

Miniscalpel Needle Therapy with Integrative Korean Medical Treatment for Carpal Tunnel or Tarsal Tunnel Syndrome: Case Series of Three Patients

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[Abstract]

Objectives : This study reports the clinical effects of miniscalpel needle therapy in patients with carpal tunnel or tarsal tunnel syndrome.

Methods : Three patients with carpal tunnel syndrome (CTS) or tarsal tunnel syndrome (TTS) (first case, patient with CTS and TTS; second case, patient with CTS; and third case, patient with TTS) were treated with miniscalpel needle (MSN) therapy and integrative Korean medical treatment. The Numeric Rating Scale (NRS), Neuropathic Pain Scale (NPS), Boston scale score, and AOFAS (American Orthopaedic Foot and Ankle Society) ankle–hindfoot score were measured.

Results : In general, outcome measures after treatment showed improvement in all cases. In the first case (CTS and TTS), scores on the NRS, NPS, and Boston scale decreased, and AOFAS ankle–hind foot scores increased. In addition, Tinel’s sign showed improvement. In the second case (CTS), scores on the NRS, NPS, and Boston scale, and Tinel’s sign, were decreased. In the third case (TTS), scores on the NRS and NPS, and Tinel’s sign, showed improvement, and AOFAS ankle–hind foot scores were increased.

Conclusion : These results suggest that MSN therapy has a meaningful clinical effect in CTS and TTS.

Key words :

Miniscalpel needle therapy;
Carpal tunnel syndrome (CTS);
Tarsal tunnel syndrome (TTS);
Boston scale;
AOFAS ankle–hindfoot scale

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I. Introduction

Carpal tunnel syndrome (CTS) is comprised of a group of symptoms, including numbness and dysesthesia, which are caused by pressure to the median nerve on the wrist. These symptoms are the most common nerve compression signs appearing in the upper limb¹. The prevalence of CTS varies, but affects approximately 0.1% of the global population², predominantly middle-aged women in their forties to sixties³. The exact etiology of CTS is unclear, but it is known to be caused by pressure to the median nerve as a consequence of the thickening of the ligament covering the carpal tunnel due to repeated use of the hand and wrist³.

Tarsal tunnel syndrome (TTS) is caused by pressure on the posterior tibial nerve in the flexion area of the posterior, lower part of the interior malleolus. Causes of TTS include fracture, fascial hypertrophy, and ganglion, etc., and are identified in 60–80% of cases; however, some cases occur without a known cause³.

The primary treatment of CTS and TTS is conservative treatment with NSAIDs, or oral administration or local injection of steroids, while surgery is performed when conservative treatment fails or the cause of the symptoms is clear³.

Miniscalpel needle (MSN) therapy is an acupuncture method that entails peeling the adhesion of soft tissue using a flat knife on the head of the acupuncture needle. Recently, it has been widely used for chronic pain diseases caused by soft tissue damage⁴. Korean medicine treatments such as acupuncture⁵, pharmacopuncture, electroacupuncture⁶, and chuna⁷ for CTS and TTS have been reported, but case reports using MSN therapy are scarce. In this study, we report three cases of patients that 1) presented with numbness and feeling of cold in the limbs, 2) were diagnosed with CTS or TTS by physical examination, and 3) were treated with MSN therapy and showed significantly positive results.

II. Methods

1. Participants

The participants of this study were three patients admitted or treated at Department of Acupuncture & Moxibustion of the Dunsan Korean medicine hospital of Daejeon University between December, 2016 and February, 2017 for symptoms of numbness and feeling of cold in the upper or lower limb, and who were diagnosed with CTS or TTS based on symptoms and physical examination^{8,9}. Prior to study initiation, agreements on personal information were signed by patients and the study was the approved by the Institutional Review Board at Dunsan Korean medicine hospital of Daejeon University (Deliberation number: DJDSKH-17-BR-02-1)

2. Intervention

1) MSN therapy

Prior to treatment, MSN therapy was explained in detail to the patient, and written consent obtained (Appendix 1).

The disposable MSN was produced by Hansung Meditech, Ltd. (Republic of Korea), 1.2 × 60 mm in size. The patient with CTS was treated with MSN therapy on the area around acupuncture point PC7, while the patient with TTS was treated on the area around KI3, KI6, and KI5. The MSN was inserted parallel to the nearby muscle and ligaments at a depth of 5–7 mm, and pulled out immediately¹⁰.

