

Original article

First metacarpal resurfacing with polyvinyl alcohol implant in rhizarthrosis: Preliminary study

Resurfaçage du premier métacarpien avec un implant en polyvinyle alcoolique dans la rhizarthrose : étude préliminaire

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Abstract

Osteoarthritis of first carpometacarpal (CMC) joint is a condition that is frequently encountered in hand surgery. If conservative treatment fails, several surgical procedures are available ranging from arthroscopic debridement to total joint arthroplasty. This study focuses on a new resurfacing technique for the base of the first metacarpal using a polyvinyl alcohol hydrogel implant. Our preliminary study found good clinical outcomes and no inflammatory reaction after a follow-up of 30 months. However prospective studies with a longer follow-up and more patient are needed to confirm these results.

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Keywords: Basal joint arthritis; Trapeziometacarpal joint; Polyvinyl alcohol implant; Joint resurfacing

Résumé

L'arthrose de l'articulation carpo-métacarpienne du premier rayon (CMC) est une affection fréquente en chirurgie de la main. Après échec d'un traitement médical, plusieurs gestes chirurgicaux allant du débridement arthroscopique à une arthroplastie totale peuvent être proposés. Ce travail se concentre sur une nouvelle technique de resurfaçage de la base du premier métacarpien par un implant à base de polyvinyle alcoolique. Cette étude préliminaire trouve de bons résultats cliniques et aucune réaction inflammatoire à 30 mois de suivi. Cependant, des études prospectives avec un suivi plus long et comprenant plus de patients sont nécessaires pour évaluer ces résultats.

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Mots clés : Rhizarthrose ; Articulation trapézo-métacarpienne ; Implant polyvinyle alcoolique ; Resurfaçage articulaire

1. Introduction

Osteoarthritis is common in the carpometacarpal (CMC) joint of the thumb. On average, 10% of the population over 50

years of age, mostly women, is affected. Primary symptoms include pain, deformity, loss of mobility and weakness [1]. In circumstances where appropriate conservative treatment has failed, surgery may be warranted. Surgical treatments for end stage CMC (basal joint) arthritis may involve joint fusion, total or partial trapeziectomy or arthroplasty [2]. Some studies have shown poor clinical outcomes with first CMC joint fusion [3–5] and as a consequence, it is seldom performed. Trapeziectomy is more common and the procedure yields good results. However

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Table 1
Patient characteristics.
Casuistique.

Patient	Gender	Age (years)	Side	Dell stage	Eaton stage
1	F	64	Dominant	2	2
2	F	65	Dominant	2	3
3	F	57	Dominant	2	2
4	F	47	Dominant	2	2
5	F	51	Dominant	2	2
6	F	77	Dominant	2	3
7	F	65	Dominant	2	3

several undesirable outcomes have been described, including thumb shortening, unattractiveness due to residual deformity and lack of pinch and grip strength. Prosthetic joint replacement usually preserves both thumb length and strength but complications such as joint dislocation and implant loosening may occur.

This study focuses on an innovative less invasive, tissue-sparing solution: resurfacing of the base of the first metacarpal with a polyvinyl alcohol hydrogel (PVA-H) implant.

2. Materials and methods

The senior author (G.M.R.) performed seven resurfacing procedures of the base of the first metacarpal between February 2008 and November 2009. Table 1 summarizes the patient characteristics. All were female patients, aged 47 to 77 (average 61 years). The osteoarthritis occurred in the dominant side in all

patients. Four were graded as stage 2 and three as stage 3 according to the Eaton-Littler classification. According to Dell's classification, all patients were stage 2 (i.e., metacarpal subluxation of less than one third of the joint surface). The Cartiva[®] implant (Cartiva Inc., Alpharetta, GA) used in this series is made of PVA-H and has a predefined shape.

