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Original article

Use of the entire flexor carpi radialis tendon for basal thumb ligament reconstruction interposition arthroplasty

Trapézectomie et ligamentoplastie utilisant l'intégralité du tendon du flexor carpi radialis

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Abstract

Recent studies seem to show that ligament reconstruction with tendon interposition (LRTI) does not provide any benefit over trapezium excision alone; however dorsal subluxation was not measured in these studies. We believe it is logical to perform ligamentoplasty in order to obtain long-term stability and therefore treat dorsal subluxation. Our aim is to verify this hypothesis in an observational prospective study of LRTI using the entire flexor carpi radialis (FCR) tendon. Patients who had failed to respond to nonoperative treatment for advanced thumb basal joint arthritis were recruited prospectively between 2007 and 2011. They all received the same surgical treatment, which consisted of LRTI using the entire FCR tendon. Pre- and postoperative pain, range of motion, strength, stability of the base of the first metacarpal and DASH scores were evaluated. Forty-three patients (49 thumbs) were included with a mean follow-up of 37 months (range: 29–72 months). Patients showed significant improvements in pain, range of motion and pinch strength. The dorsoradial subluxation was no longer present in any of the thumbs, and the grind test was positive in only three thumbs. The DASH score was improved from 49/100 preoperatively to 22/100 postoperatively. No ulnar deviation of the wrist was observed at the longest follow-up and grip strength was not altered by the procedure. This study showed that the use of the full FCR tendon for LRTI in combination with trapeziectomy is an efficient and safe treatment for advanced carpometacarpal osteoarthritis as it provides a strong ligamentoplasty with a bulky interposition.

Level of evidence. – Clinical study, Therapeutic Study: Level IV.

Keywords: Trapeziometacarpal arthritis; LRTI; FCR tendon; Radar charts

Résumé

Les dernières études comparatives dans la littérature ne retrouvent aucun bénéfice à pratiquer une ligamentoplastie (LRTI) en association à une trapézectomie. Cependant, la subluxation dorsale n'a jamais été évaluée dans ces études. Nous pensons qu'il est logique de réaliser une ligamentoplastie afin d'obtenir une stabilisation à long terme du premier métacarpien et ainsi de traiter cette subluxation dorsale. Notre objectif était de vérifier cette hypothèse dans cette étude prospective de LRTI utilisant l'intégralité du tendon du flexor carpi radialis (FCR). Tous les patients consécutifs atteints de rhizarthrose en échec de traitement médical étaient inclus prospectivement entre 2007 et 2011. Tous furent opérés selon la même technique de LRTI à l'aide de la totalité du tendon du FCR. La douleur, les amplitudes articulaires, la force, la stabilité de la base du premier métacarpien et les scores DASH furent évalués en pré- et en postopératoire. Quarante-trois patients (49 pouces) furent inclus et évalués à un recul moyen de 37 mois (29–72 mois). Une amélioration significative de la douleur, des amplitudes articulaires et de la force de pince fut retrouvée. La subluxation dorsoradiale avait disparu dans tous les pouces, et le *grinding test* n'était positif que pour 3 pouces. Le score DASH était amélioré significativement de 49/100 à 22/100 en postopératoire. Aucune déviation ulnaire du poignet n'était trouvée au dernier recul et la force de poigne n'était pas modifiée par l'intervention. Cette étude montre que l'utilisation de la totalité du FCR pour réaliser une LRTI associée à une

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trapézectomie est une méthode efficace et sûre pour la rhizarthrose en échec de traitement médical. Celle-ci permet d'obtenir une ligamentoplastie solide avec une interposition volumineuse.
Niveau de preuve. – Étude clinique et thérapeutique, niveau IV.

Mots clés : Rhizarthrose ; Ligamentoplastie et interposition tendineuse ; Tendon du FCR ; Radar chart

1. Introduction

Many different surgical procedures are used to treat advanced trapeziometacarpal (TM) osteoarthritis. These can be grouped into three main types of techniques: trapeziectomy, arthrodesis and arthroplasty. Numerous trapeziectomy techniques have been described, both partial and total. Total trapeziectomy was first described as an isolated procedure, with good results [1]; the benefit of adding ligament reconstruction is still controversial.

