

Surgical technique

Wide-awake ultrasound-guided percutaneous extensor central slip tenotomy for chronic mallet finger: A prospective study of 14 cases (with videos)

Ténotomie percutanée de la bandelette médiane de l'appareil extenseur sous échographie : étude prospective à propos de 14 cas de séquelles de doigt en maillet (avec vidéos)

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Abstract

The central slip tenotomy described by Fowler is an effective option for treating chronic mallet finger in order to avoid swan neck deformity of the finger. In a prospective study of 14 cases (13 failures of conservative treatment and one case of untreated mallet finger), we performed percutaneous ultrasound-guided central slip tenotomy with a 19 G needle using the wide-awake local anesthesia and no tourniquet (WALANT) technique. The mean extensor lag before surgery was 28° (range 20°–40°) and three patients had a swan neck deformity. The anesthesia and tenotomy were guided with a 15 MHz high frequency probe. Patient were asked to grade their pain between 0 (no pain) and 10 (extreme pain) with a Visual Analog Scale (VAS), to flex and extend their finger immediately after the tenotomy and to be reviewed at 1 month's follow-up. The mean pain score on VAS during the procedure was 1/10 (range 0–3). After several movements of the finger after the procedure, two patients immediately regained full extension of the distal interphalangeal joint. At 1 month follow-up, the correction was complete for 10 patients, three patients had a residual deformity of 10° and one had a poor result with a 30° deformity. Two patients had a persistent painless synovitis of the proximal interphalangeal joint. Thirteen patients were fully satisfied and one was a disappointed, but did not want another treatment. There are no published reports of percutaneous central slip tenotomy. In this preliminary report, central slip tenotomy for chronic mallet finger with ultrasonography was painless, effective and safe under WALANT technique. Larger clinical studies are needed to confirm the outcomes of this study.

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Keywords: Tenotomy; Mallet finger; Sonography; WALANT; Anesthesia; Extensor tendon

Résumé

La ténotomie de la bandelette médiane selon Fowler est l'un des traitements des séquelles de doigt en maillet. Dans une série prospective de 14 cas (13 échecs de traitement orthétique et un cas ayant refusé tout traitement), nous avons réalisé la technique de Fowler avec une aiguille 19 G, en percutané, sous contrôle échographique, et sous anesthésie locale sans garrot (« WALANT » *wide-awake local anesthesia and no tourniquet*). La déformation en flexion était en moyenne de 28° (extrêmes entre 20 et 40) avec 3 doigts déjà déformés en col de cygne. L'anesthésie et la ténotomie étaient pratiquées sous échographie avec une sonde à haute fréquence de 15 MHz. Tous les patients devaient évaluer leur douleur au moment de l'opération entre 0 (pas de douleur) et 10 (douleur insupportable) grâce à une échelle visuelle analogique (EVA), faire des exercices de flexion et extension du doigt immédiatement après le geste de ténotomie et revenir à la consultation de contrôle à un mois postopératoire. Le score douleur selon l'EVA était en moyenne de 1/10 (extrêmes 0 à 3). Deux patients ont immédiatement récupéré l'extension de l'interphalangienne distale juste après la ténotomie. À un mois postopératoire, 10 patients présentaient une correction complète du fessum, trois avait une déformation en flexion de 10° et un de 30°. Deux patients présentaient une synovite indolore de l'articulation interphalangienne proximale. Treize patients se disaient très satisfaits et un patient était déçu. À notre connaissance, il n'existe pas de séries de ténotomie de Fowler en technique percutanée dans la littérature. Dans cette série préliminaire de 14 patients, cette technique

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sous échographie et « WALANT » a été indolore et efficace sauf pour un patient. Des séries plus étoffées sont nécessaires pour confirmer ces résultats.

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Mots clés : Ténotomie ; Doigt en maillet ; Échographie ; WALANT ; Anesthésie ; Tendon extenseur

1. Introduction

Patients with untreated or chronic residual extensor lag may develop a swan neck deformity. Several treatments for chronic mallet finger have been described. The central slip tenotomy described by Fowler [1] has already been reported in literature as an effective option [2–7].

