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Original article

Thumb carpometacarpal joint denervation for primary osteoarthritis: A prospective study of 31 thumbs

Dénervation de l'articulation trapézo-métacarpienne pour rhizarthrose primaire : étude prospective sur 31 pouces

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ABSTRACT

We present the results of a prospective study of 31 thumbs in 30 patients affected by primary osteoarthritis at the thumb carpometacarpal (CMC1) joint who were treated with denervation of the involved joint. For every operated hand, the Kapandji score, key-pinch strength, grip strength and pain on a visual analogue scale were evaluated preoperatively and postoperatively at 2 weeks, 6 weeks, 3 months, 6 months and 1 year. The patients' satisfaction was determined. The Kapandji score and key-pinch strength improved significantly in all patients. Grip strength improved significantly in 10 hands. Pain was reduced in all cases. Nevertheless, 6 patients were dissatisfied with the operation. Of these 6 patients, 4 had stage IV arthritis in the TMC and scaphotrapeziotrapezoid joints of the thumb. Thumb CMC denervation appears to reduce pain at 1 year with an overall improvement in key-pinch strength. However, patients with stage IV CMC arthritis were not satisfied with the outcome of the procedure.

RÉSUMÉ

Nous présentons les résultats d'une étude prospective sur 31 pouces chez 30 patients souffrant d'une arthrose primaire de la première articulation carpo-métacarpienne (CMC1) et traités par dénervation de l'articulation concernée. Pour chaque main exploitée, nous avons évalué le score de Kapandji, la force de pince, la force de poigne et la douleur à l'aide de l'échelle visuelle analogique en préopératoire et postopératoire, à deux semaines, six semaines, trois mois, six mois et un an. Nous avons également enregistré le taux de satisfaction. Le score de Kapandji et la force de pince étaient améliorés de manière significative chez tous les patients. La force de poigne était améliorée de façon significative pour 10 mains. La douleur était améliorée dans tous les cas. Néanmoins, six patients n'étaient pas satisfaits de l'opération. Parmi ces six patients, quatre avaient une arthrose mixte scapho-trapézo-trapézoïdienne et CMC1 de stade IV. La dénervation de l'articulation CMC1 semble réduire la douleur à un an avec une amélioration globale de la force de pince. Cette réduction de la douleur semble être insuffisante essentiellement chez les patients présentant une arthrose CMC1 de stade IV.

1. Introduction

Surgical procedures for thumb carpometacarpal (CMC) arthritis began 50 years ago, and multiple treatment techniques have been described since then. The preferred surgical options vary with the

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stage and nature of the disease. In cases of early disease, trapeziometacarpal ligament reconstruction and/or arthroplasty have been shown to provide good symptomatic relief while delaying further degenerative changes [1]. For advanced, or late-stage, disease, some have advocated arthrodesis of the thumb CMC joint, if there is good mobility of the metacarpophalangeal and interphalangeal joints. Alternative arthroplasty techniques have ranged from partial to complete trapeziectomy, with various implants and ligament interposition/reconstruction additions. In the recent years, partial and total joint arthroplasty with cemented and non-cemented implants have been introduced. Initial problems of osteolysis and implant loosening have been substantially reduced with improvements in implant design [2]. The arthroplasty techniques are widely used for stage II or higher disease in the Eaton classification [3] once the patient has failed conservative management. The main disadvantages are loss of motion, loss of strength and presence of a prosthetic device, with all these techniques having one or more of these drawbacks.

At the wrist, as with the finger joints, the results of denervation are comparable to those from other surgical techniques. A more traditional procedure is always possible, should the result be unsatisfactory. Selective denervation of the thumb CMC joint is also possible [4,5]. It is a simple, minimally invasive surgical procedure with short postoperative immobilization after surgery. In theory, there should be no loss of strength or mobility with a relatively fast return to regular activities [4]. Unfortunately, this technique has never been explored and reported beyond the initial description.

We present the results of a prospective study on 31 thumbs in 30 patients treated with thumb CMC denervation with 1 year of follow-up.

2. Patients and methods

2.1. Patient population

From August 2012 to December 2014, 64 patients with a clinical and radiological diagnosis of primary osteoarthritis of the thumb CMC joint with no Z-deformity were seen by the first author. All patients were offered either a trapeziectomy and ligament reconstruction with the abductor pollicis longus (APL) procedure or a denervation procedure. Both techniques were described in detail during the clinical visit with discussion of the reported rates of success and possible complications of each [4,6]. Thirty patients chose to undergo thumb CMC joint denervation, including 22 women and 8 men with a mean age of 62 (range 39–86) years. Thirty-one thumbs underwent denervation in 20 dominant hands and 11 non-dominant hands. All thumb CMC joints were staged based on the Dell classification prior to surgery [7]: two thumbs were stage I, three were stage II, ten were stage III and 16 were stage IV.

