SUCCESSFUL OUTCOMES FOR PAINFUL THUMBS
Striving Toward “Best Practice”

Conservative Management of the Painful Thumb is a challenge but it can be done!

The loss of Dynamic Stability of the Thumb and the onset of pain can be complex in origin.

Intervention is not just an orthotic

GOALS:
- Decreased pain
- Increased adaptability/function
- Independent in caring for their own thumb

Teamwork is important
Doctor – Therapist – Patient – Family - Employer
Today’s presentation will be based on a program that has been introduced to therapists across the country. (2005-2010)

It will include:
- Diagnoses and biomechanical dysfunctions
- Anatomy review
- Techniques to restore stability and function (Laboratory Session)
- Conservative management strategies
- Custom orthotic demonstrations
- An invitation to participate in research to establish “best practice” in thumb intervention.

Why is the Thumb Program still “on the road”?

- Innovative techniques that go beyond Orthotics - Joint Protection - Adaptive Equipment
- Reports of success from therapists
- Emerging Evidence (EBP)
- Quest for “Best Practice” by gathering evidence
Innovative Techniques

- Exercises that first mobilize and then stabilize the thumb and do not involve painful pinching
- Strengthening of a finger muscle to assist in thumb stabilization is a key element
- Pain modification techniques that can work, rather than medications or surgery

Reports of Success

“40 year old lineman failed all previous conservative measures. Does regular 1st DI strengthening, Adductor release, and CMC distraction and wears small splints under his work gloves.” - E.M.

“I teach my patients the strategies for strengthening and flexibility all the time. I use the Caring for the Painful Thumb book, as well” – L.F.

“I and my coworkers have found the information very valuable. I’ve added the thumb stabilization splint to my armamentarium and find many patients are happy with it.” – M.L.

“I have definitely used what I learned in the course. You guys are wonderful teachers and it is a super course.” – L.M.

“This is the first course I’ve attended that I’ve been able to put into practice what I learned as soon as I got home.” – C.S.

Current Evidence

- NSAIDS may accelerate the degeneration of cartilage
- Joint movement is necessary for joint nutrition, and reduces pain
- There is evidence that incorporating exercise into a conservative management program can increase ROM, strength and function
- Moderate to high evidence that joint protection education and adaptive equipment education can reduce pain
- The 1st dorsal interosseous has been identified as a muscle that helps to stabilize the CMC joint during pinch
- Muscles can be made stronger with fewer reps and greater resistance.
The focus of this presentation will be on the importance of restoring dynamic stability to the thumb as a means of reducing pain in order to enhance function.

The goal of the conservative management program described in this presentation is to teach patients ways to preserve the CMC joint and minimize the dependence on orthotics, medications and possible surgical intervention.

Keep in mind…… there are no two “thumb pains” alike.

It is our job as therapists to partner with our patients and the referring physicians to understand causes of thumb pain, and to design and teach effective interventional programs.

Why is the human thumb at risk?

Is it because there is only a 35 year warranty on the 1st CMC joint?

Can something be done about it?
Pain can begin suddenly from TRAUMA

<table>
<thead>
<tr>
<th>Image 1</th>
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<tr>
<td>Bang!</td>
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Or pain can “accumulate” from OVERUSE

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….and what about ?

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<tr>
<td>de Quervain’s</td>
<td>Bowler’s and Skier’s Thumb: one is neurological, one is ligamentous</td>
<td>Bennett’s Fracture</td>
<td>Mucus Cyst</td>
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<tr>
<td>Ganglion Cyst</td>
<td>STT Arthritis</td>
<td>Rheumatoid Arthritis</td>
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And now this!

- Nintendo Thumbs
- Blackberry Thumbs

- We will look at the unique anatomy of the human thumb and the components for evaluation to see why the thumb is at risk for developing pain and possible Osteoarthritis.

- We will explore and practice intervention techniques effective in developing dynamic stability for the thumb.
We will look at all components of a conservative management program and the role played by custom orthotics and adaptive equipment and techniques.

<table>
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<tr>
<th>Orthotics</th>
<th>Equipment</th>
<th>Techniques</th>
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<tr>
<td>carpo-metacarpal Joint OA</td>
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<tr>
<td>carpal-metacarpal Joint OA</td>
<td>trapezio-metacarpal Joint OA</td>
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<tr>
<td>basal joint OA (CMC OA)</td>
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Does the patient already have......

CMC Degenerative Changes? A condition with many names for the pathologic process:

- 6% prevalence in men age 55-64
- 25% prevalence in post-menopausal women
- (of those, only 28% were symptomatic)

We will use “CMC” throughout the presentation

(Armstrong, Hunter, & Davis, 1994)

A Study

CMC Degenerative Changes in Finns Over age 30

- 7% prevalence in men
- 15% prevalence in women
- Radiographic presence of CMC arthritis did not predict work disability
- No association with physical workload history
- Increased Body Mass Index (BMI) correlated with CMC arthritis

(Haara, et al., 2004)
Female vs. Male CMC joint

- Females trapezium smaller
- Female cartilage is thinner
- Female trapezium is flatter, less congruent than Males
- Hormonal changes after menopause may have an effect

The goal of a conservative management program is NOT JUST to treat symptoms.....
....but to equip patients with the “relative mastery” to reduce their thumb pain by restoring dynamic thumb stability, and to minimize the effects of joint damage, if it occurs.

As therapists, we can make a difference!

(Schkade, & Schultz, 1992)

Anatomy, Biomechanics and Pathophysiology of the Thumb
The human hand has been compared to the ape hand, but the human hand is unique:

- The surface of trapezium is flatter in dorsal-palmar direction, allowing MC to ride further in ulnar direction on the trapezial saddle.
- This provides for true "opposition".
- Flexor Pollicis Longus (FPL) is separate from Flexor Digitorum Profundus (FDP)
- Volar Pad is prominent (Marzke, 1992)

Anatomy
The thumb column has 4 joints......

It sits at an angle of 60-80 degrees to the metacarpal arch, providing a wide range of motion to oppose each of 4 fingers.

(Kapandji, 1982)

 Movements of the thumb

IP 1 Axis "hinge"

MP 2 Axes "condyloid"

CMC 2 Axes "saddle" "universal"

(Brand & Hollister, 1993)
Two theories to explain the "apparent" rotation of the thumb producing pronation and supination

The trapezium is like the saddle on a scoliotic horse.

The CMC joint is like a Universal Joint

Movement in 2 planes at right angles

(Brand & Hollister, 1993)

(Kapandji, 1982)

Check out your own Left Thumb "rotation"

supination

pronation

Theory: The thumb is NOT spinning on an axis like a spindle. Rotation is provided by the shape of the trapezium and its characteristics as a "Universal Joint."

