

# COILS

Clinical  
Osteopathically  
Integrated  
Learning  
Scenarios

Patient with

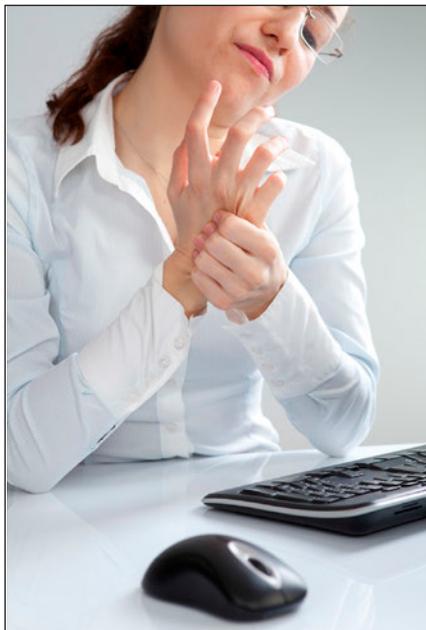
## **Carpal Tunnel Syndrome**

Prepared by: AACOM's Educational Council on Osteopathic Principles

## Part 2: Chapter 1

**Musculoskeletal Clinical  
Osteopathically  
Integrated Learning Scenario:**

# Patient With Carpal Tunnel Syndrome



## Description

This Clinical Osteopathically Integrated Learning Scenario (COILS) focuses primarily on the palpatory evaluation and supportive osteopathic manipulative treatment for carpal tunnel syndrome (CTS).

The COILS is divided into two sections:

### Section One

The **Roundtable Discussion Workshop** includes a discussion and evaluation of the patient's case history, diagnosis, pathophysiology, osteopathic principles involved, functional anatomy, treatment options, contraindications, and (if time permits) a demonstration of manipulative treatment techniques applicable to the patient's homeostatic needs.

### Section Two

The **Patient-Based Application Workshop** is the supervised application of manipulative treatment techniques for a patient with this diagnosis. The workshop is designed to evaluate the student's or physician's diagnostic and psychomotor skills when providing an osteopathic manipulative treatment for an actual (or simulated) patient.

*If time permits, the instructor may deliver the entire two-section program at one time. Ideally, however, Section One should be taught several days before Section Two to allow time for the student or physician to review and practice appropriate techniques. If an actual patient is not available for Section Two, a simulated patient may be used.*

## Section One: Roundtable Discussion Workshop

### I. Description

*This section is a roundtable-type presentation and discussion on the osteopathic approach to the treatment of a patient who has CTS.*

### II. Cognitive Components

#### A. Case Presentation

A 34-year-old administrative assistant, gravida 2, para 1, in her 32nd week of pregnancy, complains of pain and paresthesia in her right thumb, index finger, and middle finger beginning one month ago. She has experienced an ache in her forearm. The pain is intermittent and worse at night. She also has woken up with numbness in her hands. Shaking or rubbing the hands lessens the symptoms. During the day, she experiences similar symptoms while driving the car. She also describes some weakness in opening jars and grasping objects.

#### Physical Examination

**Vital signs:** Heart Rate, 93; Respiratory Rate, 18; Blood Pressure 130/85  
**Head:** Normocephalic, atraumatic  
**Ears:** Tympanic membrane are clear with good cone of light; no erythema  
**Eyes:** PERLA; conjunctiva with injection; retinal exam without hemorrhage or exudate  
**Nose:** Nares patent without erythema or edema  
**Throat:** No thyromegaly; no lymphadenopathy  
**Cardiac:** No murmur; no S3 or S4 gallop  
**Lungs:** CTA with no abnormal lung sounds  
**Abdominal:** Gravid uterus palpated just below the xiphoid; bowel sounds in all quadrants; non-tender; no other abnormal masses palpated  
**Extremities:** +1/4 edema in the lower extremities at the ankles bilateral; pulses +2/5 bilaterally  
**Lungs:** CTA with no abnormal lung sounds  
**Neuro:** Loss of sensation of the thumb, index, and medial aspect of the middle finger of the right hand; right thumb abduction weak without any muscle atrophy; Tinel's and Phalen's tests reproduce patient's symptoms; Finkelstein's test negative

#### Diagnostics

- Nerve conduction: Prolonged distal latency of the median motor and sensory nerves

