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CASE REPORT

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Volar denervation and osteophyte resection to relieve volar CMC joint pain

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ABSTRACT

At mean 125.6 months, pain was reduced from mean of 8.7 to 0.67, $p < .001$. Each of three patients, two of whom were musicians, returned to full professional ability. It is concluded that volar CMC joint denervation is a useful procedure, preserving joint function and relieving pain long-term.

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Introduction

Trapeziectomy as a treatment of first carpal-metacarpal (CMC) joint has been reported for almost 70 years [1]. It can be hypothesized that part or all of the pain relief related to CMC arthroplasty is related to denervation of the joint. This same hypothesis has been presented for partial denervation of the wrist joint itself, the lateral humeral epicondyle, and the anterior shoulder joint capsule in the upper extremity [2] and for the medial and lateral ankle joint and the sinus tarsi in the lower extremity [3]. In comparing CMC resection arthroplasty to resection-implant arthroplasty, it has been claimed that the thermal capsulorrhaphy component is, in these authors' opinion, a form of denervation responsible for the observed pain relief [4]. They implicate 'the superficial radial sensory nerve, the lateral antebrachial cutaneous nerve, and sensory branches from the median thenar motor and the ulnar deep motor branch' [4]. An attempt to denervate the CMC to include relief of the most common pain, dorsal radial, has been reported using a Wagner incision to approach the nerves innervating all surfaces of the joint [5]. It is the purpose of the present report, however, to describe long-term results of a denervation designed to relieve just the *volar* pain present in a subset of CMC joint pain patients, in particular those with pain related to playing the piano and writing.

Methods and demographics

A retrospective review of three patients was done to evaluate the results of a volar approach to the CMC joint, permitting resection of a volar osteophyte and resection of the volar innervation of this joint. Inclusion criteria were pain with manipulation of the first metacarpal against the trapezium, with the pain localized to the volar aspect of the joint, not the dorsoradial aspect of the joint. The pain did not respond long-term to anti-inflammatory medication or to steroid injection into the CMC joint. Preoperative radiographs demonstrated osteoarthritis of the CMC joint with a volar osteophyte, with or without osteoarthritis at the dorsal surfaces of the trapezium. Pain levels were greater a mean of 8.7 on a numerical rating scale from 0 to 10, and caused some degree of disability, which in two patients meant inability to play the piano, and in the third patient inability to work as a postal clerk (Table 1). Mean patient age was 64.3 with a range of 54–83 years.

Case reports

#1: A 56-year-old physician who was a concert pianist and violinist had pantrapezial osteoarthritis. She had disabling pain bilaterally in the CMC joint, preventing use of surgical instruments and playing musical instruments. Two previous hand surgery consultations both had suggested surgical treatment, either with a CMC fusion or resection-implant arthroplasty based upon her radiographic appearance (Figure 1). However, when she was examined, using a classic first metacarpal 'grind test' of the first metacarpal against the trapezium, pain was only present over the volar

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Table 1. Demographics.

Patient number	Age (years)	Side of surgery	Follow-up (months)		NRS		Outcome
			Right	Left	Pre-op pain	Post-op pain	
1	83	Right	48		9	1	Excellent
2	56	Bilateral	136	144	9	0	Excellent
3	54	Bilateral	148	152	8	1	Excellent

NRS: numerical rating scale; 0: no pain; 10: worst possible pain.

Figure 1. Radiographs of the patient who is described in Case #1, and who is patient #2 in Table 1. Radiograph in (A) shows the right first metacarpal trapezial joint pre-operatively and (B) shows the pan-osteoarthritis also on the left side.