Carpometacarpal (CMC) joint

- Loose capsule
- Joint surfaces are not congruent
- Stability from soft tissues
- Ligamentous support
- Muscular support

Ligaments of the CMC joint:
- Ulnar Collateral
- Intermetacarpal
- Dorsal Intermetacarpal
- Posterior Oblique
- Radial Collateral (Dorsal Radial)
- Superior Anterior Oblique
- Deep Anterior Oblique ("Beak")

Location of the "Beak" Ligament (Stabilizer or Pivot?)
7 Ligaments stabilize 1st Metacarpal (thumb)

- Ulnar collateral
- Intermetacarpal
- Dorsal Intermetacarpal
- Posterior oblique
- Radial collateral (dorsal radial)
- Anterior oblique
  - Superficial
  - Deep (beak)

(Tubiana, Thomine, & Mazrin, 1996)

9 ligaments stabilize the trapezium

- Dorsal Trapeziotrapezoid
- Volar Trapeziotrapezoid
- Dorsal Trapezi-II Metacarpal
- Volar Trapezi-II Metacarpal
- Trapezi-III Metacarpal
- Transverse Carpal Ligament
- Trapezi-Capitate
- Volar Scaphotrapezial
- Radial Scaphotrapezial

These ligaments function by enabling the trapezium to withstand the cantilevering, bending forces acting upon it during key pinch.

Over time, these ligaments can become attenuated, resulting in an increased “trapezial tilt”

(Bettinger & Berger, 2001)

Trapezial Tilt

is dynamic in nature and changes with the amount of force across the CMC joint.

Increased tilt subjects the CMC to abnormal shear stresses due to overloading of the trapezium.

Cadaver studies show greater Trapezial Tilt in those with Eaton Stage III or IV osteoarthritis (OA), compared to those with no signs of OA or just Stages I and II OA.

(Bettinger, Keene, Linscheid, Conrey, El, & An, 2001)
**The research and the theories:**

- Bettinger: AOL (beak ligament) does NOT stabilize CMC in flexion, nor prevents dorsal subluxation.
- AOL (beak ligament) is more of a pivot point for rotation as in pronation.
- Dorsal Radial Ligament is the shortest ligament spanning the joint and is an important stabilizer of the CMC.
- Trapezium is anatomically unstable due to location at radial aspect without supporting structures.
- Ligaments can attenuate over time.
- Cantilevering may increase dorsoradial subluxing force and contribute to cartilage erosion.

*It helps to understand what happens to thumb stability to address conservative management*

(Bettinger & Berger, 2001) (Edmonds, 2006)

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**Ligamentous support**

- Control the extent and direction of joint motion
- Help maintain normal alignment of the joint
- Help control and dissipate forces produced by activated muscles

**Muscular control**

- Extrinsic muscles
- Intrinsic muscles
- Including the 1\textsuperscript{st} Dorsal Interosseous!

(Brand & Hollister, 1993)

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**Active stabilizing structures of the thumb**

<table>
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<tr>
<th>DORSAL (pull)</th>
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<td>Extensor Pollicis Brevis</td>
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<td><strong>APL</strong> = radial n.</td>
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<td>Abductor Pollicis Longus</td>
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"KEY":
- Red - radial
- Blue - Median
- Yellow - Ulnar
- Green - Mixed
Active stabilizing structures of the thumb

**RADIAL (pull)**
- APB – median n.
  - Abductor Pollicis Brevis
- APL – radial n.
  - Abductor Pollicis Longus (deep branches)
- FPB – median / ulnar n.
  - Flexor Pollicis Brevis
- Superficial – median n.
- Deep – ulnar n.

“KEY”:
- Red – radial
- Blue – Median
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* Be aware of Martin-Gruber and Rich-Carriere Anastomoses

Active stabilizing structures of the thumb

**VOLAR (pull)**
- FPL – median n.
  - Flexor Pollicis Longus
- FPB – median / ulnar n.
  - Flexor Pollicis Brevis (deep)

“KEY”:
- Red – radial
- Blue – Median
- Yellow – Ulnar
- Green – Mixed

Active stabilizing structures of the thumb

**ULNAR (pull)**
- AD – ulnar n.
  - Adductor Pollicis
- OP – median n.
  - Opponens Pollicis

“KEY”:
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Active stabilizing structures of the thumb

**Distal - Radial (pull)**

1st DI – ulnar n.
1st Dorsal Interosseous

"KEY:"
Red - radial
Blue - median
Yellow - ulnar
Green - mixed

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First Dorsal Interosseous

Adductor Pollicis

(Tubiana, Thomine, & Mackin, 1996)

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A closer look at the multidirectional pull of these muscles:

- Opponens
- First dorsal interosseous
- Adductor
- Abductor Brevis
- Flexor Brevis
- Abductor Longus

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How can the thumb be Stable and Flexible?

- Ulnar collateral ligaments
- Radial collateral ligaments
- Volar plates
- Abductor Pollicis Brevis (median n.)
- Opponens Pollicis (median n.)
- Flexor Pollicis Brevis (ulnar/med. n.)
- Adductor Pollicis (ulnar n.)
- Flexor Pollicis Longus (median n.)
- Extensor Pollicis Longus (radial n.)
- Extensor Pollicis Brevis (radial n.)

And don’t forget………

1st dorsal Interosseous

and………..

all of those ligaments

You could think of the thumb as a May Pole

Except the thumb “maypole” is jointed.

It has muscles for streamers.

and ligaments for support instead of a bunch of kids!

And don’t forget the 1st Dorsal Interosseous!
Typical OA thumb deformity

IP joint flexion
MP hyper-extension or lateral deviation
CMC joint adduction

The position of habit or comfort becomes the position of deformity

Theories of Deformity

Classic thought:
Typical deformity is secondary to adductor contracture
Adducted posture results in APL having a deforming effect instead of stabilizing effect at CMC

Theories of Deformity - Moulton

Moulton's research
Indicates MP hyperextension from hypermobility may be contributing factor by accentuating the metacarpal flexed posture, reducing the stabilizing influence of the APL and stressing the beak ligament (?)

(Moulton et al., 2001)
Moulton’s research

- Moulton showed that MP flexion of 30 degrees moves the contact area on the trapezium more dorsally, unloading the volar articular surface
- Achieving this position during functional activity is important and may require an orthosis with MP ext. block temporarily.