## Osteopathic Structural Examination

- Slumped posture, with shoulders protracted and forward carriage of the head
- T2 is ERRSR, and T3 is ERLSL.
- Right pectoralis minor muscle tender and hypertonic
- Right first and second ribs elevated
- Right scalene muscles ropy and tender
- Right posterior radial head with a right wrist flexion dysfunction

## B. Pathophysiology

1. Right-sided upper thoracic and rib dysfunction with consequent increased upper-extremity sympathetic tone produces arm and hand symptoms. Some arm symptoms are nerve related, while others may relate to lymphatic dysfunction, located in the same distribution as the median nerve.
2. Increased sympathetic influences to the lymphatics cause a reduction in the size of lymphatic channels, producing tissue congestion and a “hard” tissue edema.
3. Hormonal retention of fluids during pregnancy may aggravate CTS symptoms. These symptoms disappear after delivery.
4. Metabolic factors such as diabetes or thyroid disease can predispose a patient to the pathology that leads to CTS.
5. Repetitive motion with wrist flexion and poor postural mechanics will predispose a patient to developing CTS.

## C. Functional Anatomy

Includes knowledge of structure and physiology necessary to properly carry out the osteopathic manipulative treatment support.

1. Nerve compression is usually seen in patients with poor posture and protracted shoulders. The three areas for potential nerve compression are
  - Between the anterior and middle scalene
  - Under the clavicle in the costoclavicular space
  - Under the pectoralis minor muscle and coracoid process.
2. Compression of the median nerve under the transverse carpal ligament, between the two heads of the pronator teres or at the brachial plexus in the thoracic outlet, may contribute to a “double-crush” phenomenon.
3. Cervical dysfunction can affect the scalenes and nerve roots innervating the arm, contributing to a “double-crush” phenomenon.
4. Swelling or hypertrophy of the flexor tendons themselves or also bony overgrowth of the carpals also can narrow the available space for the median nerve.
5. Forearm muscles are usually tight and irritable and may contain myofascial triggers.

#### D. Goals for Osteopathic Manipulative Management

Includes a review of treatment pearls; a general plan for manipulative treatment of the patient; and a discussion of treatment options, contraindications, and plans for follow-up evaluation and treatment.

1. Decrease upper thoracic and rib dysfunction, which will decrease sympathetic tone to the upper extremity. Counterstrain is recommended for rib tender points.
2. Improve motion restrictions at the forearm, wrist, and hand, especially tightness associated with pronator dysfunction, tension in the flexor retinaculum, and trigger points associated with the forearm flexors.
3. Treat the thoracic inlet fascia, scalene muscles, and cervical spine. These areas are typically the proximal end of a “double-crush” phenomenon.
4. Obtain a detailed occupational history. Occupational hazards, ergonomics, and repetitive overuse can exacerbate CTS symptoms.
5. A gentle, direct myofascial release of the ligament is appropriate.

#### E. Contraindications and Cautions Regarding Treatment

See contraindications to treatment, Foundations, pp. 1015–1024.

1. Avoid using high-velocity techniques in the cervical region. A cervical radiculopathy may be the cause of the CTS symptoms.
2. Progressive muscle atrophy of the thenar muscles is an indication for surgery.

#### F. Instructor’s Notes

Personal clinical pearls and lessons learned from previous COILS presentations.

1. The median nerve is usually impinged upon traveling under the flexor retinaculum, and the challenge is to determine why there is insufficient space in the carpal tunnel. An EMG may determine where, along its course, the median nerve obstruction is occurring. Several common occupations and preexisting conditions which predispose a patient to this syndrome, including postal work, carpentry, pregnancy, and certain cervical root problems. Physicians must determine why there is insufficient carpal tunnel space. CTS can be due to inflammation, arthritis, hydration of the median nerve, cervical ribs, tendonitis, myofascial triggers, or lymphatic congestion.
2. Benjamin Sucher, DO, demonstrated by MRI that myofascial release and exercises directed at the wrist enlarged the carpal tunnel and decompressed the median nerve. Symptoms and nerve conduction velocity improved as well.
3. David Melchior, DO, studied patients with upper-extremity nerve pain. He discovered that patients with CTS had myofascial trigger points (Simon and Travell points) in the forearm flexors.

4. Billy W. Strait, DO, did a study treating patients using spray and stretch, demonstrating the validity of myofascial triggers as part of the constellation of findings in CTS. If the transverse carpal ligament is tight, stretch it with a direct myofascial stretch.
5. Kenneth A. Ramey, DO, studied patients with CTS using MRI and nerve conduction velocity. He deliberately avoided treatment of the wrist and focused attention to the upper thoracic findings. In the study, all patient symptoms improved with OMM/OMT. A decreased swelling of the median nerve was seen on MRI in correlation with patient improvement.

