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## Case report

## The effect of miniscalpel acupuncture and splint treatment for joint deformity of hand osteoarthritis: a case report

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## ABSTRACT

We are reporting the combined therapeutic effect of miniscalpel acupuncture and splint therapy on osteoarthritis of the hand accompanying severe joint deformity. The patient, female, 55 years of age, was diagnosed with symptomatic osteoarthritis of hand based on radiological examination and the American College of Rheumatology classification criteria. The patient was classified a grade 4 of Kellgren–Lawrence (KL) scale upon initial consultation. Over five months, the patient was treated with miniscalpel acupuncture with splint therapy. The patient's pain, decreased from 6–2 on numeral rating score (NRS) scale. The combined therapeutic effect of miniscalpel acupuncture and splint therapy seems to have positive results on OA of hand accompanying joint deformity, albeit being limited to a single case.

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## 1. Introduction

Along with hip and knee, the hand is one of the most frequently affected joints of osteoarthritis.<sup>1</sup> According to the Rotterdam study, the prevalence rate of those over 55 years of age ranges from 67% in women and 55% in men.<sup>2</sup> Similarly the American College of Rheumatology (ACR) physical examination criteria reported 8% of those over 60 years of age to suffer from symptomatic hand osteoarthritis,<sup>3</sup> characterized by symptoms like pain, stiffness, dysfunction, bony enlargement and joint deformities.<sup>4</sup> Osteoarthritis dramatically affects the quality of life and requires sufficient treatment.<sup>5</sup> In 2018, The European League Against Rheumatism (EULAR) analyzed 10 most frequent procedures and categorized the following as conventional: assistive devices, exercises, orthoses, topical medication, oral analgesics, chondroitin sulfate, and intra-articular glucocorticoid injections.<sup>6</sup> However, injections and oral analgesics were restricted due to the possibility of adverse effects, limiting treatment options once topical treatment and exercise fail.<sup>6,7</sup>

We are reporting symptom improvement of a patient with osteoarthritis of the hand with miniscalpel acupuncture treatment and splint therapy. The patient was considering surgical procedure

after failing with conventional treatment. This case report corresponds to the CARE guideline.<sup>8</sup>

## 2. Case

## 2.1. Patient information

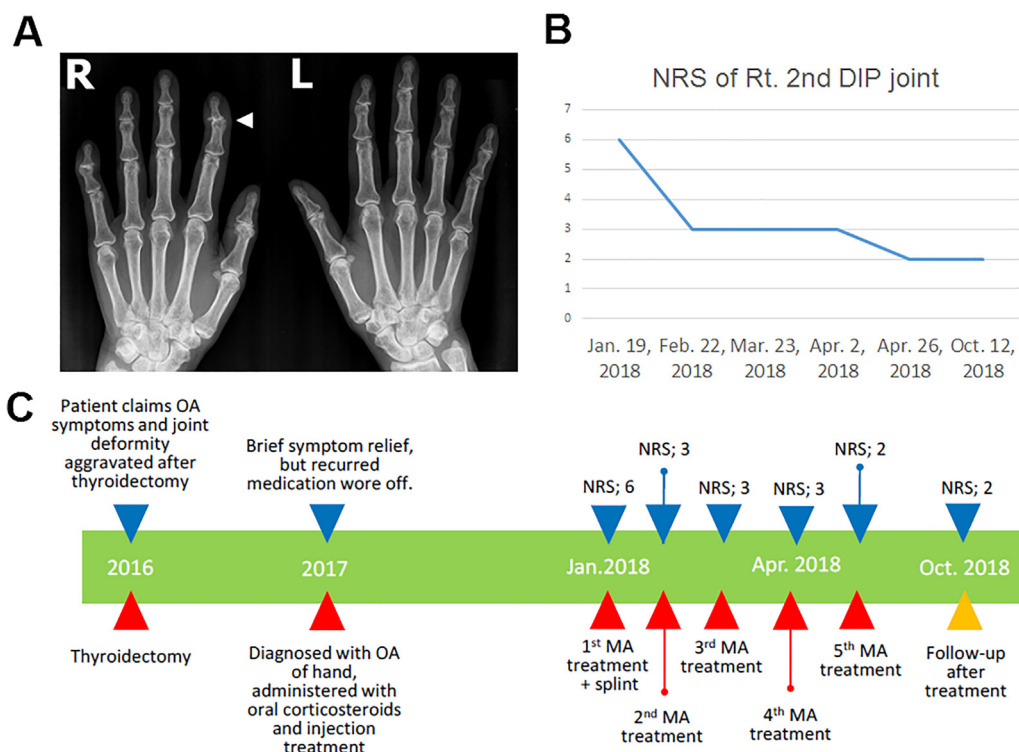
The patient is a female housewife, 55 years of age. On the initial consultation at 15th of January, 2018, her chief complaint was the pain of both 1<sup>st</sup> interphalangeal (IP) joint, Lt. 3<sup>rd</sup> distal interphalangeal (DIP) joint, Rt. 4<sup>th</sup> proximal interphalangeal (PIP) joint and severe pain with joint deformity of Rt. 2<sup>nd</sup> DIP joint. Patient history showed she has been administering oral medication related to osteoporosis and thyroid after thyroidectomy in 2016. With no family history of osteoarthritis, she claimed symptoms and joint deformity aggravated after thyroidectomy. She was primarily diagnosed with osteoarthritis in 2017 and treated with oral corticosteroids and injections, which only offered brief relief before relapse once the medication wore off. Since then, she suffered consistent swelling, pain, and joint deformity (Fig. 1).

