

CASE REPORT

New option for surgical treatment of the trapeziometacarpal osteoarthritis: a case report

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Abstract

We present the case of a 71-year-old, left-handed woman with left thumb carpometacarpal (CMC) joint arthritis. The patient had no pain and could use the hand actively in daily life with a new option of surgical treatment, a vascularized pedicled third CMC joint transfer to the thumb CMC joint.

Keywords:

Arthroplasty, dorsal carpal network, trapeziometacarpal osteoarthritis, vascularized pedicled 3rd carpometacarpal joint transfer

History

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Introduction

The thumb carpometacarpal (CMC) joint is one of the most common sites of arthritis in the hand. Numerous surgical techniques, including trapeziectomy, arthroplasty and arthrodesis have been reported [1,2]. Especially trapeziectomy with or without interpositional tendon arthroplasty is popular [3]. We report here a new option of surgical treatment for trapeziometacarpal osteoarthritis. This new technique is a vascularized pedicled joint transfer from the third CMC joint to the thumb CMC joint. This report describes the technique and provides an early result of the case.

Case report

A 71-year-old, left-handed woman presented with an approximately 24-month history of worsening pain, swelling and stiffness of the left thumb CMC joint. The patient had no history of thumb trauma and was in good health. Although she had received conservative treatment, it failed to decrease her symptoms. At her first visit to our hospital, she had severe active and passive motion pain. Active radial abduction and volar abduction of the thumb were 25 and 35°, respectively. Metacarpophalangeal active flexion was 30° and interphalangeal active flexion was 45°. Grip strengths were 21 kg for the right hand and 10 kg for the left hand. Key pinch

strengths were 3.2 kg for the right hand and 1.2 kg for the left hand. Disabilities of the Arm, Shoulder, and Hand score was 27.3 points. Radiographs showed osteoarthritic changes, which were classified as Eaton and Littler grade 3 (Figure 1). We recommended the surgical treatment with preservation of the joint. Therefore, arthroplasty with a vascularized pedicled joint transfer from the third CMC joint was considered.

Via a 4 cm curved incision, the dorsal CMC joint capsule was exposed and incised transversally. After exposing the CMC joint, the osteoarthritic lesion was hollowed out, leaving the cortical shell following synovectomy and osteophyte resection.

Next the dorsal carpal arterial network and the dorsal metacarpal network were identified on the dorsal wrist capsule with a 4 cm curved incision on the dorsal wrist. The harvesting position encompassing the third dorsal metacarpal artery was decided under fluoroscopy. The third CMC joint was harvested atraumatically with its size being 1 cm wide and 2 cm long. The joint was hollowed out, leaving the radial and ulnar cortical shell of the capitate and metacarpal base. The arterial pedicle of the harvested joint was dissected carefully to the snuff box. The harvested joint was elevated to the thumb CMC joint under extensor carpi radialis longus and brevis tendon (Figure 2a). The harvested joint retained the periosteal and capsular connection on the dorsal site. In contrast, the volar site was mobile



Figure 1. The radiograph images showed Eaton and Littler grade 3.

without any soft tissue connection (Figure 2b). Therefore, the harvested joint was inverted and inserted by press fitting into the thumb CMC joint. Internal fixation of the joint was performed with three 1.2 mm K-wires. Finally, the donor site was filled up with spongy artificial bone and local pedicled fat.

Cast immobilization, maintaining the thumb in abduction with the wrist in neutral, was performed for a total of 4 weeks

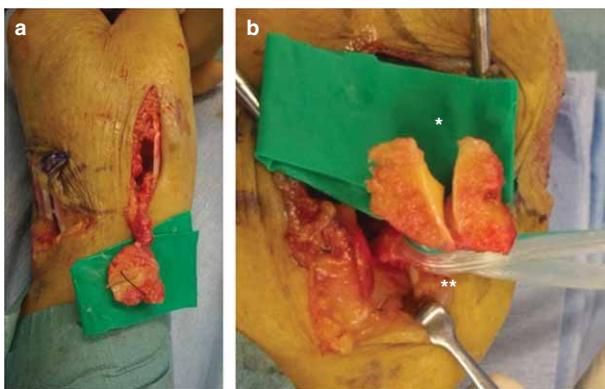


Figure 2. (a) The arterial pedicle of the harvested joint was dissected carefully to the snuff box, and the harvested joint was elevated to the thumb carpometacarpal joint. (b) The third carpometacarpal was harvested with remaining radial and ulnar cortical shell of capitate and metacarpal base.