### III. Psychomotor Components

*If time permits, this part can be carried out on a simulated patient.*

1. Practice palpatory diagnosis. See techniques under Section D above. Diagnoses procedures include cervical; upper thoracic and ribs; thoracic inlet; anterior chest wall; and forearm, wrist, and hand.
2. Demonstrate key treatment techniques in the body regions involved, including gentle release techniques for the upper thoracics and ribs, OA myofascial release or indirect techniques, cervical techniques, myofascial and muscle energy techniques for the forearm, and counterstrain.
3. Evaluate the plan for treating the patient in the appropriate position, localization of gentle forces, and activation.

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### IV. References

- Elkiss ML, Rentz LE. Neurology. In: Ward RC Ed. *Foundations for Osteopathic Medicine*. Baltimore, MD: Williams & Wilkins; 1997:411-413.
- Ramey KA, Kappler RE, et al. MRI assessment of changes in swelling of wrist structures following OMT in patients with carpal tunnel syndrome. *The AAO Journal*. 1999; 9(2):25-32.
- Ramey KA, Kappler RE. Upper extremities. In: Ward RC Ed. *Foundations for Osteopathic Medicine*. Baltimore, MD: Williams & Wilkins; 1997:46:547-561.
- Sucher BM. Myofascial manipulative relief of carpal tunnel syndrome: documentation with MRI. *J Am Osteopath Assoc*. 1993; 93:1273-1278.
- Sucher, BM. Palpatory diagnosis and manipulative management of carpal tunnel syndrome. *J Am Osteopath Assoc*; 94(8):647-663.

## V. Examination Questions

*These multiple-choice questions involve the treatment of a patient with CTS.*

*(\* denotes answer)*

- 1. Treatment of which area would be most likely to decrease excessive sympathetic tone to the upper extremity?**
  - A. OA
  - B. C3-C5
  - C. T2-T8\*
  - D. T10-T12
  - E. L4-L5
  
- 2. Treatment of which area would have the greatest effect on lymphatic drainage from the upper extremity?**
  - A. Paraspinal inhibition to T6-T10
  - B. Myofascial release to the thoracic inlet\*
  - C. Muscle energy to OA somatic dysfunction
  - D. High-velocity low amplitude to the mid-thoracic spine
  - E. Rocking of the sacrum
  
- 3. Where are the myofascial trigger points located that have been found to be related to CTS?**
  - A. Pectoralis major
  - B. Latissimus dorsi
  - C. Serratus anterior
  - D. Scalenes
  - E. Forearm flexors\*
  
- 4. The wrist flexor muscles have their origin from which anatomic structure?**
  - A. Medial epicondyle\*
  - B. Radial head
  - C. Olecranon process
  - D. Supracondylar ridge
  - E. Phalanges
  
- 5. Where is a positive Tinel's test elicited?**
  - A. Flexor muscles
  - B. Distal to the flexor retinaculum
  - C. Proximal to the transverse carpal ligament
  - D. Anterior axillary line
  - E. Over the carpal tunnel\*

## Section Two: Patient-Based Application Workshop

### I. Description

*This section includes the practical application of osteopathic treatment techniques to support the patient with CTS.*

### II. Psychomotor Components

*(Refer to Section One for regions of the body that are involved.)*

1. Examination of the patient using TART, including postural screen, palpation, segmental motion testing, and diagnosis of somatic dysfunction.
2. Application of philosophy and treatment technique.
3. Re-evaluation of the patient after treatment is completed to assess results. If a simulated patient is used, then the student or physician should verbalize length of treatment and future treatment goals.

### III. Cognitive Components

1. Documentation in the medical record.
2. Post-treatment discussion.

*Note. It is recommended to use the standardized outpatient form included in each of these chapters for documentation*

Physician: \_\_\_\_\_ Date: \_\_\_\_\_

Title:  Resident (Specialty) \_\_\_\_\_

Intern       OMS III       OMS IV

**Critical Actions Evaluation Checklist of Osteopathic Principals  
Applicable to a Patient with Carpal Tunnel Syndrome**

CRITICAL ACTION	COMPLETED		COMMENTS
	Yes	No	
Become familiar with the patient's history physical examination findings, laboratory and other diagnostic findings.			
Perform an osteopathic structural examination.			
Determine significant areas of somatic dysfunction.			
Determine body region(s) to be treated with OMT.			
Apply OMT to at least the body region determined to be the most in need of treatment at present time.			
Treat other significant somatic dysfunctions if feasible.			
Document treatment and immediately observable effects.			