Per hospital recommendations, a total of 0.5 ml of 2% lidocaine using a 30G, 13 mm disposable needle on the area was administered for local anesthesia. The area was disinfected with a disposable alcohol swab and potadine to prevent infection.

The practitioner wore sterilized gloves and mask. The patient's systemic reaction and focal side effects were monitored, and the treated site was covered with gauze and a bandage. The patient was informed about possible adverse events such as

hemorrhage, palpitation, dizziness, and hypotension. MSN therapy was performed by a board-certified specialist of acupuncture and moxibustion with over twenty years of clinical practice.

2) Acupuncture

Acupuncture was performed once before MSN therapy with sterilized 0.20×30 mm-sized stainless steel disposable needles produced by Dong-Bang Medical Ltd (Republic of Korea). Needle retention time was approximately 20 minutes. According to patient symptoms, the lesions near the acupuncture points were chosen from TE5, LI5, TE2, TE3, SI2, and SI3 for CTS, and from KI3, KI4, KI6, LR3, BL62, and BL60 for TTS. Distal acupuncture points were chosen from LI4, LI11, LU5, PC3, LI10, ST36, and SP9⁴⁾.

3) Herbal medicine

Bangpungtongseong-san was administered three times a day, 30 minutes after each meal (120 cc per dose). One of the cases was outpatient and thus herbal medicine was not administered. The composition of Bangpungtongseong-san is described in Table 1.

4) Physical therapy

Deep layer thermotherapy using ultrasonic waves was performed on the affected wrist or ankle according to patient symptoms.

3. Evaluation

Case 1 and Case 3 were admitted to our hospital for 2 days. MSN therapy was performed on the first day of admission, and evaluation was carried out before MSN therapy and on the following day. Case 2 was treated in the outpatient ward, and evaluation was performed before treatment and on the next follow up, 1 week later. Evaluation was performed by a Korean medical doctor with over one year of clinical practice.

Table 1. Composition of Bangpungtongseong-san

Scientific name	Amounts (g) per pack
Talcum	6
Glycyrrhiza	5
Gypsum Fibrosum	3
Scutellariae Radix	3
Platycodi Radix	3
Ledebouriellae Radix	2
Cnidii Rhizoma	2
Angelicae gigantis Radix	2
Paeonia Radix Rubra	2
Rhei Radix et Rhizoma	2
Ephedrae Herba	2
Menthae Herba	2
Forsythiae Fructus	2
Natrii Sulfas	2
Schizonepetae Herba	1
Atractylodis Macrocephalae Rhizoma	1
Gardeniae Fructus	1

1) Numeric Rating Scale (NRS)

The severity of pain is expressed from 0 to 10 by the patient to objectify subjective pain. A score of 0 indicates no pain while a score of 10 indicates the worst pain¹¹⁾.

2) Neuropathic Pain Scale (NPS)

The severity of pain due to neuropathy is measured by eight questions pertaining to the intensity of pain, sharpness, burning sensation, dull sense, cold sensation, sensitivity, itching, and discomfort¹²⁾ (Appendix 2).

3) Tinel's sign

Tinel's sign on the hand is tested by tapping the median nerve on the palmar wrist. Tinel's sign on the foot is tested by tapping the posterior tibial nerve on the posterior, lower part of the malleolus with a percussor, with the knee of the patient flexed, in a prone position. Signs of dysesthesia are monitored⁴⁾.

4) Boston scale

The Boston scale is a specialized questionnaire for CTS patients, divided into a symptom severity scale consisting of eleven questions and a functional status scale consisting of eight questions. For each question, a 5 is scored for the most severe symptom and 1 for no symptom. The mean score represented the final score^{13,14}. This test was performed on patients with CTS (Appendix 3).

5) American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot score

The AOFAS ankle-hindfoot score is obtained from a questionnaire developed by the AOFAS that measures the discomfort of the hindfoot and ankle. The test consisting of 40 points of pain severity, 50 points of functional limitation, and 10 points of arrangement. Higher points signify greater improvement of symptoms^{15,16}. This test was performed on patients with TTS (Appendix 4).

around 2014. She received medication from local Hospital around January, 2016, without any improvement, and visited our hospital on December 5, 2016. She was diagnosed with CTS and TTS based on the complaining symptom, a positive Phalen test and Tinel's sign, and increased numbness when pressing the carpal tunnel and the tarsal tunnel. Other diseases were ruled out through physical examination of the neck and lower back.