*Volar site of the harvested joint; it has mobility without soft tissue connection.

**Dorsal site of the harvested joint; it has the periosteal and capsular connection.

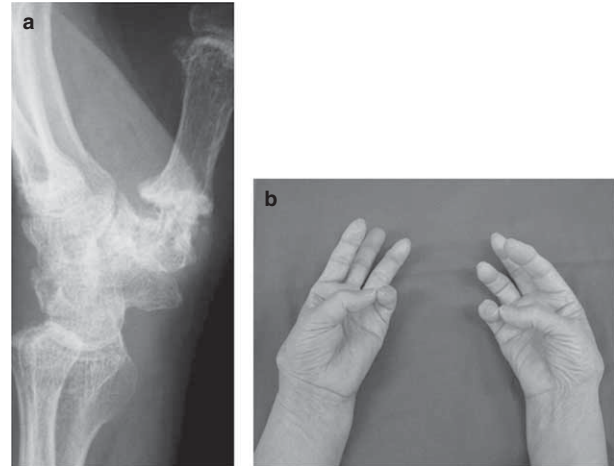


Figure 3. (a) Radiographic images at 1-year follow-up evaluation. The grafted joint survived and showed no osteoarthritic changes in the radiographic findings. Donor site had no problems at the 1-year follow-up evaluation. (b) The patient had no pain in the left thumb and could use the hand actively in daily life. Active volar abduction of the thumb was 65°. The Disabilities of the Arm, Shoulder, and Hand score was 4.5 points.

postoperatively. At 6 weeks postoperatively, the K-wires were removed and gentle active and passive range of motion exercise was commenced.

At the 1-year follow-up evaluation, the grafted joint survived and showed no osteoarthritic changes in the radiographic findings (Figure 3). The patient had no pain in the left thumb and could use the hand actively in daily life. Active radial abduction and volar abduction of the thumb were 40 and 65°, respectively. Metacarpophalangeal active flexion was 50° and interphalangeal active flexion was 75°. Grip strengths of both hands were 19 kg and key pinch strengths were 3.0 kg. The Disabilities of the Arm, Shoulder, and Hand score was 4.5 points.

Discussion

Over the years, many surgical techniques have been reported for the treatment of trapeziometacarpal osteoarthritis. A Cochrane meta-analysis demonstrated no significant difference between any of these surgical techniques for treating joint arthritis of the thumb [4]. Excision of the trapezium with ligament reconstruction with or without tendon interposition is a commonly performed procedure. However, there may be no advantage to either tendon interposition or ligament reconstruction over simple trapeziectomy [3]. Rubino *et al.* reported the simple surgical treatment with a narrow thumb CMC joint pseudoarthrosis for a retrospective review of 248 consecutive patients [5]. Rubino's procedure is to resect the osteophyte and degenerative cartilage by 1–2 mm in the distal trapezium and base of the thumb metacarpal. However, a limitation of this report is that the duration of follow-up was short-to-medium term. In the long-term follow-up, it is possible that the pseudoarthrosis may lead to further degeneration, resulting in severe pain. In contrast, vascularized transfer of the third CMC joint after resecting the degenerated joint components may prevent further degeneration because the harvested joint has biological

activities. Although there were no reports describing vascularized pedicled third CMC joint transfer to the arthritic thumb CMC joint, a vascularized second or third metacarpal-based bone grafting technique has been reported for scaphoid nonunion and for Kienböck's disease in a few studies [6]. This procedure can be elevated with the same pedicle as the dorsal carpal network. Dauphin *et al.* reported that the third dorsal metacarpal artery was present in 97% of 20 fresh human cadavers and provided a reliable vascular system [7].

Vascularized joint transfer has been described for hand and wrist joint reconstruction [8,9]. Toe joint transfers have been demonstrated to maintain joint space in long-term follow-up, whereas collapse is seen in nonvascularized joint grafts [8]. These data suggest that use of a vascularized osteochondral flap may lead to superior survival compared with a nonvascularized graft. Therefore, it seems likely that the transferred vascularized third CMC joint can survive.

There are some limitations to this study. First, the follow-up period was only 1 year. Longer follow-up is needed to confirm the absence of advanced osteoarthritic changes in the donor or recipient site. Second, we did not perform second-look observation with magnetic resonance imaging or histological examination of the transferred area. Further detailed study of a case series is warranted.

Although it is necessary to evaluate the mid- and long-term follow-up results, our results reveal that vascularized third CMC joint transfer in cases of trapeziometacarpal arthritis may improve thumb function and reduce pain.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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