Hypermobility

Lax ligaments allow dorsal translation of metacarpal on trapezium, further stretching the already lax ligaments

Chronic ligamentous instability alters proprioceptive input, decreasing awareness of thumb posture

Articular Cartilage

- Avascular and aneural
- Nutrition from synovial fluid
- Movement necessary for joint nutrition
- Joint motion increases synovial blood flow, circulates synovial fluid, increases penetration of solutes
Disruption of the cartilage matrix
Intrinsic stress (ligament laxity)
Extrinsic stress (overuse)

Response of chondrocytes to the altered matrix
Cartilage is maintained and may be restored
- appropriate for conservative management program

Decline of the chondrocyte synthetic response (do NSAIDS help or hurt?)
- Decrease in resistance to compressive and shear forces
  - may respond to conservative management but may opt for surgery

We treat painful thumbs ...not x-rays

(Brandt, 1993)

Boney outgrowths or Osteophyte formation can obstruct motion.

It is theorized that this is the body's attempt to improve joint stability after cartilage breaks down, but instead it can cause limitations of motion.

We treat painful thumbs...not x-rays

(brandt, 1993)

Physician Evaluation
- Signs and Symptoms
- Differential diagnosis
- Radiographic Classification

Physical Exam Tests
- Digital pressure over capsule of CMC joint
- Grind test
- Differential Injections
- Intra-articular lidocaine

Treatment
- Non-operative
- Operative
- Referral to Occupational Therapy

We treat painful thumbs...not x-rays

(brandt, 1993)
Imposters
De Quervain’s tenosynovitis
FCR tendonitis
Carpal Tunnel Syndrome
Ligament Strain/Fracture
Scaphoid Pathology
Nonunion Fractures
Preiser’s Disease
AVN of scaphoid
Arthritis of other joints
Thumb MCP
Radiocarpal
Scaphotrapezial joint

Bett’s View
Shows all 4 contact surfaces of the trapezium

Eaton’s Radiographic Classification
- Stage I: normal articular cartilage, widened joint space (effusion)
- Stage II: slight narrowing at thumb CMC joint space < 2mm, maintained joint contours, joint debris
- Stage III: significant thumb CMC joint arthritis, sclerosis/cysts, osteophytes > 2mm
- Stage IV: significant thumb CMC joint arthritis and scaphotrapezial degeneration
Surgical Procedures

**Stage I/II**
- Volar Ligament Reconstruction
- Metacarpal Extension Osteotomy
- CMC Joint Arthroscopy

**Stage II/III/IV**
- CMC Arthrodesis
- Implant Arthroplasty
- CMC Resection Arthroplasty
- Trapeziectomy with or without ligament reconstruction or LRTI/suspensionplasty

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**BREATHE**

- CONTEMPLATE
- THIS IS DEEP

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**OT Evaluation, Intervention and Outcome Monitoring**

- OTs uniquely use **OCCUPATION** to engage the person, and as the **means** and **end** of **intervention** and **functional outcome**
- OTs apply **therapeutic knowledge, evidence, and skills** to:
  - Reduce effects of disease, disability and deprivation
  - Promote health and well-being
- OTs use **clinical reasoning** to critically **observe, analyze, describe and interpret** performance

(AOTA, 2008)
Therapist’s Evaluation

- Occupational performance in all areas of occupation:
  - ADLs: basic self care activities
  - IADLs: managing daily life at home & community
  - Rest and sleep, Education, Work, Play, Leisure, and Social participation

- Client Factors:
  - Values, beliefs, spirituality
  - Body functions and structures

(AOTA, 2008)

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Therapist’s Evaluation

- Activity Demands:
  - specific activity features which influence the effort required to perform

- Performance Skills:
  - motor, sensory, cognitive

- Performance Patterns:
  - habits, routines, rituals, and roles

- Contexts/Environments:
  - Personal, cultural, virtual, physical, social, temporal

(AOTA, 2008)

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Outcomes : Overview

- Outcomes, outcomes, outcomes
  - Outcomes Research: Scholarly endeavor
  - Outcomes Management: Financial business

- Outcome Tools: Generic Tools:
  - SF-36/DASH/QuickDASH: measures multidimensional aspects of health
  - Barthel ADL index: physical domain of health
  - Beck Depression Scale: emotional aspect of health

- Outcome Tools : Condition-Specific
  - Carpal Tunnel Sx Severity Scale
  - Pt-Rated Wrist/Hand Evaluation
**Outcome Measures**

- **Reliable** - first prerequisite is reliability, or the extent to which a measurement is consistent, free from error.
- **Valid** – Validity (truth) assures a test is measuring what it is intended to measure.
- **Responsive** - Responsiveness is used to assess the effectiveness of intervention in proportion to the patient’s status change, i.e. over time.
- **V/R/R vs. Standardization:** may not be accurate.
- **Convention** for use of a tool: once it is published, it is in the public domain.
- **Rule:** contact the researcher that you are using the tool and how you are using the tool.
- But in teaching, there are copyright rules: BEWARE

*(Portney & Watkins, 2009, p. 77, 112)*

**Gather Info with Outcome Tools**

- **Canadian Occupational Performance Measure**
  - Semi-structured interview, valid/reliable/responsive
  - Pt. rates problems in 3 areas in order of importance
  - Initially, re-assessments, discharge
  *(Law et al, 2005)*

- **Disabilities of the Arm, Shoulder, and Hand** *(DASH)*
  - 30 items or the QuickDASH [9 items]
  - Valid for multiple dx of the upper extremity
  - Established **Reliability** and **Responsiveness**

- **Patient Rated Wrist/Hand Evaluation (PRWHE)**
  - V/R/R for many UE dx
  - Condition-specific: more specific information of hand
  *(MacDermid, 1996), (MacDermid & Tottenham, 2004)*

**Therapist’s Evaluation**

- **How does thumb pain affect:**
  - All “Areas of Occupation”
  - Client factors: Full medical hx & co-morbidities
  - Smoking/diabetes/HBP/medications
  - Hx of hand accidents, incidents, pain onset
  - Activity Demands: home, work, play
  - Performance Skills: ROM, sensation, cognitive
  - Performance Patterns: roles, habits, routines
  - Contexts: Where does this happen?
**Evaluation Specifics**

- Observation of the thumb, all joints.
- ROM of both thumbs (compare)
- Strength of grip and pinch
- Pain assessment during evaluation/tasks
- Provocative Tests for differentiation

**Observation of the thumb – typical deformity**

- Adduction contracture
- Hyperextension or deviation of MPJ
- Shoulder Appearance

**Compare hands**

- Palmar Abduction
- Radial Abduction

- And in every area of the evaluation
Observation of the thumb deformity

• Rather than hyper-extending at the MP, hyper-extension occurs at the IP and the MP joint compensates by going into hyper-flexion.
• It can be present for a lifetime without a problem.
• Thumb pain can develop due to ligament stretching and dynamic instability can contribute to joint changes over time.