(6) Radiologic imaging results

① Both wrist A/L(2016.12.05):

No significant visible abnormal findings.

② Both ankle A/L(2016.12.05):

No significant visible abnormal findings.

(7) Herbal medicine

Bangpungtongseong-san for a day

2) Case 2

(1) Patient: Han OO, male, 56 years old

(2) Chief complaint: numbness and pain of fingers of both hands

(3) Onset: around September, 2015

(4) Medical history

① Herniation of lumbar disc

(5) Present illness

This patient developed numbness and pain of fingers of both hands after repeatedly carrying goods at onset, and has been treated with acupuncture at our hospital since September 2015, without any improvement. He visited our hospital on December 17, 2016 to receive MSN therapy. He was diagnosed with CTS based on the complaining symptom, a positive Phalen test and Tinel's sign, and increased numbness when pressing the carpal tunnel. Other diseases were ruled out through physical examination of the neck.

III. Results

1. Cases

1) Case 1

(1) Patient: Cho OO, female, 58 years old

(2) Chief complaint: numbness and feeling of cold in the limbs

(3) Onset: around 2014

(4) Medical history

① Arrhythmia

(5) Present illness

This patient developed numbness and feeling of cold in the limbs at onset, without a particular cause, and received acupuncture and herbal medicine treatment at local Korean medicine clinic

(6) Radiologic imaging results

① Both hand A/O(2015.09.24) :

No significant visible abnormal findings.

3) Case 3

(1) Patient: Kim OO, male, 55 years old

(2) Chief complaint: numbness and feeling of cold in both lower limbs

(3) Onset: around December, 2016

(4) Medical history

① Hypertension

② Hyperlipidemia

③ Gout

④ Gastrointestinal hemorrhage

⑤ Otolithiasis

(5) Present illness

This patient developed numbness and feeling of cold on both lower limbs at onset, without a particular cause, and visited our hospital on January 6, 2017. He was diagnosed with TTS based on the complaining symptom, a positive Tinel's sign, and increased numbness when pressing the tarsal tunnel. Other diseases were ruled out through physical examination of the lower back.

(6) Radiologic imaging results

① Both ankle A/L(2016.01.06) :

No significant visible abnormal findings.

(7) Herbal medicine

Bangpungtongseong-san for a day

2. Results

1) Case 1

MSN therapy was performed once on both hands and feet on December 5, 2016. In the hands, the NRS of 5 was improved to a NRS of 4, and the NPS of 38 was decreased to 9. The symptom severity

score of the Boston scale, 3.18, remained unchanged before and after intervention, but the score on the functional status scale decreased from 3.38 to 2.63. The Tinel's sign changed from positive to negative. In the feet, the NRS of 5 was improved to a NRS of 4, and the NPS was reduced from 34 to 9. The AOFAS ankle-hind foot score remained unchanged at 81 points while the Tinel's sign disappeared (Table 2).

2) Case 2

MSN therapy was performed once on the hands, on December 17, 2016. The NRS of 5 before the intervention decreased to a NRS of 3 after the treatment, and the NPS was reduced from 23 to 18. The symptom severity score of the Boston scale was decreased from 3.18 to 2.18, and the score on the functional status scale decreased from 3 to 1.63. The Tinel's sign changed from positive to negative (Table 2).

3) Case 3

MSN therapy was performed once on the feet on January 6, 2017. The NRS of 5 before the treatment decreased to a NRS of 4, and the NPS decreased from 42 to 26. The AOFAS ankle-hindfoot score increased from 72 to 90 points. The Tinel's sign changed from positive to negative (Table 2).

IV. Discussion

The carpal tunnel is an inelastic fibro-osseous canal located in front of the wrist consisting of proximal deep fascia of the forearm, transverse carpal ligament of the middle section, and distal aponeurosis between the thenar and antithenar muscles. Nine of the flexor tendons and the median nerve pass through this canal. The tarsal tunnel is a structure surrounded by the medial condyle of the tibia, the interior wall of the calcaneus bone, and flexor ligaments. The posterior tib-

Table 2. Symptom and function scores of three patients with carpal tunnel syndrome and/or tarsal tunnel syndrome before and after treatment with miniscalpel needle therapy

Scale		Case 1-1*		Case 1-2 ⁺		Case 2*		Case 3 ⁺	
		Before	After	Before	After	Before	After	Before	After
NRS		5	4	5	4	5	3	5	4
NPS		38	9	34	9	23	18	42	26
Tinel's Sign	Rt.	(-)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
	Lt.	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
Boston	Symptom	3.18	3.18	.	.	3.18	2.18	.	.
	Functional	3.18	2.18	.	.	3.00	1.63	.	.
AOFAS ankle-hindfoot score		.	.	81	81	.	.	72	90

* Carpal tunnel syndrome.