With the development of high frequency ultrasound probes, it is now possible to use ultrasonography to explore the proximal interphalangeal joint (PIP). The aim of this study was to assess whether percutaneous Fowler's tenotomy is feasible ultrasonographically, safe and effective.

2. Patients and methods

All patients with chronic mallet fingers who failed conservative treatment were eligible for the study. Exclusion criteria were patients under 18 years of age, fracture–dislocation of the distal interphalangeal (DIP) joint, avulsion fracture of the distal tendon, DIP stiffness, swan neck deformity with greater than 25° of PIP hyperextension, and distal phalangeal epiphyseal injuries.

Between January 2015 and December 2015, we enrolled prospectively all patients with chronic mallet finger. Fourteen patients were included (6 males and 8 females) who had a mean age of 55 years (range 48–66): 13 cases of failed conservative treatment (3 months of splinting) and one case of untreated mallet finger (the patient had been examined few days after the injury but did not want to wear the splint).

We used an ultrasound (US) machine (Sonosite Edge[®], FUJIFILM SonoSite Inc., France) with a very high frequency 6–15 MHz linear probe that allowed rapid assessments, static and dynamic evaluations (including flexion and extension movements), and stress studies of the finger. Real-time scanning could be done during clinical examination and the procedure.

Although this was an office-based surgical procedure, the customary precautions were used to ensure aseptic conditions: sterile gloves, sterile kit for the US probe and gel, mask for the patient and the surgeon. Under US-guidance, anesthesia was induced in the PIP joint and between the skin and the central band of extensor tendon with a 27 G needle and a local injection of lidocaine and epinephrine 10:1 buffered with 8.4% bicarbonate, as described by Lalonde et al. [8]. A 1 mL volume was injected into the joint and the syringe was gently retracted to introduce another 4 mL between the tendon and skin. The aim of this double injection was to improve the visual contrast of the central slip

of the extensor aponeurosis (hyperechoic structure between the hypoechoic liquid) (Video 1).

The wide-awake local anesthesia and no tourniquet (WALANT) technique allowed the patient to perform active flexion and extension immediately after the procedure [9].

We performed percutaneous US-guided central slip tenotomy with a 19 G needle. First, with the finger in extension, the needle was placed 2 mm distally to the PIP joint and the percutaneous tenotomy was done just under the probe. Second, the PIP joint was flexed 120° and the tenotomy continued in front of the head of the proximal phalanx without the probe. Third, US was used to check the hypoechoic space between the joint and skin at the location of the central slip, to confirm the tenotomy.

The patient was asked to make several flexion and extension movements immediately after the tenotomy. A small dressing was placed for the night and removed by the patient the day after the procedure. No analgesics were given but the patient was asked to call the center if pain was not acceptable.

The mean extensor lag before surgery was 28° (range 20°–40°). The patients were asked to grade their pain between 0 (no pain) and 10 (extreme pain) with a Visual Analog Scale (VAS). Two patients had a swan neck deformity between 10 and 25°, and one patient had a smaller one (between 0 and 10°).

At 1 and 3 months' follow-up, the authors carried out a clinical examination and asked the patients to score their satisfaction. Since there is no standard clinical scoring system for mallet finger, so we adopted the simple four-part classification proposed by Asghar and Helm [4]. Patients were graded as excellent (normal), good (some minor symptoms or measurable loss of motion but significant improvement, over 50% of the original extensor lag), fair (some improvement in the extensor lag up to 50%, and/or minor or moderate symptoms) or poor (no improvement or worse compared with the preoperative condition).

3. Results

Details about the patients are given in Table 1. The mean pain score during the procedure was 1/10 (range 0–3). After several finger movements after the procedure, two patients immediately regained full extension of the DIP joint. No patient called the center for pain management.

In a typical case with no swan neck deformity but an extensor lag of 50° before surgery (Video 2) and at 1 month follow-up (Video 3), the correction was complete.

One patient had an immediate complication: she was not able to actively extend the PIP joint of the third finger. We hypothesized that the tenotomy was too large (section of the

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