Our hypothesis was that ligament reconstruction is mandatory to prevent dorsal subluxation and first metacarpal impaction. Basal thumb instability is known to be a cause of weakness [2], pain [3–5] and unsightly hand contour. Recent studies seem to show that ligament reconstruction with tendon interposition (LRTI) does not provide any benefit over trapezium excision alone [6–10]. In these studies, dorsal subluxation was not measured. We believe it is logical to perform ligament reconstruction in order to obtain long-term stability, and therefore treat dorsal subluxation. Our aim was to verify this hypothesis in an observational prospective study of LRTI using the entire flexor carpi radialis (FCR) tendon.

2. Materials and methods

2.1. Patient selection

Consecutive patients who had failed to respond to nonoperative treatment for advanced thumb basal joint arthritis were recruited prospectively between 2007 and 2011. They all received the same surgical treatment that consisted of trapeziectomy associated with LRTI arthroplasty as described by Tomaino and Coleman [11]. Institutional Review Board approval was not required at our healthcare facility.

2.2. Surgical procedure

All the patients were operated by the senior author (TD) using the same surgical technique. An anterior approach was performed with a 5-cm long curved incision following the lateral contour of the thenar eminence, and stopping before the lateral aspect of the FCR, in order to preserve the palmar branch of the median nerve.

The thenar muscles were detached from the underlying TM joint capsule and retracted distally. The FCR tendon was then released by excision of the trapezial ridge and followed down to its insertion on the base of the 2nd metacarpal. This extensive release is important to allow the reconstructed ligament to have a straight line. The trapeziometacarpal capsule was reflected as a radially based flap in order to preserve it for final closure of the trapezial space.

A 2.0-mm K-wire was inserted in the center of the trapezium and used as a joystick to facilitate its en-bloc excision (Fig. 1). The base of the first metacarpal was then trimmed and any osteophytes were removed. A 2-cm long transverse incision was made between the middle and distal third of the volar aspect of the forearm over the FCR tendon; the entire FCR tendon was harvested, leaving it attached only at its distal insertion on the base of the 2nd metacarpal.

A 3.5-mm drill hole was then made from dorsal to volar, from 1 cm distal to the base through its articular surface (Fig. 2). The direction of the tunnel was not perpendicular to the nail plate, but deliberately made at an angle to restore opposition and to reproduce the physiologic resting position of the thumb. A tunnel-drilled perpendicular to the nail plate would lead to excessive opposition because the resting Bourrel angle would be around 0°.

Before the ligamentoplasty, the stability was tested systematically: the base of the first metacarpal was grasped with a forceps and pulled upward, lifting the whole forearm. This test always produced a visible dorsal subluxation justifying the use of a stabilizing ligamentoplasty.

Next, the entire length of the harvested FCR tendon was passed from a volar to a dorsal direction through the drill hole at the base of the thumb and pulled to remove slack in the tendon. The ligamentoplasty was fixed with one or two trans-osseous sutures at the tunnel exit. The FCR was passed through the capsule inside the trapezial space. It was then passed around

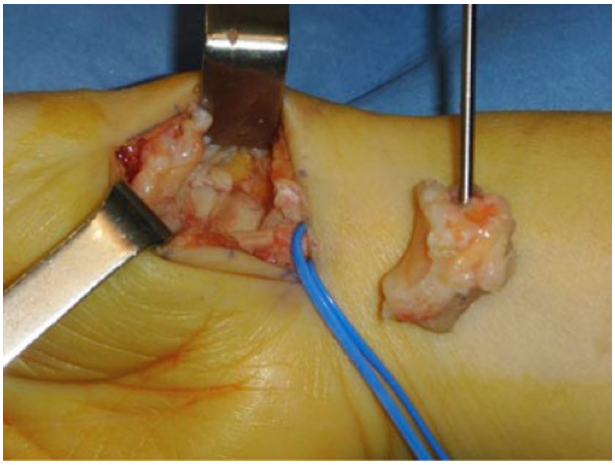

Fig. 1. En-bloc trapeziectomy.