Trainer: \_\_\_\_\_

# Osteopathic Musculoskeletal Examination

EXAMINER \_\_\_\_\_ SIGNATURE \_\_\_\_\_ DATE OF EXAMINATION \_\_\_\_\_

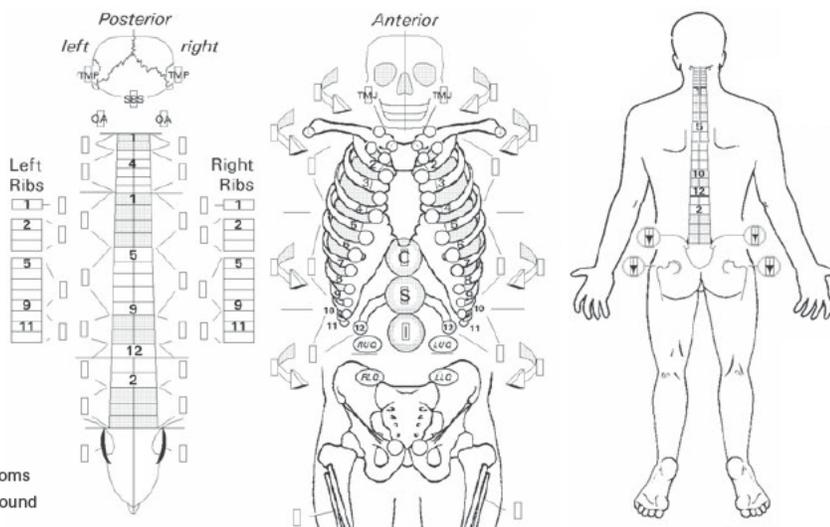
EXAMINER \_\_\_\_\_ SIGNATURE \_\_\_\_\_ DATE OF EXAMINATION \_\_\_\_\_

CHIEF COMPLAINT \_\_\_\_\_

<p><b>Required</b></p> <p><b>Ant. Post. Spinal Curves:</b></p> <p><b>Cervical Lordosis</b>  <input type="checkbox"/> Increased   <input type="checkbox"/> Normal   <input type="checkbox"/> Decreased</p> <p><b>Thoracic Kyphosis</b>  <input type="checkbox"/> Increased   <input type="checkbox"/> Normal   <input type="checkbox"/> Decreased</p> <p><b>Lumbar Lordosis</b>  <input type="checkbox"/> Increased   <input type="checkbox"/> Normal   <input type="checkbox"/> Decreased</p>	<p><b>Scoliosis (Lateral Spine Curves)</b>  <input type="checkbox"/> None   <input type="checkbox"/> Functional   <input type="checkbox"/> Mild   <input type="checkbox"/> Moderate   <input type="checkbox"/> Severe</p> <p><b>Assessment Tools</b></p> <p><input type="checkbox"/> T = Tenderness</p> <p><input type="checkbox"/> A = Asymmetry</p> <p><input type="checkbox"/> R = Restricted Motion   <input type="checkbox"/> Active   <input type="checkbox"/> Passive</p> <p><input type="checkbox"/> T = Tissue Texture Change</p>	<p>For coding purposes only</p>
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**Abbreviation Key**

- OA Occipito-Atlantal joint
- Sympathetic Ganglia:**
- C Cellac
- S Superior Mesenteric
- I Inferior Mesenteric
- TMJ Temporomandibular joint
- TMP Temporal Bone
- SBS Sphenobasilar symphysis



**Severity Key**

- 0 No SD or background (BG) levels
- 1 Minor TART more than BG levels
- 2 TART obvious (R&T esp) +/- symptoms
- 3 Symptomatic, R and T very easily found "key lesion"

Region Evaluated	Severity				Specific Major Somatic Dysfunctions
	0	1	2	3	
Head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Thoracic T1-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
T5-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
T10-12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Lumbar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pelvis/Sacrum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pelvis/Innominate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extremity Lower R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
L	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extremity Upper R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
L	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ribs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other/Abdomen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Major Correlations with:**

- Traumatic    Orthopedic    Neurological    Viscerosomatic    Primary Musculoskeletal    Activities of Daily Living
- Rheumatological    EENT    Cardiovascular    Pulmonary    Cardiovascular    Gastrointestinal    Genitourinary    Other

Other: \_\_\_\_\_