⁺ Tarsal tunnel syndrome.

AOFAS, American Orthopaedic Foot and Ankle Society; NPS, neuropathic pain scale; NRS, numeric rating scale.

ial tendon, flexor digitorum longus, flexor hallucis longus and the posterior tibial nerve pass by¹⁾.

CTS occurs from pressure to the median nerve from various factors causing the narrowing of the carpal tunnel, such as the malunion of a distal radial fracture, or a tumor, injury, or infection. Numbness, sharp pain, burning sensation, etc. appears on the thumb, index and middle finger⁴⁾. In most cases, it is idiopathic and common in people who repeatedly use the wrist^{6,17)}. TTS is a disease-causing numbness and pain due to the pressure of the posterior tibial nerve inside the tarsal tunnel, and generally appears in the medial part of the calf, medial part of toes, and the sole. Causes outside the tarsal tunnel are fracture or splints of the astragalus, calcaneus, or posterior tibia, and eversion of the posterior foot. Inside the tarsal tunnel, factors such as ganglion, tendosynovitis, lipoma, etc. cause TTS, but in many cases, the cause of TTS is unknown^{3,4)}.

The diagnosis of CTS or TTS is mainly based on detailed history and physical examination. Electrical tests and magnetic resonance imaging can also help with the diagnosis^{3,18)}. The physical examination of CTS includes the Phalen test and Tinel's sign. The Phalen test is high in sensitivity and the Tinel's sign is high in specificity³⁾. Numbness of the sole and positive a Tinel's sign are helpful in diag-

nosing TTS. The diagnosis can be confirmed through the presence of neuropathy through an electromyogram^{19,20)}.

The treatment of CTS and TTS are classified into either conservative treatment or surgery. Generally, conservative treatment includes medication such as NSAIDs and steroids, local steroid injection, or fixing splints. When these methods fail and the cause of the signs is clear, surgery is considered. However, when the cause is unclear or when psychiatric diseases are also present, treatment by operation calls for much caution^{3,13)}. Generally, conservative treatment is preferred for mild cases and surgery is preferred by severe cases, but the rationale for what treatment is optimal for each patient is lacking²¹⁾.

In this study, MSN therapy was used to treat CTS and TTS. It is a novel acupuncture method that incorporates the functions of acupuncture and scalpel, thus combining and advancing acupuncture theory of Korean medicine and operative treatment. By using the MSN, the adhesion of soft tissue is peeled off to treat chronic pain due to soft tissue damage. The chronically damaged soft tissue of the tendon sheath, muscles, and ligament is peeled to recover the original kinetic state and promote blood circulation to the lesion⁴⁾. MSN therapy is currently applied in various diseases,

and of the 39 MSN studies reported from 1999 to 2014, 34 (87.1%) investigated musculoskeletal diseases²², showing that MSN therapy is highly beneficial in musculoskeletal diseases.

MSN therapy is simple to perform, the benefits are immediate⁴, is less painful than surgery, and demonstrates positive effects when surgery is not an option and existing conservative treatments show little benefit.

The Korean medicine treatment for CTS and TTS utilizes conservative treatments including acupuncture, pharmacopuncture, electroacupuncture, chuna, etc.⁵⁻⁷, but studies on MSN therapy compared to other treatments is lacking. One study reported improvement of pain symptoms after MSN therapy in patients with TTS²³, but there was only a limited number of case reports and related studies.

In this study, we performed MSN therapy in combination with integrative Korean medicine treatment on three participants who visited or were admitted to Department of Acupuncture & Moxibustion of the Dunsan Korean medicine hospital of Daejeon University. The patients complained of numbness and feeling of cold in the limbs, and were diagnosed with CTS or TTS by physical examination between December, 2016 and February, 2017.

A decrease in scores on pain scales such as the NRS, NPS, as well as the disappearance of Tinel's sign, was observed in all three patients. The Boston scale scores on the symptom and function measurement were generally decreased in the CTS case, while the AOFAS ankle-hind foot score generally increased in the TTS case, showing improvement after only one session of treatment (Table 2). No adverse event occurred in any of the cases.

