about 1 cm beyond the planned incision line or tissue preparation line.

The anaesthesia performed in this way works for about 4-6 hours, which is sufficient to perform most typical hand surgeries.

### c. Surgery description

- The site of the tendon damage was exposed by making the Bruner incision on the thumb. There was a scanty bleeding that quickly resolved.
- The fibrous sheath was cut conservatively and the distal FPL stump was identified.
- Then, several unsuccessful attempts were made to grasp the proximal stump, by inserting the Pean forceps into the sheath.
- In this situation, an additional incision was made on the radial side of the carpus; FPL tendon was found (typically located under the FCR tendon) and pulled outside (Figs 2, 3).



Fig. 2. Finding the proximal stump of FPL tendon on the carpus.

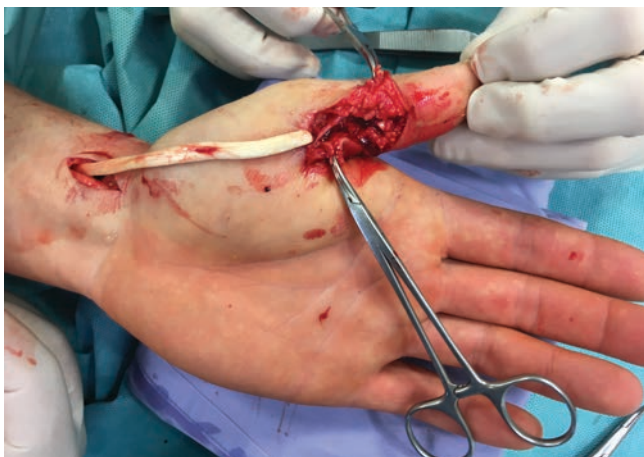


Fig. 3. The exposed proximal stump of FPL tendon.

- From the primary wound side, a polyethylene drain (used for suctioning) was inserted into the fibrous sheath and it was pushed to the wound on the wrist (Fig. 4). Finding the end of the drain was not easy, because after going through the carpal canal it ran between the other flexors.

At this stage of the surgery, the surgeon should be patient and try to push the drain through again.

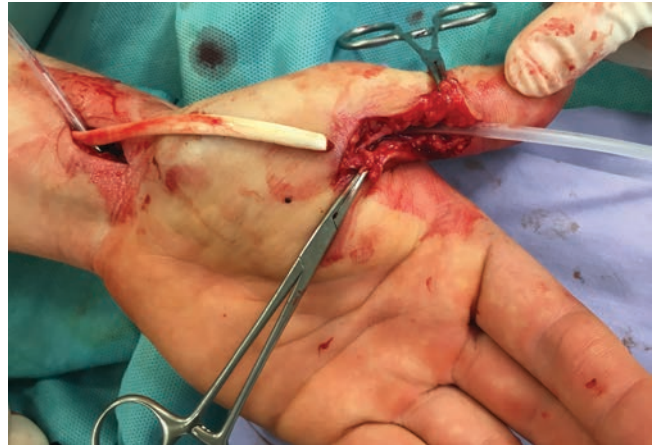


Fig. 4. Introduction of a drain through the fibrous tendon sheath from the distal side to the carpus.

- The proximal stump of the FPL tendon was sutured to the end of the drain and the knot was placed in its "eye", thus obtaining a union without protruding elements (Fig. 5).



Fig. 5. Proximal stump sutured to the drain and prepared for pulling.

- The proximal stump of the FPL tendon was pulled to the wound on the thumb, and then it was fixed with a needle (Fig. 6).



Fig. 6. Proximal tendon stump pulled to the surgical wound.

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- After the stumps were approximated, they were repaired with PDS 3/0 suture, using the Savage 6 strand technique. Despite the loss of almost the entire A4 part of the fibrous sheath, the preserved A5 part prevented bowstringing of the repaired tendon (Figs. 7, 8). Because the 6-strand suture of the tendon was used and the undisturbed repositioning of the repair was observed during the movements – no epitenon suture was made.



Fig. 7. Beginning of tendon suturing using Savage technique.



Fig. 8. Completed tendon suture. Despite the complete opening of the A4 pulley, no bowstringing of the repaired tendon is observed.

- After suturing the tendon, the patient was asked to fully extend and fully flex his thumb, which he could observe himself, after pulling aside the surgical draping (Figs 9, 10).
- After suturing the wound, a short splint was applied to fix the carpus in a neutral position and the thumb in a slightly bent position so that during the postoperative rehabilitation the patient could fully flex and extend the thumb to 0° position (without hyperextension).



Fig. 9. Full extension of the thumb after suturing the flexor tendon.



Fig. 10. The patient may observe full mobility of the thumb after the tendon repair is completed.

## Discussion

WALANT anaesthesia in hand surgery constitutes a new quality and significantly improves the work of surgeons.

- Its most important advantage is the ability to perform anaesthesia by the surgeon, without the anaesthesiologist.
- When compared to normal infiltration anaesthesia, WALANT anaesthesia creates the conditions for a bloodless field, which is normally achieved by putting on a tourniquet.
- Its advantage over the brachial plexus block is the ability to perform a full range of movements with the fingers of the operated limb, which in some situations facilitates intraoperative control of the precision of the repair (or correction).

WALANT anaesthesia is suitable for the majority of hand surgeries, both within the soft tissue and bone tissue. Several years of experience at the author's centre shows that this method is relatively less convenient for Dupuytren's contracture surgery, surgery of ganglia of palmar carpus and CMC-1 joint degeneration. In contrast, it is particularly useful in suturing tendons and in corrective osteotomies for malunions of the phalanges and metacarpal bones.

The literature offers reports on complications after administering lignocaine with the addition of adrenaline, in the form of ischaemia and subsequent necrosis of the finger or its part. In some patients, adrenaline is not adequately metabolised, which results in a prolonged contraction of the digital arterioles and digital ischaemia. However, there is an antidote to such a dangerous situation, namely a phentolamine (Regitine) injection at the base of the ischaemic finger, which causes it to quickly become pink thus preventing harm [3, 4]. Therefore, Regitine should always be in stock at the ward where this type of anaesthesia is administered. It is a drug imported via named patient supply programmes, so it is advisable to stock up on it in advance.

## References

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