Reverse Zig Zag Deformity

Hand Therapist reports pain developing with overuse

CMC “shoulder” deformity also called “squaring” of the CMC

Range of Motion of the Thumb

RADIAL ABD  PALMAR ABD  RETROPULSION  FLEXION @ MP & IP
Kapandji scale of opposition: 0-10 scale

(Edgar, Finlay, Wu, & Wood, 2009)
(Kapandji, 1985)

Strength of grip/pinch

Functional Test of the 3 Motor Nerves of the Hand

Radial n: Thumb extension
Median n: Thumb to Middle tip
Ulnar n: Index and Ring ADDuction under Middle

Virginia O'Brien OTDs, OTR/L, CHT
Jan Albrecht OTR/L, CHT
Joy Drews OTR/L
Froment’s Sign: Weak or absent adductor function
Pulling paper away from a tight pinch.....

Jeanne’s Sign:
Hyperextension of the MP during pinch

Neurological Problems
Low Ulnar n.
Ant. Int. n.
Median n.
High Ulnar n.

Beighton Test for Hypermobility

( Jonsson, 1996)
Pain Assessment
Functional Assessment

Where is the pain?

When does it hurt? How much? (1-10)
Where is support needed to pinch without pain?
Match orthotic type to activity requirement.
One for activity, one for rest?

Be aware of all possible thumb problems

Collateral Ligament Injury
Volar Plate Injury
Dorsal Capsule Injury
Sesamoid Fracture
IP Deformities
Ligament Laxity
Innervation - motor/sensory

“Thumb Pain” from Arthritis

CMC Osteoarthritis
➢ Cartilage degeneration/stages
➢ Many Treatment options

STT Arthritis
➢ Scaphoid, Trapezium, Trapezoid

Rheumatoid Arthritis
➢ Synovial – usually bilateral
➢ Different treatment options

Virginia O'Brien OTDs, OTR/L, CHT
Jan Albrecht OTR/L, CHT
Joy Drews OTR/L
“Thumb Pain” from daily use

Heavy demand and over-use
- without joint protection or adaptations

Faulty biomechanics
- Uncorrected habits of use.

Tenosynovitis
- de Quervain’s
- Trigger thumb

“Thumb Pain” from sports injuries

Bowler’s Thumb (neurological)
- DRSN compression

Skier’s Thumb (ligamentous)
- Ulnar collateral ligament sprain
- Stener’s Lesion

Bennett’s Fracture (boney)
- Avulsion (with bone) of Beak Ligament

“Thumb Pain” from cysts

Ganglion Cyst

Mucous Cyst
Thumb Pain from sesamoid fracture

Adductor Pollicis
Flexor Pollicis Brevis
Flexor Pollicis Longus

New age gadget pains

- Notice the more **stable** CMC Abducted position. Over-use can cause:
  - de Quervains
  - Trigger thumb
  - Carpal tunnel

- Notice the more **unstable** CMC Adducted position. Over-use can cause:
  - Trigger thumb
  - de Quervains
  - Carpal tunnel
  - CMC strain or early OA

“Nintendo Thumbs” – “RSI”

“Blackberry or Texting Thumbs”

Future Therapy Clients

The next generation has grown up with hand held electronic devices. This is one with a SAT prep game to prepare for college entrance exams. Are they ready for life entrance when the 35 year warranty runs out on the thumb?
Remember

➢ There are no two "thumb pains" alike
➢ Therapists have the skills to clarify diagnoses
➢ Share impressions (suspicions) with physician
➢ Customize Interventions
➢ Strive for Best Practice to restore

Dynamic Stability
Pain-Free Pinch

Thumb Care is Life-Long Use of OT model

➢ The ability to competently engage in life is a life-long adaptive process

Thumb pain happens!
➢ The demands to engage (perform) occur naturally in the interactive life environment
➢ When demand for "performance" exceeds the person’s ability to adapt="dysfunction"

"Occupational Adaptation Model of Practice" (Schkade & Schultz, 1992a)
(Schade & Schultz, 1992b) (Ramafikeng, 2009)

Thumb Care/Adaptation: Internalized

Occupational Challenge: turning the door key

Press for Mastery: turn the key effectively to efficiently unlock the door

Desire for mastery (internal): to turn the key without pain to get into my house

Demand of the lock (external): the inside must turn to sufficiently to open the door

Response generated: I turn the key- That hurt when I turned the key

Adaptive response: I change to a C pinch- turn the key- open the door without pain

Relative Mastery of key turning in door.

Self-Evaluative and Integrative response: When I turn the key in the car, I will use the "C" pinch.

Poor motor patterns to “stop the pain”> more pain, more deformity
**Definition: Health and Disability**

**HEALTH IS:**
When a person shows
- adaptive capacity
- relative mastery

**DISABILITY IS:**
Due to a disruption in adaptive capacity, the person
Decreased occupational performance (relative mastery)
Faulty mechanisms may exist
- Within the person
- Within environment

Functional Behavior

Dysfunctional Behavior

*Occupational Adaptation Model of Practice*

**OAM: Practical Model**

- OT collaborates with
- Client/Person (sensorimotor, cognitive, psychosocial)
- Desire for mastery
- To promote the adaptive response
- To promote relative mastery
- Match to environmental demands
- Match to adaptive capacity of client/person
- Appropriate occupational choices

**This Conservative Management Program for the Painful Thumb includes the following:**
Intervention to Restore Thumb Stability

- Manual release of the adductor and any over-active, dominant muscle
- Joint mobilization to reduce / realign the CMC Joint
- Muscle re-education / strengthening
- Use of adaptive tools and joint protection techniques
- Orthotics as needed

Manual Release

- Adductor: One of the strongest muscle per square measure in the body.
- Manual release of this muscle increases the potential ROM of the thumb that is lost due to web space contracture.
- Improves congruency of joint surfaces, making it easier to complete other portions of the exercise program.

Manual Release: Adductor muscle release, the KEY

Manual Release at the “Tender Point” Contract-Relax Release
Joint Mobilization

Initiated after Myofascial Release (adductor release) BUT before muscle re-education*

Approximates the joint surfaces, helps to improve motion thereby increasing the production of nutritional substances in the joint.

Joint mobilization of the thumb column restores stable thumb biomechanics.