The Cartiva[®] implant is an organic polymer-based biomaterial comprised of 40% polyvinyl alcohol (PVA) and saline (0.9%). PVA is a synthetic polymer derived from polyvinyl acetate through partial or full hydroxylation. The implant's compressive modulus and coefficient of friction are close to that of cartilage [6]. It has two concave surfaces that can smoothly slide against the cartilage. Two diameters are available: 8 and 10 mm.

The surgical procedure was performed under tourniquet control with regional anesthesia. A dorsal approach for the thumb CMC joint was used (Fig. 1). The abductor pollicis longus and abductor pollicis brevis tendons were detached from their insertions with a capsular and periosteal flap from the base of the first metacarpal and its joint surface. The CMC joint was further exposed and dislocated. The surface of the base of the first metacarpal was prepared for reaming. A K-wire (1.0 mm) was inserted into the metacarpal shaft. The K-wire insertion point into the metacarpal was defined as the approximate center of the metacarpal joint surface. Because the reamer is the same height as the implant and we wanted to let the implant protrude to act as a spacer, we stopped reaming 1–2 mm short of full depth. The implant was inserted into the reamed area and stabilization achieved through the implant's press-fit design.

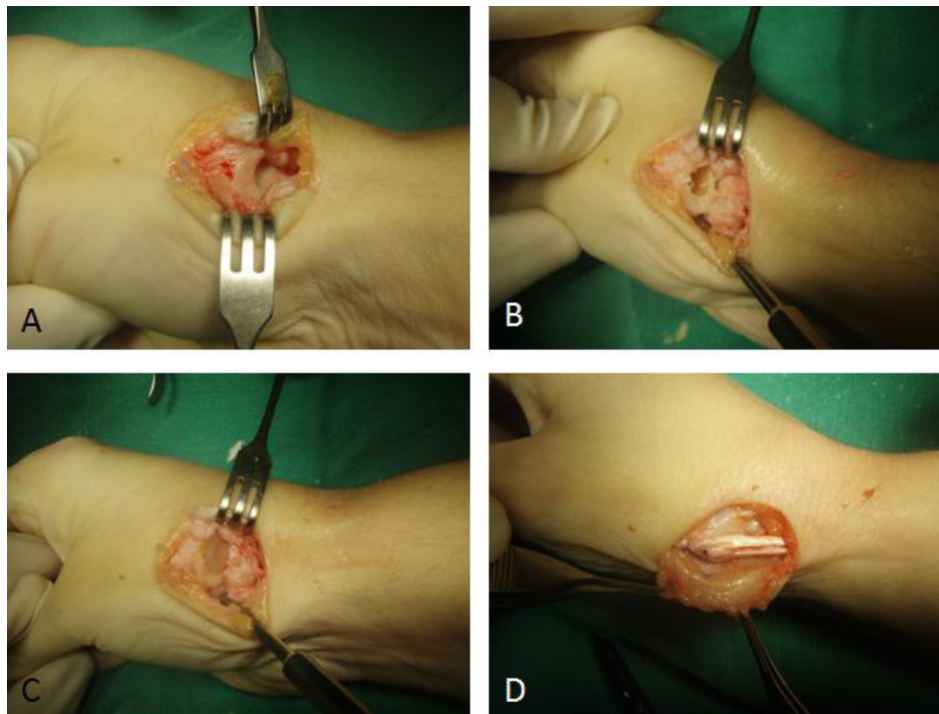


Fig. 1. Surgical procedure. The carpometacarpal (CMC) joint is exposed after detaching the abductor pollicis longus (APL) and abductor pollicis brevis (APB) (A), the surface of the first metacarpal is reamed (B) and the implant is impacted (C). Tendons are reattached at the end of the procedure (D).

Technique chirurgicale. L'articulation carpo-métacarpienne est exposée après désinsertion de l'abductor pollicis longus (APL) et de l'abductor pollicis brevis (APB) (A), la surface articulaire du première métacarpien est préparée (B) et l'implant impacté (C). Les tendons sont réinsérés à la fin de l'intervention (D).

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