

Original article

Ligament reconstruction and tendon interposition arthroplasty of the trapeziometacarpal joint with the use of the full thickness of the flexor carpi radialis tendon

Trapézectomie et ligamentoplastie utilisant l'intégralité du fléchisseur radial du carpe

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Received 14 May 2012; received in revised form 29 September 2012; accepted 14 October 2012

Abstract

We analyzed the outcomes of the ligament reconstruction and tendon interposition arthroplasty of the trapeziometacarpal joint with use of the full thickness of the flexor carpi radialis. We reviewed 19 patients, with 23 thumbs at mean follow-up of 59 ± 15 months. According to Dell classification, 11 thumbs were grade 2, and 12 thumbs were grade 3. The preoperative VAS pain score was 7 ± 0.9 and thumb web space was $23 \pm 2.4^\circ$. The preoperative grip strength was 13 ± 0.7 kg, tip pinch strength was 2.8 ± 0.5 kg and lateral pinch strength was 4 ± 0.9 kg. None of the thumbs could touch the palmar crease of the little finger. The final outcome was 0.9 ± 1.4 for VAS, 19 ± 1 kg for grip strength, 4.5 ± 0.3 kg for tip pinch strength, 5.6 ± 0.5 kg for lateral pinch strength and $38 \pm 2.4^\circ$ for thumb web space. Mobility of the thumbs was improved; 19 thumbs could touch the base of the fifth finger, and five thumbs could touch the crease of the proximal interphalangeal joint. We compared the operated side with the healthy one in 15 patients, the grip strengths were 82% of the contralateral side, tip pinch strengths 78%, and lateral pinch strengths as 75%. According to our series, this surgical technique relieves pain and provides stability and mobility of the thumb.

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Keywords: Trapeziometacarpal osteoarthritis; Ligament reconstruction and tendon interposition arthroplasty; Metacarpophalangeal joint surgery; Thumb surgery

Résumé

Nous avons analysé les résultats d'une série de trapézectomies-ligamentoplasties utilisant l'intégralité du fléchisseur radial du carpe. Nous avons revu 19 patients (23 pouces) à un recul moyen de ± 15 mois. Suivant la classification de Dell, notre série comporte 11 pouces de stade 2 et 12 de stade 3. En préopératoire, la douleur évaluée par une échelle visuelle analogique était mesurée à $7 \pm 0,9$ et l'ouverture commissurale à $23 \pm 2,4$ kg, la force de poigne à $14 \pm 0,7$ kg, la force de la pince pollici-digitale terminale à $2,8 \pm 0,5$ kg et la pince terminolaterale à $4 \pm 0,9$ kg. Aucun des pouces ne pouvait toucher la base de l'auriculaire en préopératoire. Au recul maximum, la douleur était mesurée à $0,9 \pm 1,4$, l'ouverture commissurale à $38 \pm 2,4^\circ$, la force de poigne à 19 ± 1 kg, la force de la pince terminale à $4,5 \pm 0,3$ kg et la pince terminolaterale à $5,6 \pm 0,5$ kg. Le secteur de mobilité des pouces était augmenté et cinq pouces pouvaient toucher la base de l'auriculaire. Nous avons comparé le côté opéré avec le côté opposé chez 15 patients. La force de poigne était mesurée à 82 % du côté opposé, la force de la pince terminale à 78 %, la pince terminolaterale à 75 %. Dans notre série, cette technique est efficace pour soulager la douleur et restaurer la stabilité et la mobilité du pouce.

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Mots clés : Rhizarthrose ; Ligamentoplastie ; Suspension ; Interposition ; Métacarpophalangienne ; Chirurgie du pouce

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1. Introduction

The carpometacarpal joint is the most frequent operative focus in the osteoarthritic upper extremity joint [1]. Trapeziometacarpal osteoarthritis is a common entity predominantly affecting postmenopausal women [2,3]. The disease affects females more than males, the ratio being 10:1 to 15:1 according to different studies [4,5]. The etiology is hormonal laxity, intra-articular joint destruction and ligamentous injury [6]. The main sign of the disease is pain that is exacerbated with daily living activities. Mild disease is usually treated conservatively, however carpometacarpal osteoarthritis can progress to severe pain and disability, and this is the most frequent reason that patients with upper extremity osteoarthritis choose to have surgery [7]. The aim of the surgery is to relieve the pain and provide the stability [8,9].

Resection arthroplasty was described in 1949 and it is still a choice for surgical procedures of thumb carpometacarpal osteoarthritis [10]. Tendon interposition arthroplasty was described in 1970, modified in 1985 [11,12]. The current choice surgical procedure is ligament reconstruction and tendon interposition arthroplasty, which was described in 1986 [5,6,9]. There are some problems. The subluxation of the metacarpal base is the most important problem [13,14]. The other problem is loss of height of the arthroplasty space [13]. The aim of our study is to resolve these problems using full thickness FCR tendon.

In 1997, the entire FCR tendon was used for the ligament reconstruction tendon interposition arthroplasty. Good results were achieved [15]. This surgical procedure is not accepted because of surgical difficulty of using the entire FCR tendon. We try to develop a new surgical technique easily reproducible.

2. Methods

Between January 2002 and January 2008, 19 patients (23 thumbs), who underwent the ligament reconstruction and tendon interposition arthroplasty of the trapeziometacarpal joint, were included in the study. The informed consent was obtained from all patients. The disease was diagnosed by

clinical examination and radiological signs. Surgical treatment decision was made after conservative treatment failed. All patients were diagnosed as primary osteoarthritis and none of them had an additional hand lesion. Conservative treatment was administered in all patients before considering surgery. This consisted of activity modification, non-steroidal anti-inflammatory drugs (NSAID), thenar muscular strengthening and splinting for 3 to 4 weeks.

We reviewed 19 patients (18 women, one man), 23 thumbs (14 right, nine left). The average age was 55 ± 5.7 years. The average follow-up was 60 ± 15 months. There were 18 dominant hand thumbs and five non-dominant. In four patients, both thumbs underwent surgery. Radiologic evaluation was made according to the Dell classification [16]. Preoperative and final evaluations were made according to VAS, Buck-Gramcko score, grip, pinch strengths and Kapandji opposition test [17,18]. Grip strength was measured with a dynamometer (Jamar, Jackson, MI), tip and lateral pinch strength were measured with a pinch gauge (B&R Engineering, Sante Fe Springs, CA). Three values were taken and the mean value was recorded for all patients. These measurements were repeated at all controls. Thumb web space was the angle between the first and second metacarpals during maximum palmar abduction of the thumb (Fig. 1). Arthroplasty stability was evaluated by measuring the loss of the radiologic arthroplasty distance between final and early postoperative views. Arthroplasty distance was defined as the distance between the scaphoid and first metacarpal base (Fig. 2).

Statistical analysis was performed by Chi² test and $P < 0.05$ was considered significant. All operations were done by the senior author (C.T).

Surgical procedure: modified ligament reconstruction tendon interposition arthroplasty using the full thickness flexor carpi radialis.

The skin incision was started 2 cm proximal to the distal palmar crease and over the base and volar radial border of the metacarpal and 1 to 1.5 cm distally (Fig. 3A). Sensory branches of the radial nerve were identified and protected. The joint capsule was opened to expose the trapeziometacarpal joint (Fig. 3B). The trapezium was fractured into four pieces by a



Fig. 1. Preoperative, early postoperative and final control views and thumb web space.

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