**Must be done pain free!!!**

Joint Mobilization by Distraction

- Distraction is the first level of joint mobilization to gain pain relief.
- Opens joint spaces, relieves pain & increases nutrition.
- Grasp the base of involved thumb, hold arms behind back. The weight of the arms provides distraction.
**Muscle re-education first, then strengthening**

Re-education of the thumb muscles to restore stable balance

**Focus:**
- Abductor Pollicis Brevis and Opponens Pollicis
- 1st Dorsal Interosseous
- Extensor Pollicis Brevis
- Abductor Pollicis Brevis and Abductor Pollicis Longus
- Flexor Pollicis Brevis

**Isolate the abductor, opponens**

Make the thumb puppet sing

Closed Chain Exercise

**Isometric and Isotonic Muscle re-education of palmar abduction**

The CMC joint is most stable in the “C” position

Isometric “hold” in that position

Relax and repeat

A light weight rubber band may be added for isotonic exercise

Note the rubber band placement on the metacarpal

This exercise is to be done pain free.
Isolate the Extensor Pollicis Brevis

Muscle re-education
EPB  APL  APB  OP

“Piano playing”
to strengthen
(isometric to isotonic)
Extensor Pollicis Brevis
Abductor Pollicis Longus
Abductor Pollicis Brevis
Opponens Pollicis

Abduct without losing the MP flexion posture

Strengthen the 1st Dorsal Interosseous
1st Dorsal Interosseous (DI) with instability

- For the patient who has a very unstable CMC, performing 1st DI strengthening may be painful initially.
- External support in the way of co-contraction of the "C" position, manual support with an extra finger, or performing the exercise with splint support at the CMC may be needed.

If the program is unsuccessful in stabilizing the CMC and relieving pain, ligament reconstruction may be a consideration.

Place and Hold

- Manual release of the adductor and any over-active, dominant muscle
- Joint mobilization to reduce / realign the CMC Joint
- Muscle re-education / strengthening
- Coming up:
  - Use of adaptive tools and joint protection techniques
  - Orthotics as needed

Intervention Review
Joint Protection Techniques and Adaptive Equipment
Could it have made a difference?

Who benefits from conservative management?
Dental Hygienists
Homemakers
Carpenters
Musicians
Metal Workers
Chefs, Waitresses
Massage Therapists
Flight Attendants
Occupational Therapists
Physical Therapists
Trauma Victims
One-handed People
Surgeons and ?????

Orthotics, alone may not do the job!

Without a mobilization/stabilization program, this patient gradually lost much of the thumb-index web space as well as flexion at the MP joint. She continues to have pain.

She has been unable to wean from her orthotics program.
Teach patients about adaptive equipment and techniques.

Look, Hobbes... You just hook the pull tab with your claw!

Necessity has always been the mother of invention.

Equipment to "unload" thumbs
Avoid lateral pinch
Lateral pinching is unstable and can be painful.
Turn clippers around and use fingers instead.

Modify the use of common tools

Adaptation – works for her
**Penmanship Posture**

Holding the pen more upright and using a contoured pen grip, creates a more stable CMC joint. Notice that the thumb and fingers form the ideal "C" position.

- **Biomechanical CMC Instability**
  - Metacarpal is ADDucted

- **Biomechanical CMC Stability**
  - Metacarpal is ADDucted

Thumb is in Supination

Thumb is in Pronation

**Prefab orthotics can play a role in pain relief**

- 

- 

- 

- 

- 

Lots more designs and more to come!

**Abduction "Belt" by Julie Liebelt**

5/8" stretch loop, closed cell padding, rivet, velcro hook
Hand Based Orthotics: Rationale and Considerations

The CMC Stabilization Splint

A stable MP joint increases stability at the CMC
Harpist wearing Strap Orthotic

Playing (Less) Hurt – An Injury Prevention Guide for Musicians
by Janet Horvath, Associate Principal Cello, Minnesota Orchestra
http://www.playinglesshurt.com

Figure 8 splint – holds the MP joint in flexed position of 30 degrees or greater

Moulton: Theoretically increases CMC stability

IP Deformities

- UCL laxity after cyst excision
  - Silver ring option
- RA instability with no tip pinch for ADLs
  - Held with a custom figure 8 orthotic… Fusion may be a better option.

A stable IP Joint contributes to stability at the CMC
Reverse Zig Zag deformity Intervention
Orthotic options to block IP hyperextension

“My left and right thumb postures used to be the same. To experiment I treated the left first as it had been hurting more. It hurt less in the orthotic. I wore it for about 6 hours a day for two times a week for about two weeks.”  Rachel Dyrud OTR/L, CHT

Hypermobility Orthotic Muscle Re-ed

Before Extension block Left Thumb only
After Muscle re-ed

“The change has been permanent. I can now very easily extend my left MP without hyper extending my IP and I’m working on developing a stable tip pinch.”  Rachel Dyrud OTR/L, CHT

What is the purpose of orthotics?

• To protect?
• To rest?
• To immobilize?
• To stabilize?
• To retrain?

Another custom orthotic

To create dynamic stability
The Benefits of Custom Orthotics

“Active” worn during activity

- Dynamic Stability
- Durable
- Comfortable
- Inconspicuous
- Easy on/easy off.

Recap - Intervention to Create Dynamic Stability includes:

- Manual release of adductor and any over-active, dominant muscle
- Joint mobilization to reduce / realign the CMC Joint
- Muscle re-education / strengthening
- Use of adaptive tools and joint protection techniques
- Orthotics as needed

Evidence Based Practice for Dynamic Stability for the Painful Thumb: An Overview of a Critically Appraised Topic (CAT)

Virginia H. O’Brien
Rocky Mountain University of Health Professionals
Provo, Utah

Virginia O’Brien OTR/L, CHT
OT and Evidence Based Practice

"It is not necessary to change. Survival is not mandatory.”
– W. Edwards Deming

➢ Incorporating evidence is vital to OT practice
➢ Who is expecting Evidence?
  ➢ Clients and families
  ➢ Payers, before covering services
  ➢ AOTA’s Centennial Vision highlights the importance
➢ Challenging to daily incorporate Evidence
➢ Resources on AOTA website: http://otcats.com
  ➢ http://www.aota.org/Educate/Research.aspx

Evidence Based Practice (EBP)?

What is that?

➢ EBP is the "conscientious, explicit and judicious use of the current best evidence in making decision about the care of individual patients."
  – Sackett, et al. 1996

➢ Based on 2 fundamental principles:
  ➢ Hierarchy of Evidence to guide clinical decision making
  ➢ Evidence alone is never enough to make a clinical decision  

EBP is...