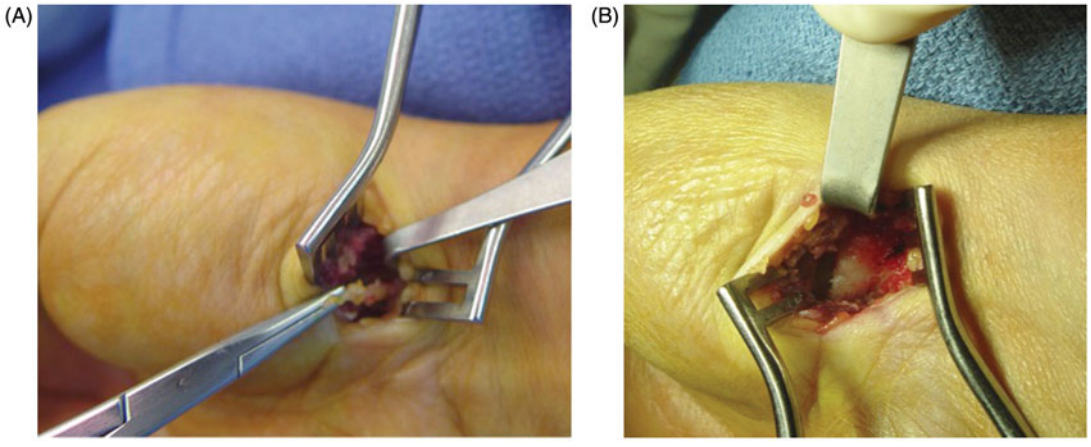

Figure 2. Intra-operative views of same patient as in Figure 1. (A) The innervation to be resected. (B) After osteophyte removal.

base of the first metacarpal, where imaging demonstrated a volar osteophyte. A surgical procedure was developed that included a volar osteophyte excision and partial CMC joint denervation. It was explained that if this approach did not relieve her pain sufficiently, either a fusion of resection arthroplasty, with or without implant would still be possible. The intra-operative views from the surgery on the right CMC are given in Figure 2. Post-operatively, she was able to resume her medical practice and musical instruments playing without the previous pain (Figure 3). At follow-up, 136 months after the right and 144 months after the right volar denervation, she was able to do all her professional skills, both medical and musical, and her pain relief had gone from a 9 to a 0 in each hand.

#2: A 54-year-old postal clerk had disabling pain bilaterally in the CMC joints that persisted after cortisone injections and splinting. The right hand had a volar denervation and osteophyte excision with good success and seven months later the left hand had the same surgery. Figure 4 demonstrates the intra-operative view of the nerve prior to resection, and a five-year follow up of him pinching bilaterally without pain. Twelve years after the surgery, he is still working at the postal department without problems. The radiographic comparison of the right CMC joint pre-op and five years post-operatively is seen in Figure 5.

Surgical technique

Loupe magnification (3.5×) is used. A pneumatic tourniquet is used. A 2 cm transverse incision is made at the base of the first metacarpal. The subcutaneous tissue is gently spread to avoid injury to cutaneous branches of the lateral antebrachial cutaneous nerve, the palmar cutaneous branch of the median nerve and the radial sensory nerve. The thenar muscle origin is gently elevated to gain entry to the CMC joint capsule. Just below this muscle will be observed the nerve innervating this portion of the CMC joint. The nerve branch or branches are injected with 1% lidocaine, dissected as far proximally as possible, cauterized and divided. The joint capsule is opened and the volar osteophyte removed. The capsule is closed with a 4-0 absorbable suture and the skin close. A bulky supportive dressing is used for just one week. Then gentle return to full activities is begun over the next two weeks.

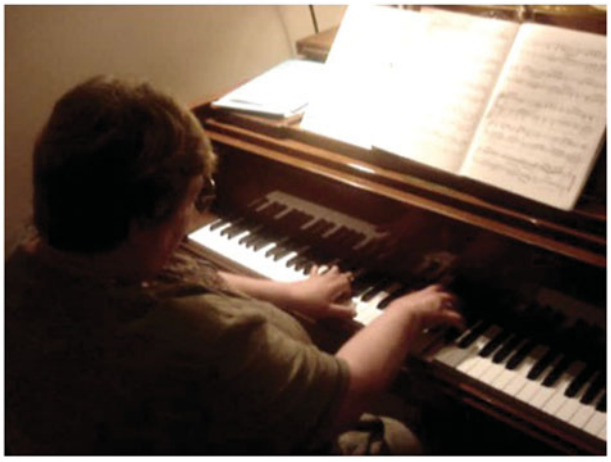

Figure 3. Clinical views of same patient as in Figure 1. Five years following bilateral volar CMC denervation, piano playing is possible without volar CMC joint pain.

Results

At a mean follow-up time of 125.6 months (range 48–152 months), the mean pre-operative pain score (NPS) of 8.7 dropped to 0.67. All three patients

