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Clinical case

Thumb CMC total exchange arthroplasty with the ARPE implant

Rescellement de prothèse totale trapézo-métacarpienne avec l'implant ARPE

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Abstract

We present two case reports of successful total exchange arthroplasty at the carpometacarpal joint of the thumb using an ARPE implant. In one patient (62-year-old female), a primary MOJE prosthesis had been implanted two years previous. In the second patient (48-year-old female), a primary ELEKTRA prosthesis had been implanted one year previous. At a follow-up of two and three years respectively, there were no changes in position of both ARPE implants and no signs of loosening. All clinical parameters (DASH score, pain through VAS, grip strength) had improved.

Keywords: Carpometacarpal joint; Thumb; Total joint replacement; Failed arthroplasty; ARPE prosthesis

Résumé

Nous présentons deux cas cliniques de rescellement de prothèse totale trapézo-métacarpienne avec l'implant ARPE. Chez une patiente de 62 ans, une prothèse MOJE avait été implantée deux ans plus tôt. Chez l'autre patiente de 48 ans, une prothèse ELEKTRA avait été implantée un an plus tôt. Au recul respectif de deux ans et trois ans, il n'y avait pas de changement de position des deux implants ARPE ni aucun signe de descellement. Tous les paramètres cliniques (DASH score, douleur évaluée par une EVA, force de serrage) s'étaient améliorés.

Mots clés : Articulation carpo-métacarpienne ; Pouce ; Rescellement ; Échec d'arthroplastie ; Prothèse ARPE

1. Introduction

The thumb carpometacarpal (CMC1) joint is the most common site of osteoarthritis in the hand. Implant arthroplasty is an alternative to resection arthroplasty [1].

The biggest problem with all CMC1 endoprostheses is the long-term osseointegration of its cups [2]. To analyze the reasons for these high failure rates, we must explore the biomechanical imbalance in load transmission across the long lever of the first metacarpal bone onto the small cross-section at the trapezium, which is anatomically determined. A tip pinch of 1 kg will generate 12 kg joint compression; for the power grip, the load may be as high as 120 kg [3].

Resection arthroplasty is a salvage procedure following failed total joint replacement [4]. The main problem after trapeziectomy with or without tendon interposition or ligament reconstruction is the persistent strength deficit [5]. If a patient is unsatisfied after resection arthroplasty, there are no other therapeutic options in the future.

We wanted to determine if sufficient grip strength in working patients who have failed primary joint replacements could be obtained by providing them with total exchange arthroplasty. For this purpose, the ARPE implant cup (BIOMET, Warsaw, Indiana, USA) seems to meet all prerequisites [6]. The initial published short-term results [7–9] were satisfactory. These

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results were confirmed in medium- and long-term studies, with the survival rate for in vivo functional implants ranging from 85 to 97% [10–12]. For failed total exchange arthroplasty, resection arthroplasty continues to be the salvage option. The outcomes of secondary resection arthroplasty are reported to be identical to those after a primary procedure [13].

2. Case reports

2.1. Case 1

A 64-year-old female patient presented with a history of total CMC1 joint replacement in her left hand with a MOJE implant one year previous. She reported that her pain had been increasing over the past three months since her initial visit. At this time, her pain on the Visual Analogue Scale ([VAS], 0–10 points) was 5 and radiological signs of loosening in both components were detectable. One year later, the pain had increased to eight points in the VAS; implant subluxation and migration of the metacarpal ceramic component were found (Fig. 1a). There was no history of trauma. Computerized analysis of the intra-trapezial bone showed a bone defect of less than 10 mm; as a consequence, the exchange procedure with an ARPE implant was indicated (Fig. 1b).

The CMC1 joint was exposed through a dorsal incision. To avoid inducing an iatrogenic fracture, centering of the first metacarpal bone with a round burr was performed intraoperatively (Fig. 1c). Correct positioning of the ARPE implant was confirmed on X-rays (stem size 10, cup size 10, Fig. 1d). After surgery, the left thumb was not immobilized in a cast. Strengthening was started after the fourth postoperative week. After eight weeks, the patient returned to full-timework as a secretary.

At the 2-year follow-up, there was no change in position of the ARPE implant and no radiological signs of loosening (Fig. 1e). Pain on the VAS improved to three points, grip strength increased from 4 kg preoperatively (Jamar dynamometer) to 7 kg (87% of the opposite side). Full pinch grip was achieved; thumb abduction improved from 40° preoperatively to 70°, with a 10° deficit relative to the opposite side. The QuickDASH Score improved to 16 from 43 preoperatively. The patient indicated she would have the same procedure again.

2.2. Case 2

A 48-year-old female patient presented with a history of total CMC1 joint replacement in her left hand with an ELEKTRA implant one year previous (Fig. 2a). She reported acute pain during the previous five days (VAS 8 points). There was no history of trauma. X-rays showed dislocation of the 6.5 mm pressfit cup with an intra-trapezial bone defect of less than 9 mm (Fig. 2b). As a consequence, an exchange procedure with an ARPE implant was indicated.

The CMC1 joint was exposed through a dorsal incision. Intraoperatively, excessive metallosis was seen (Fig. 2c); the cup could be explanted without problems. The stem was firmly integrated into the bone; circular drilling at the bone-implant interface with a 1.2 mm K-wire was performed to remove it. Correct positioning of the ARPE implant was confirmed on

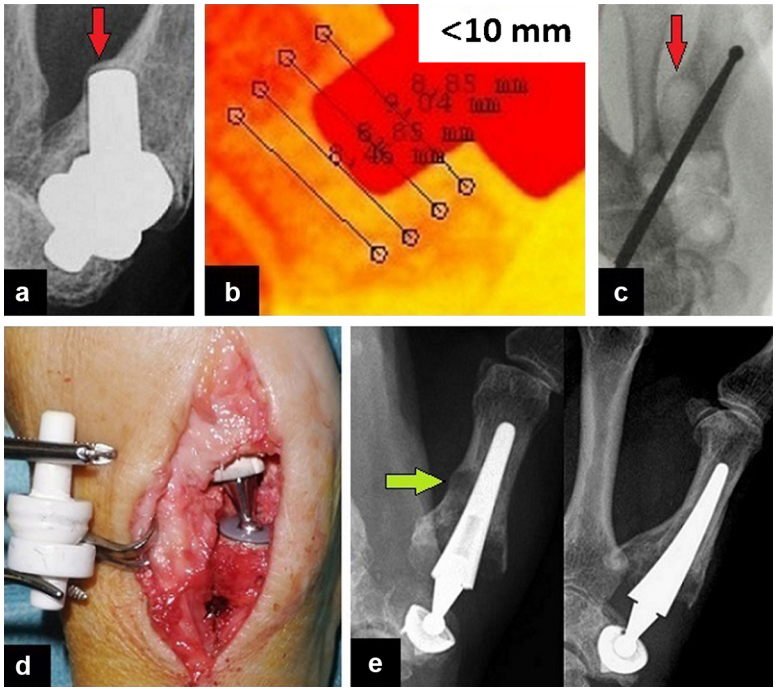

Fig. 1. Case report 1: a: atraumatic cortical migration (arrow) and subluxation of the MOJE prosthesis; b: measurement of the trapezium bone defect; c: centering in the first metacarpal bone using a round burr without irritation of the cortical migration zone (arrow); d: removal of the MOJE and implantation of the ARPE implant; e: no changes in the position of the ARPE implant in the AP and lateral X-rays without complication of the cortical migration zone (arrow).