➢ Evidence-Based Practice is INTEGRATION of:
  ➢ Individual clinical expertise with
  ➢ The best available external clinical evidence from systematic research with
  ➢ Patient preferences and values

➢ Broad definition: Any empirical observation is potential evidence, whether gathered systematically or not
  – Guyatt, 2008, p.6

(Abiesman & Lieberman, 2010)
Hierarchy of Evidence

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Type of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Systematic Review of RCTs (Meta-analysis)</td>
</tr>
<tr>
<td>1b</td>
<td>N=1 Randomized controlled trial</td>
</tr>
<tr>
<td>1c</td>
<td>All or none* (see explanation)</td>
</tr>
<tr>
<td>2a</td>
<td>Multiple RCTs: Systematic Review of cohort studies</td>
</tr>
<tr>
<td>2b</td>
<td>Randomized Controlled Trial</td>
</tr>
<tr>
<td>3a</td>
<td>Systematic Review of the studies below</td>
</tr>
<tr>
<td>3b</td>
<td>Observational cohort or Case Control Studies, Large Case Series</td>
</tr>
<tr>
<td>4</td>
<td>Case Reports, Small Case Series</td>
</tr>
<tr>
<td>5</td>
<td>Unsystenctical Clinical Observations (Expert Opinion)</td>
</tr>
</tbody>
</table>

Adapted from Centre for Evidence Based Medicine: http://www.cebm.net/index.aspx?o=1025

EBP Caveats & Clarification

- EBP is NOT finding an article to prove your treatment
- Clinical evidence is NOT all or none (not cookbook or protocol driven)
- Current, external clinical evidence informs but does not replace clinical expertise
  - Clinical expertise decides if evidence applies to individual client & how it will be integrated into the clinical decisions
- EBP=**informed** clinical reasoning, informed sound judgment

Critically Appraised Topic

- Standardized, 1-2 page summary of research evidence based on a clinical question
- Bottom line statement which synthesizes the research and clinical application of the results
- Critiques the validity of the research
- CATs organize thought toward confidence in clinical application
  (*)Fetters, Figueiredo, Keane-Miller, McSweeney, & Tsao, 2004*)
Critically Appraised Topic

Clinical Question: Will a specific splint and thenar exercise benefit my 54 y.o. female patient with grade 2 OA? (better than other OT treatment?)

Search terms: thumb arthritis, pain, hand, OA, exercises, splint

- Joint protection instruction w/ HEP hand exercises improve hand function in pts w/ hand OA [small RCT] (Stamm, 2002)
- In elderly hand OA pts, Exercise improved strength w/o increase in pain [small RCT] (Lefler et al. 2004)
- Thumb splints with exercise decreases pain in all subjects. [small RCT] (Wajon, 2005)
- Night splint vs. “usual care” (no splints) had significantly less pain, improved function at 12 mo. [larger group RCT] (Rannou, 2009)

Other articles found in Search for CAT

- American College of Rheumatology (ACR) recommends exercise for OA
  (ACR subcommittee on OA guidelines, 2000)
- Projected prevalence of Arthritis by 2030 to affect ~67 million U.S. adults, including 40.9 million women. (Theis, Helmick, & Hootman, 2007)

CAT conclusion: My EBP decision

For my patient, I decided:

- There is no evidence that concludes that specific thenar strengthening exercises reduces pain and increases functions more than general hand strengthening and with a specific type of thumb splint.
- Generally, exercise is recommended as a non-medical intervention for arthritis
- Based on this, I am confident that exercise for the thumb can be effective to reduce pain and improve strength. I am only minimally confident that this will improve function because no study was just of the specific thumb muscles.
Hot Off the Press: SR of Conservative Intervention for CMC OA

- Moderate evidence for hand exercises for:
  - Increased grip strength
  - Increased function
  - Improved ROM
  - Pain reduction
- Moderate evidence that joint protection education and provision of adaptive equipment for:
  - Pain reduction
- High to moderate evidence for use of CMC orthotics
  - Pain reduction
  - Improve hand function
- Moderate evidence that use of CMC orthotics to
  - Increase grip strength

(Valdes & Marik, 2010)

In summary:

This Conservative Management Program has been used Successfully as an Intervention Program for Thumb Instability and Pain

The patient's ability to achieve success with the program is subject to many variables:

- patient's receptiveness and ability to learn
- decisions made along the way
- the course of the disease
- patient compliance over a lifetime

Questions?

Jan Albrecht, Virginia O'Brien, Joy Drews

Thank you
Case Reports are...
- Stories about patients
- Stories about therapy services
- Stories about real clinical/practice situations
- Model Evidence based practice
- Convey experiences to other clinicians
- Assist in evolution of theory, one pt at a time
- Help develop practice guidelines/critical pathways
- Persuade/motivate other clinicians

Seriak, D, 2009, personal communication

Case Reports Test Theory

THEORY

DEVELOPMENT
REFINEMENT
CLARIFICATION

TESTING THROUGH
PRACTICE AND
RESEARCH

NEW DATA
AND
EXPERIENCE

Seriak, 2009

Subjective
- Age: 64
- DX: R>L thumb CMC OA, R Dequervains, R=L thumb pain
- Sex:
- Occupation: Psychologist at a prison
- Avocation
- PMHx: knee surgery? OA with PT intervention; L thumb UCL tear, s/p repair, 1984
- Bx: decline in function due to increased hand pain noted over 2-3 yrs
- What is important to her? 1) To ride her horse, for leisure physically and mentally; 2) use her thumbs when showering; 3) able to cut food for prep and eating without pain

History of onset: 2-3 yrs ago, laying flooring, not recovered from, hand and thumb pain, and noting decline in use of hand

Impairment measures
- Pain descriptors: gnawing pain, aching, can be sharp, pain with light and heavy use. 5/10 rest, 8/10 use
- Thumb ROM:
  - Hyperextension at MCP: + R>L
  - Hyperextension at PIP: -
  - Retropulsion: R=3.0 cm +, L=3.5 +

- Strength:
  - Grip: R>54 L=54
  - Pinch: R>p=5 L=p=5
  - Lateral: R>17 L>17

- Provocative:
  - CMC Grid: + R>L
  - Finkelsteins:

Outcome Tool:
QuickDASH:41/100

---

Virginia O'Brien OTDs, OTR/L, CHT
Jan Albrecht OTR/L, CHT
Joy Drews OTR/L
MM: intervention timeline