The current study confirms that MSN therapy combined with integrative Korean medicine treatment can significantly relieve pain and improve discomfort of daily life with only one session of treatment in patients with CTS or TTS complaining of numbness and feeling of cold in the upper or lower limb. However, this study did not contain a

control group, the number of cases was low, and follow up observation was not performed. Also, the integrative Korean medicine treatment, including acupuncture, herbal medicine, and physical therapy was administered differently in all the cases. More objective diagnosis criteria using electromyography, in addition to the complaint and physical examination, was not applied. In future studies on the effectiveness of MSN therapy on CTS and TTS, systematically-designed large scale randomized, controlled trials are needed.

However, as verified in this study, the fact that MSN therapy significantly improved symptoms in patients with numbness and feeling of cold in the upper and lower limbs that did not react to general conservative treatment, implies the possibility of advancement of this therapy. Continued investigation on the use of MSN therapy in CTS and TTS is needed in the future.

V. References

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Appendix 1.

Patient number:
Name:
Age:
Gender: M / F
Dep.:
Ward:
Date of Admission:

Patient Information and Consent Form

Doctor:

Signature:

▪ **What is Miniscalpel Needle (MSN) Therapy?**

Miniscalpel needle (MSN) therapy is the Oriental therapy of peeling deep inside the lesion using a bladed needle with a thick flat-head and cylindrical body. Its purpose is to resolve chronic soft tissue injury and adhesion, recovering kinetic state. It is an efficient therapy for chronic accumulated injury.

▪ **Procedure method**

We use a specialized MSN targeting the inner core muscles where tenderness appears.

▪ **Alternative treatment**

We can substitute general acupuncture and pharmacopuncture treatment for MSN.

▪ **Expected results without MSN**

Recovery from disease could be delayed.

▪ **Possible side effects and precautions**

Although we sterilize the needle and MSN site directly, inflammation may possibly occur according to patient's immunity. Side effects from the anesthetic may include shock, malignant hyperthermia, convulsion, vomiting, dizziness, or allergic response.

On the day of the treatment, DO NO STIMULATE the MSN sites by washing, taking a bath, or drinking. You are recommended to AVOID EXCESSIVE MOVEMENT for 3 days after treatment. You have to BE CAREFUL OF INFECTION on the MSN sites, where sterilized gauze will be applied. This treatment has a greater possibility of infection than general acupuncture. Side effects, including palpitation, dizziness, and hypotension may occur after treatment.

▪ **Please check if you are included**

- You have central nervous system diseases
- You may be pregnant
- You have severe hypertension
- You are taking antithrombotic drugs like warfarin, aspirin or others, OR you have a hemostatic disorder.
- You have any history of surgery or you are currently receiving treatment (Name of disease:)

I received sufficient explanation about MSN treatment and fully understand causable complications (inflammation, palpitation, dizziness, or hypotension) with MSN. I agree to this consent and entrust treatment to the medical attendant.

· Dates: , 2017

· Patient: · Signature:

· Substitute (Relation to patient): · Signature:

- For: The patient could not comprehend this form due to somatopsychic disorder.
 The patient is underage.
 It is obvious that this explanation could adversely affect the patient's condition.
 The patient personally delegates the right to consent to a specific person.
 Other()

Appendix 2.

Neuropathic Pain Scale(NPS)

Please read the following questions and mark ✓ in the appropriate box

1. How strong is your pain?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe pain imaginable
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2. How sharp is your pain?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe sharp pain imaginable
---------	---	---	---	---	---	---	---	---	---	----	---------------------------------------

3. How much do you feel burning sensation in the pain area?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe burning sensation imaginable
---------	---	---	---	---	---	---	---	---	---	----	--

4. How much do you feel dull sense in the pain area

No pain	1	2	3	4	5	6	7	8	9	10	The most severe dull sense imaginable
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5. How much do you feel cold sensation in the pain area?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe cold sensation imaginable
---------	---	---	---	---	---	---	---	---	---	----	---

6. How sensitive do you feel in the pain area?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe sensitivity imaginable
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7. How much do you feel itch in the pain area?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe itch imaginable
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8. How much do you feel discomfort in the pain area?

No pain	1	2	3	4	5	6	7	8	9	10	The most severe discomfort imaginable
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Appendix 3.

Boston Scale

I. Symptom

The following questions refer to your symptoms within a typical period of 24 hours, during the last two weeks.