## 2.2. Clinical findings

Swelling, rubor, and tenderness of both 1<sup>st</sup> IP joint, Lt. 3<sup>rd</sup> DIP joint, Rt. 4<sup>th</sup> PIP joint, Rt. 2<sup>nd</sup> and 5<sup>th</sup> DIP joint. Ulnar deviation deformity of Rt. 2<sup>nd</sup> DIP joint and radial deviation deformity of 5<sup>th</sup> DIP joint was observable (Fig. 1). Despite no limitation in range of

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**Fig. 1.** (A) X-ray view of both hand before treatment. Arrowhead, Rt. 2nd distal interphalangeal joint. (B) Numeral rating scale change before and after treatment. (C) Timeline. Abbreviations: DIP, distal interphalangeal; L, left; MA, miniscalpel acupuncture; NRS, numeral rating scale; OA, osteoarthritis; R, right.

motion (ROM), patient hesitated from fully grasping her hands due to pain.

### 2.3. Diagnostic assessment

Rheumatoid arthritis was excluded from the final diagnosis as the patient's blood test, and imaging results in February 2017 showed no signs of RA factor or rheumatoid deformity. She satisfied the American College of Rheumatology (ACR) classification criteria for osteoarthritis of hand; complaining pain and stiffness of both 1<sup>st</sup> IP joint, Lt. 3<sup>rd</sup> DIP joint, Rt. 4<sup>th</sup> PIP joint, Rt. 2<sup>nd</sup> DIP joint, Rt. 5<sup>th</sup> DIP joint and deformity of Rt. 2<sup>nd</sup>, 5<sup>th</sup> DIP joints.<sup>3</sup> With severe deformity, bone spur formation and decreased inter-joint space of 2<sup>nd</sup> and Rt. 5<sup>th</sup> DIP joint she was classified grade 4 of Kellgren–Lawrence (KL) scale (Fig. 1).<sup>9</sup>

### 2.4. Therapeutic interventions

Treatment was carried out by a licensed Korean medicine Doctor with 10 years of clinical experience. We applied miniscalpel acupuncture (scalpel width; 0.5 mm, length; 50 mm. Dongbang Dochim, Dongbang Medical, Boryeong, Korea) treatment on Ashi-points; distal interphalangeal joint and origin points of proper collateral ligament. Treatment was applied 5 times on Rt. 2<sup>nd</sup> DIP joint, the joint with most severe symptoms and once on joints with relatively light symptoms; both 1<sup>st</sup> IP joint, Lt. 3<sup>rd</sup> DIP joint, Rt. 4<sup>th</sup> PIP joint and Rt. 5<sup>th</sup> DIP joint. Points were marked and sterilized with povidone before anesthetized with 0.2 mL Bufonis Venenum phamacoacupuncture. Allergy skin test was carried out before the procedure. To avoid unnecessary injury, we approached the blade tip of miniscalpel acupuncture parallel to the direction of palmar digital nerve and palmar digital artery. Miniscalpel acupuncture was approached until bone contact and retrieved after 2–3 sessions of lifting–thrusting manipulation. Thorough pressure was applied to prevent bleeding. Besides miniscalpel acupuncture treatment, 30