- Visits: 6 visits in 6 weeks
- Interventions:
  - 1st DI release:
    - Clips
    - Web to web release
  - Webspace PABD stretch/contract-relax
  - R CMC stabilization splint: day and night, if pain relief needed: pt was to decide
  - Custom FBTS wear at night, if more pain relief needed: pt was to decide
- 2nd visit report: "I like the splint; I can do more w/ R hand. I used to switch to L more. Can turn key, door knobs. We have heavy doors at work, lots of keys to open them. Can do this without pain.
- Fabricated L CMC splint
- HEP: DeQuervain's tendon gliding, "C" isometric BUE, 1st DI w/ RB resistance, trial CMC splint for horseback riding. Report if this ↓ pain

MM: thumb pain resolves

- 3rd visit: no pain @ nite Day pain: 1/10 rest, 2/10 use. ROM: PABD: 60° (+10); retro:3.5cm, no pain
- 5th visit: goes 2 days w/o splint w/o pain, no nite pain, less pain in thumb working at stables, still pain with riding horse
- 6th visit: riding and gardening w/o PAIN, NO splint.
- 7th visit: DeQuervain's pain resolved.
- Goals: met by 6th visit
  - 1) ride horse w/o hand pain; met by 6th visit
  - 2) using thumbs during shower: met by 6th visit
  - 3) cutting, gripping knife: met by 6th visit
- Pt notes she is doing exercises regularly. She requests that this be emphasized!

MM: outcome measures

- 9th visit: Prog Note: 8.20.10
- Thumb complaints resolved, CMC/1st DC
- -Finkelsteins, -grind test
- Able to ride horse, fix motorcycle with good strength, no splint.
- Continues intervention for ring finger contracture
- Pain: 0/10
- Strength: grip & pinch same as initial, but w/o pain
- ROM: RABD&PABD: 60° no MCP HE (was +20°)
- QuickDASH: 16/100 (was 41/100 [greater number indicates greater disability)]
JS: case report #2

- Thumb pain early 2010, wishes to avoid surgery
- Intervention included CMC splint, HBTESS for night, JT Mobs, MFR, 1st DI exercises.
- Pain resolved, pt independent with HEP
- Returns August with report of constant L thumb pain (7/10), exercises or splints don’t relieve pain

- Eval’d, reviewed her HEP technique
- Webspace ROM: RABD & PABD: 40⁰, HE MCP.
- JT mobs: was holding trapezium with axial tractioning
- Pain after pinching
- Exercises: not web release, but doing 1st DI and chest stretch

- Pain resolved, pt independent with HEP
- Returns August with report of constant L thumb pain (7/10), exercises or splints don’t relieve pain

- Eval’d, reviewed her HEP technique
- Webspace ROM: RABD & PABD: 40⁰, HE MCP.
- JT mobs: was holding trapezium with axial tractioning
- Pain after pinching
- Exercises: not web release, but doing 1st DI and chest stretch

JS: case report #2

Intervention:
- Corrected JT mob technique: MC axial
- Performed web release
- Reviewed 1st DI
- Refit CMC splint
- Rechecked pinch with resistance: no delayed pain, VAS: 2/10

- MCP HE: reidentified, but less than initially, due to pt’s diligence.
- Results: pain relief in less than one hour
- Pt consents to doing effective exercises

Disclaimer:
The presenters do not claim the Intervention program described in this presentation to be the best or only conservative management program for restoring thumb stability and preventing osteoarthritis. Therapists adopting this program must use their own clinical reasoning in its application. The presenters have no financial interest and do not intend to promote any specific products or companies in describing techniques used in the program.

References supporting primary points of this presentation:
- 1st Dorsal Interosseous as a primary stabilizer of the thumb (Brand & Hollister, 1993)
- Guidelines for resistance strengthening (Pollock, et al., 1998)
- A program that encourages stable movement patterns may be a better choice than medication that has the potential for causing cartilage damage. (Brandt, 1993)
This Is The Last Slide
References:


Jan Albrecht    Virginia O’Brien    Joy Drews
Successful Outcomes for Painful Thumbs: Striving Toward “Best Practice”
MOTA Conference, Duluth, October 2010


Successful Outcomes for Painful Thumbs: Striving Toward “Best Practice”
MOTA Conference, Duluth, October 2010


Bibliography:


Centre for Evidence-based Physiotherapy, retrieved online from [https://www.cebp.nl/?NODE=77&SUBNODE=1124](https://www.cebp.nl/?NODE=77&SUBNODE=1124)
MUSCLES THAT MOVE THE THUMB

EXTRINSICS: Radial (R) and Median (M) innervations

**Extensor Pollicis Longus**
*EPL C6, 7, 8 (R)*
- **ORIGIN:** Middle 1/3 lateral dorsal Ulna and Interosseous Membrane
- **INSERTION:** Base of Distal Phalange
- **ACTION:** Extends IPJ and Re-positions the Thumb

**Extensor Pollicis Brevis**
*EPB C6, 7 (R)*
- **ORIGIN:** Distal middle 1/3 Dorsal Radius and Interosseous Membrane
- **INSERTION:** Base of Proximal Phalange and Capsule of MPJ
- **ACTION:** Extends MPJ, Abducts Thumb

**Abductor Pollicis Longus**
*APL C6, 7 (R)*
- **ORIGIN:** Lateral dorsal Ulna and Interosseous Membrane
- **INSERTION:** Various - (Sup) Radial side of 1<sup>st</sup> Metacarpal Base (deep) trapezium, APB, OP, Capsule, Ant. Oblique Ligament
- **ACTION:** Abducts, flexes 1<sup>st</sup> Metacarpal

**Flexor Pollicis Longus**
*FPL C8 T1 (M)*
- **ORIGIN:** Volar Radius, Interosseous Membrane.
- **INSERTION:** Base of distal Phalange.
- **ACTION:** Flexes IPJ and pulls MPJ into flexion

INTRINSICS: Median (M) and/or Ulnar (U) innervations

**Abductor Pollicis Brevis**
*APB C6, 7 (M)*
- **ORIGIN:** Tubercles of scaphoid and trapezium and flexor retinaculum
- **INSERTION:** Proximal Phalange (proximal, radial)
- **ACTION:** Abducts Metacarpal, Flexes MPJ, Extends IPJ, Pronates

**Opponens Pollicis**
*OP C6, 7 (M)*
- **ORIGIN:** Transverse carpal ligament (flexor retinaculum)
- **INSERTION:** 1<sup>st</sup> Metacarpal (radial border)
- **ACTION:** Flexes, Adducts, and Pronates the Metacarpal

**Flexor Pollicis Brevis**
*FPB C8, T1 (M/U)*
- **ORIGIN:** Flexor retinaculum and trapezium (Deep: 1<sup>st</sup> Metacarpal and lateral head of 1<sup>st</sup> Interosseous muscle)
- **INSERTION:** Proximal Phalange radial base (Deep: Ulnar base)
- **ACTION:** Adducts Metacarpal, Flexes MPJ, Pronates