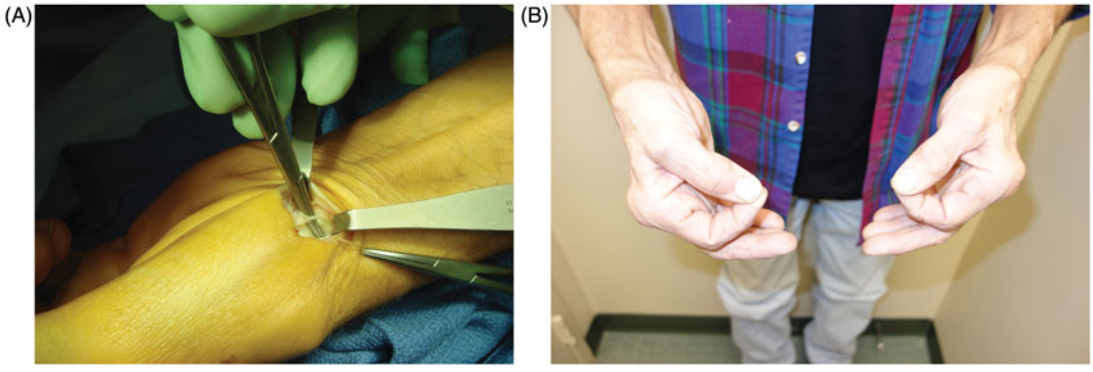

Figure 4. (A) Intra-operative view of the innervation to the left CMC joint and (B) a clinical bilateral view of the patient pinching without pain five years following the bilateral partial CMC joint denervation. This is the patient described in Case #2, who is patient #3 in Table 1.

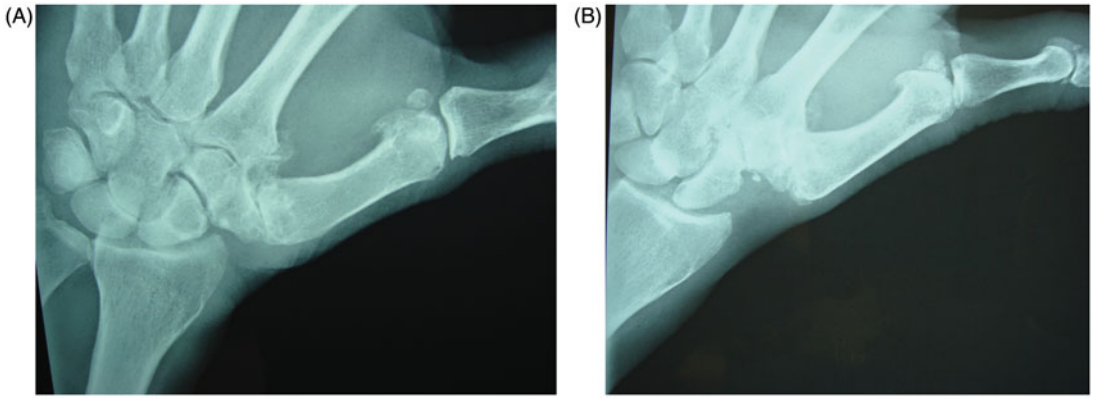

Figure 5. Radiographs of the same patient described in Figure 4. (A) Pre-operative view of the left CMC joint and (B) five year post-operative view of the same joint.

improved. The p value of the NPS change was $p < .001$. There were no complications in these three patients.

Discussion

The long-term results of this small retrospective cohort of three patients, demonstrate that for the patient with disability related to osteoarthritis of the first CMC joint, where the pain is located volarly and not dorsoradial, it is possible to relieve the disabling pain without a trapeziectomy. Each of the three patients in this study was able to return to the musical or other profession and maintain that work environment without pain medication related to the thumb. The pre- and post-operative radiographs support that the first metacarpal relationship to the trapezium remained unchanged by this partial joint denervation procedure.

The innervation of the first metacarpal trapezial joint has been investigated by several authors who were studying the innervation of the entire wrist joint [6–9]. These studies have concurred that the superficial radial sensory nerve and the lateral antebrachial cutaneous nerve and the palmar cutaneous branch of the median nerve are involved. One study suggests that the sensory branches from the ulnar deep motor branch contribute to the ulnar side of this joint, however these studies were done using embalmed cadavers [9]. The study of this joint using fresh cadavers did not identify innervation of the first CMC from the deep motor branch [7]. It remains for a further study in fresh cadavers to confirm/deny these observations related to the ulnar motor branch.

The innervation that is interrupted during the volar approach described in this report was probably from the palmar cutaneous branch of the median nerve, although this could not be confirmed clinically due to the limited surgical exposure.

Denervation of just one aspect of the CMC joint follows the concept of other partial joint denervation as begun and described by Dellon, first for the wrist [10], then for the knee [11], the shoulder [12] and the sinus tarsi [13]. It is possible that the CMC with dorsoradial pain will require an approach to denervate the entire joint, and this remains to be described.

Conclusions

Partial, volar, first CMC joint denervation is possible and results in long-term relief of pain with increased hand function.

Disclosure statement

The author reports no conflicts of interest. The author alone is responsible for the content and writing of this article.

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