sessions of acupuncture treatment with a similar approach were used on same points over 5 months; approaching the acupuncture needle until bone and ligament contact and retaining for 10 minutes without further manipulation. Patient wore Mallet finger Splint (Nuri Health Medical Appliances, Chilgok-gun, Korea) on the Rt. 2<sup>nd</sup> finger DIP for 2 weeks. Treatment procedure corresponds to the STRICTA criteria.<sup>10</sup>

### 2.5. Follow-up and outcomes

The patient received a total of five sessions of miniscalpel acupuncture treatment over 5 months (Fig. 1.). After the final treatment the Numeral rating scale (NRS) of rubor, swelling, and pain of Rt. 2<sup>nd</sup> finger DIP joint decreased from 6 to 2. Pain in both MCP IP, Lt. 3<sup>rd</sup> DIP, Rt. 4<sup>th</sup> PIP, Rt. 5<sup>th</sup> DIP joint decreased to 0 after a single treatment. No remarkable adverse event occurred throughout the treatment. Upon the last visit in October 2018, the patient's subjective pain remained NRS 2.

## 3. Discussion

The significance of this research is the promising results of the combined therapeutic effect of miniscalpel acupuncture and splint treatment on a patient, classified as in need for surgical intervention according to EURAL recommendations after failing to respond to oral medication and injection therapy. Improvement in both pain and, despite minor, radiological findings were observable.

The current guideline recommends topical NSAIDs first hand, before administering oral medications or injection therapy. However, due to possible side effects, oral medication is prescribed in the short term while injection therapy is limited to acute inflammatory pain.<sup>6</sup>

Surgical intervention is suggested when all conventional treatment fails, but not highly recommended due to the possibility of pain, instability, nerve dysfunction, superficial wound infections,

tendon pulling sensation and chronic regional pain syndrome.<sup>11</sup> Hence treatment options are limited to patients with chronic symptomatic osteoarthritis of hand not responding to oral medication and injection therapy.

Miniscalpel acupuncture is a piece of equipment combining both the features of acupuncture and surgical knife, using the blunt tip to stimulate the area of chronic injury and soft tissue damage.<sup>12</sup> Lin et al (2014) reported greater treatment effect and reduction of inflammatory substance IL-1 $\beta$ , IL-6, TNF- $\alpha$  in joint synovium compared to conventional acupuncture.<sup>13</sup> A study comparing the treatment effect of miniscalpel acupuncture and sodium hyaluronate concluded miniscalpel acupuncture presented greater histopathological cartilage recovery and effective inhibition of Vascular endothelial growth factor (VEGF) expression.<sup>14</sup> Miniscalpel acupuncture has been reported to reduce abnormal stress applied on joints, promote cartilage synthesis and recovery by activating FAK-PI3K pathways.<sup>15</sup> However, these studies are based on osteoarthritis of the knee, or in vivo, and does not apply directly on osteoarthritis of the hand.

The most prominent limitation of this research is the number of patients; we barely discuss the possibility nor propose any evidence for treating osteoarthritis of the hand. Another limitation is the combined effect of therapeutic interventions. The patient was treated with miniscalpel acupuncture, conventional acupuncture, and splint therapy, assessing independent interventions impossible. A more strictly bias controlled study with a larger number of patients should be conducted in the near future.

#### 4. Patient perspective

Before treatment, the patient experienced pain and joint deformity which affected daily chores and caused depression. Currently, the patient complains occasional pain. Other joints also affected with osteoarthritis were treated with miniscalpel acupuncture. Those with early deformity showed significant improvement within 1–2 treatment sessions. She claims she would have expected a better prognosis if treated earlier, before severe deformity (October 2018).

#### Informed consent

The patient gave written informed consent to the publication of this case report.

#### Authors' contributions

K-Cho performed conception and design of the study, acquisition of data. SH-Yoon and Y-Kim were drafting the article and revising it critically for important intellectual content. All authors approved the final manuscript.

#### Conflict of interest

The authors declare no conflict of interest.

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#### Data availability

Data will be made available on request

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