**Adductor Pollicis**
*AP C8, T1 (U)*
- **ORIGIN:** Carpus and 2<sup>nd</sup> and 3<sup>rd</sup> Metacarpal
- **INSERTION:** Proximal Phalange (ulnar base)
- **ACTION:** Adducts and Supinates Metacarpal, Extends IPJ

**1<sup>st</sup> Dorsal Interosseous**
*1<sup>st</sup> DI C8, T1 (U)*
- **ORIGIN:** 1<sup>st</sup> Metacarpal (ulnar side) and 2<sup>nd</sup> Metacarpal (radial side)
- **INSERTION:** Index Finger Proximal Phalange (radial base)
- **ACTION:** Tightens the Inter-metacarpal Ligament, Distracts CMCJ

EXCEPTIONS: Martin-Gruber anastomosis: median and ulnar nerves join.
Riche Cannieu anastomosis: ulnar nerve fibers enter median nerve.
ELASTIC THUMB ABDUCTION STRAP

Provides a gentle counterforce to assist in thumb abduction. Helps in re-educating stable thumb posture. May enhance joint proprioception.

Materials:
- 12-14 inches 5/8th inch stretch LOOP strapping
- 2 small rivets
- Closed cell padding
- Short piece of HOOK strapping

Fabrication:

1. Loop strap through the web space, cross over the CMC joint, stretching the strap to abduct thumb.
2. Insert rivet in the strap (or sew) to hold the cross position.
3. Apply two small diamonds of closed cell padding inside to cover the rivet and provide pressure on the metacarpal base at the point of instability.
4. Rivet (or sew) a short piece of Velcro HOOK strapping to one end to hold overlapped strapping in place.

“L’BELT” by Julie Liebelt PT, CHT
CMC Stabilization Splint
Provides 3 point stabilization to the thumb column while allowing CMC abduction, adduction, flexion, and extension. MP joint is free to bend.

Fabrication
The material is wrapped around the thumb with little or no stretch, covering the entire thenar cone.

Pinch or roll the material that passes through the web space after it has been secured.

Pull it away from the MP joint.

Insert padding and reheat.

Mold the splint to the thumb, applying support to the areas indicated by ★

Avoid pressure on sesemoids and tendons near the MP joint.

Keep holding the shape to the thumb while the material cools. Have patient do a test pinch while holding it to see if pain is absent with use. Reheat and remodel if necessary.

Angle Velcro hook patches toward the ulnar side of the wrist. Attach distal edges with a crescent of splint material.

The two ½ inch straps cross each other around the wrist. Some patients prefer to use a 1 inch elastic loop strap instead.

Albrecht J, Fine tuning the CMC splint. Correspondence Club Letters. 1993 Pg 101
Strap Splint
Control dynamic instability of the CMC.
Block MP hyperextension.

1/8" - 1/16" thermoplastic
Height: IP to base of CMC
Length: 1st CMC to 3rd CMC
Drape heated material over
dorsum of thumb.
Fold B under to give volar
support to metacarpal.
Allow IP clearance. Trim.
Curve C over proximal
phalanx to block MP
hyperextension.

IP Joint
Radial Edge
C
B
A
Sized for med-large thumb

CMC Joint
Oriented for R Thumb
Flip for L Thumb placement
Pad strip A for comfort

After a splint by
Wajon and Diaz
Strap "T" is
approximately
7 inches

Adjust straps to hold
thumb in comfortable
abduction and MP in
slight flexion.

Apply Velcro HOOK strips over A, B, and C.
Cut Velcro LOOP straps to size.
Attach angled strap with rivet or sew with sewing machine.
It should rest at the carpal tunnel.

Cut the strap from ½” loop
Slope “T” strap to the Left for a Left splint
and to the Right for Right splint

Cut straps longer as indicated
Wrist strap is approximately
14 inches

Simple Abduction Splint – “Figure 8”

Using a long strip of 1/8\textsuperscript{th} inch (or 3/32\textsuperscript{nd} inch) thermoplastic, wrap around thumb as shown. Join on the dorsum of the hand. (About 1 inch wide and 12 inches long)

Carefully position the thumb in palmar abduction, contouring the palm area to support the palmar arch.

Hold until set.

Properly fabricated, this splint can serve to stabilize the thumb in a functional position and can prevent MP hyperextension or collapse.
Form a “C” with thumb and fingers, tilt hand away and tape toward base of thumb, pulling only on the paper backing.

Use a 12 -14 inch length of 1 inch wide stretchable tape. Start to peel off paper backing and apply sticky tape at base of thumb, as shown.

Stretch the tape as it is wound around the base of the thumb, gathering skin into wrinkles around the base of the thumb.

Bring the tape up through the center of the web space between the thumb and index finger.

Form thumb and fingers into a “C” position. Tilt hand to little finger side and slowly apply tape to back of arm while pulling on paper backing, as shown.

Press tape to attach it over the starting point, then curve the tape upwards to change directions, as shown.

Rub over tape gently to heat the glue and make it stick to the skin.

Another strip can be added, as shown, for more stability and to reduce swelling. Attach it at base of thumb, bend hand back and apply tape while pulling off paper backing.

Taping is a technique that can be used to provide gentle repositioning of the thumb while coincidentally serving as a myofascial release to the skin. This can reduce swelling and pain. It is not intended to provide support similar to a splint, but may be worn for very light activity or for overnight use instead of a resting splint.
Taping is a technique that can be used to provide gentle repositioning of the thumb while coincidentally serving as a myofascial release to the skin. This can reduce swelling and pain. It is not intended to provide support similar to a splint, but may be worn for very light activity or for overnight use instead of a resting splint.
The Paper Hand - Understanding Thumb Opposition

Kapandji describes the CMC joint as a UNIVERSAL JOINT.

By constructing a paper hand, patients and therapists can visualize the biomechanics of thumb opposition.

**Cut out:**
- hand, thumb, trapezium and disk and assemble as described below:

1. Fold all dotted lines on handpiece TOWARD palm.
   Fold IP, MP and trapezium AWAY from you.
   Fold CMC TOWARD you.
   Do not fold disk.

2. Glue gray tab at base of thumb OVER gray half of disk.
   (gray side up)

3. Glue black tab of trapezium UNDER black half of disk.

4. Place trapezium on paper hand.
   Hold in place while copying motions shown on images at right.

5. Glue trapezium in place once position is satisfactory.

**Adduction**

**Abduction/Extension**

**Palmar Abduction**

**Flexion**


Jan Albrecht OTR/L, CHT - Handout