(Choose one answer to each question)

1. How strong is the pain in your hand or wrist at night?
 - 1) I feel no pain on hand or wrist at night
 - 2) little pain
 - 3) moderate pain
 - 4) intense pain
 - 5) severe pain
2. How many times did your hand or wrist pain wake you up in a typical night for the last two weeks?
 - 1) never
 - 2) once
 - 3) two or three times
 - 4) four or five times
 - 5) more than five times
3. Do you usually feel hand or wrist pain during the day?
 - 1) I never feel pain during the day
 - 2) I feel little pain during the day
 - 3) I feel moderate pain during the day
 - 4) I feel intense pain during the day
 - 5) I feel severe pain during the day
4. How often do you feel hand or wrist pain during the day?
 - 1) never
 - 2) once or twice a day
 - 3) three to five times a day
 - 4) more than five times a day
 - 5) constant pain
5. On average, how long do daytime pain episodes last?
 - 1) I never feel pain during the day
 - 2) less than 10 minutes
 - 3) from 10 to 60 minutes
 - 4) more than 60 minutes
 - 5) I feel constant pain during the day
6. Do you feel your hand dormant (loss of sensitivity)?
 - 1) No
 - 2) I feel little dormancy
 - 3) I feel moderate dormancy
 - 4) I feel intense dormancy
 - 5) I feel severe dormancy
7. Do you feel weakness in your hand or wrist?
 - 1) no weakness
 - 2) little weakness
 - 3) moderate weakness
 - 4) intense weakness
 - 5) severe weakness
8. Do you feel a tingling sensation in your hand?
 - 1) no tingling sensation
 - 2) little tingling sensation
 - 3) moderate tingling sensation
 - 4) intense tingling sensation
 - 5) severe tingling sensation
9. How strong is dormancy or the tingling sensation at night?
 - 1) never feel dormancy or tingling sensation at night
 - 2) little
 - 3) moderate
 - 4) intense
 - 5) severe
10. How often did dormancy or the tingling sensation wake you up during a typical night for the last two weeks?
 - 1) never
 - 2) once
 - 3) two or three times
 - 4) four or five times
 - 5) more than five times
11. How difficult is it to take and using small objects, such as keys or pens?
 - 1) not difficult
 - 2) a little difficult
 - 3) moderately difficult
 - 4) very difficult
 - 5) severely difficult

II. Function

In a typical day for the last two weeks, have your hand or wrist symptoms brought difficulty in performing the activities listed below?
 (Please circle the number that best describes your ability to perform the activity)

Activity	Degree of Difficulty
Writing	1 2 3 4 5
Buttoning clothes	1 2 3 4 5
Holding a book while reading	1 2 3 4 5
Holding the telephone receiver	1 2 3 4 5
Housekeeping	1 2 3 4 5
Opening a glass vial cap	1 2 3 4 5
Carrying market bags	1 2 3 4 5
Bathing and dressing	1 2 3 4 5

- No difficulty 1
- Little difficulty 2
- Moderate difficulty..... 3
- Intense difficulty..... 4
- Cannot perform the activity at all due to hands and wrists symptoms 5

Appendix 4.

AOFAS Ankle–Hindfoot Scale

Pain (40 points)	
No pain	40
Little	30
Moderate	20
Severe	0
Function (50 points)	
Activity disorder, need for assistance instrument	
No limitation	10
Limitation in everyday life	7
Limitation in leisure activity	4
Severe limitation in everyday life and leisure activity	0
Use of assistance instrument	
Maximum Walking Distance	
More than 6 blocks	5
4 to 6 blocks	4
1 to 3 blocks	2
Less than 1 block	0
Difficulty Due to Walking Area	
No difficulty	5
A little difficult for rugged surface, slope, ladder, etc.	3
Very difficult for rugged surface, slope, ladder, etc.	0
Walking Disorders	
No	8
Moderate	4

Severe	0
Ankle movement	
Normal or little limitation (more than 30° angle)	8
Moderate limitation (15 to 29°)	4
Severe limitation (less than 15°)	0
Heel Movement	
Normal or little limitation (more than 30° angle)	6
Moderate limitation (15 to 29°)	3
Severe limitation (less than 15°)	0
Stability of Ankle-Heel	
Stable	8
Unstable	0
Arrangement (10 points)	
Good walking by soles normal arrangement of metatarsal bones	10
Moderate walking by soles little disarrangement of metatarsal bones	5
Poor not walking by soles severe disarrangement of metatarsal bones	0
Total	