Eight patients had other pathologies in the operated hand requiring concomitant surgery: two cases of carpal tunnel decompression, one trigger finger release, three procedures for arthritis in the fingers and one ganglion excision.

2.2. Surgical technique

All patients underwent surgery under regional or general anesthesia using a tourniquet. We used the technique described by Loréa [4] with one modification. We also resected 1 cm of the posterior interosseous nerve (PIN) through a short, longitudinal dorsal wrist incision into the fourth extensor compartment in all cases (reasons provided in the Discussion). A bulky soft dressing was applied to the operated hand, with no hard splinting. This soft dressing was removed 12 to 14 days after surgery.

2.3. Assessment

Clinical parameters related to thumb function were collected preoperatively and then at 2, 6 and 12 weeks after surgery. The same parameters were recorded at 6 months.

At each visit, up to and including 6 months, we measured the Kapandji score [8], grip strength using the Jamar dynamometer in position 2 and key-pinch strength. The visual analog scale (VAS) pain scores (0–10 scale) were recorded at rest, while performing gentle activities (eating, personal hygiene, dressing) and intense activities (carrying loads, gardening, turning doors keys, cooking, pain experienced during maximum effort on the key-pinch dynamometer).

Time to return to work or time to go back to usual daily activities were recorded. Adverse events, including infection and nerve pain/paresthesia were also recorded.

2.4. Assessment at 1 year

All patients included in the study were contacted by telephone to ask whether they were willing to complete a written questionnaire. Twenty-seven patients accepted to receive the questionnaire and were sent the questionnaire with a consent form. Of the 27 questionnaires, 24 questionnaires were returned, providing 1 year results of the denervation from two stage I, one stage II, eight

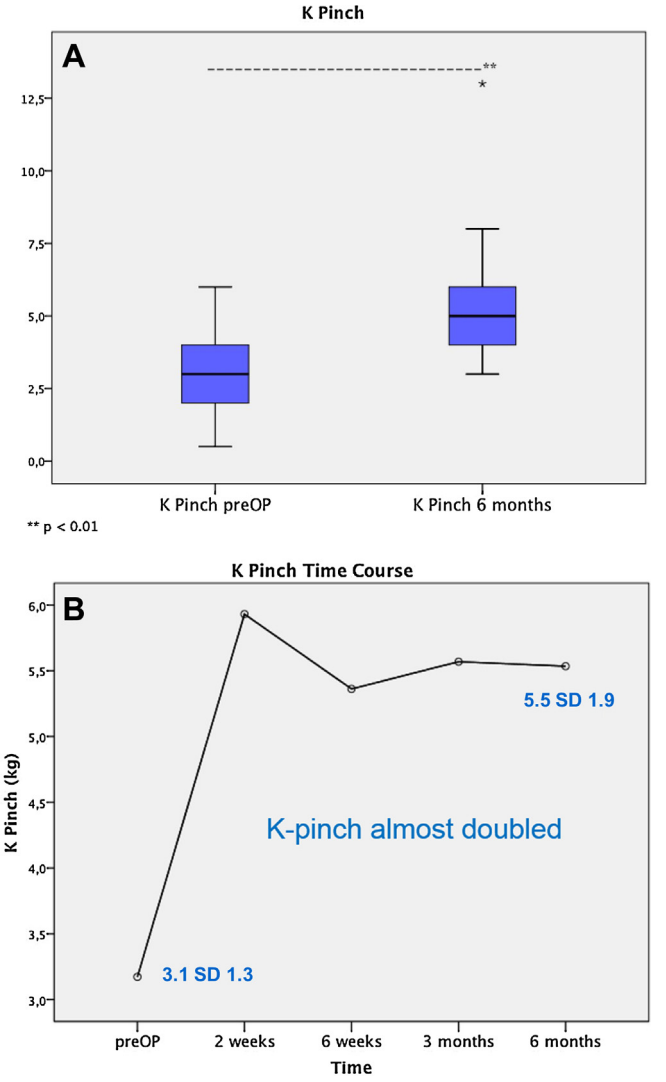

Fig. 1. Statistically significant improvement of the key-pinch strength at 6 months (A) and the change over time (B).

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