Prevalence:

- Idiopathic thumb CMC arthritis is most common
- Women 40-70 years old.
- Women are 15 to 20 times more likely than men
  - most likely secondary to increased joint laxity found in women when compared to men
- Common arthritis of the hand 2nd only to DIP OA

Epidemiology

- Trapezometacarpal joint OA - common
  - 1 in 4 women
  - 1 in 12 men
- 143 post-menopausal women
- Radiological prevalence
  - Isolated CMC OA - 20%
  - Isolated STT OA - 2%
  - Combined CMC + STT OA - 8%
- Symptomatic – basal thumb pain
  - 28% with isolated CMC, 55% with combined CMC/STT
Etiology

- Osteoarthritis
- Inflammatory arthritis
- Hypermobile laxity
- Connective tissue disorders
- Failed reconstructive procedures
- Trauma
  - Bennett's/Rolando Fractures
  - Dislocations
  - Ligamentous injuries
- NO longitudinal natural history study has established clear etiology for basal joint disease
- Strong association between excessive basal joint laxity → development of premature degenerative changes

Clinical presentation:

- pain at the base of the thumb with pinch and gripping activities
- turning a key, opening a jar or door.
- Decreased grip strength is also a common complaint
- metacarpophalangeal (MCP) joint hyperextension occurs

Biomechanics

- CMC joint reactive force is 12-13X applied pinch force
  
  Cooney 1977 JBJS
- Saddle joint- Circumduction.
  - Shallow saddle-joint architecture
    - little intrinsic osseous stability
    - must rely on static ligamentous constraints
Biomechanics

Role of palmar beak ligament

Pellegrini et al. Contact patterns in the trapeziometacarpal joint: The role of the palmar beak ligament. *J Hand Surg (Am)* 1993;18:238-244.

End-stage osteoarthritic specimens had a nonfunctional beak ligament and demonstrated a pathologic total contact pattern of joint congruity.

Typical volar to dorsal wear pattern.

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ANATOMY

- Four trapezial articulations
  - Trapeziometacarpal (TM)*
  - Scaphotrapezial (ST) *
  - Trapezio- trapezoid
  - Trapezium-Index metacarpal

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Anatomy Tendons

- EPL
- APL
- EPB
- FPL
Diagnosis:

- PE: +Abduction, +Adduction, +Grind.
- 'Crank Test': axial load + flexion/extension
- Pinch Test – MP hyperextension collapse
- Distraction Test – relief of pain
- PATIENTS TELL YOU!!!!

BEWARE OF OTHER DIAGNOSIS
- CTS- concomitant in up to 50%-80% of Pt's
- PAN TRAPEZIAL ARTHRITIS.

Diagnosis:

- Xray: Eaton classification:
  - Stage I - slight joint space widening (pre-arthritis)
  - Stage II - slight narrowing of CMC joint with sclerosis, osteophytes <2mm
  - Stage III - marked narrowing of CMC joint with osteophytes, osteophytes >2mm
  - Stage IV - pantrapezial arthritis (SSTT involved)

Eaton I
Eaton II

Eaton III

Eaton IV
XRAYS SCHEMEXRAYS

“Poor correlation between X-rays + symptomatic disease”
Swanson JBJS-A (54) 1972

Non-operative Treatment

- Education
- Activity modification
  - less forceful pinching, alternating hand use, switching to larger diameter writing instruments and golf grips, using reading stand to hold books
- NSAIDS
- Intra-articular steroid injections
- Physiotherapy
  - thenar/adductor stretching & strengthening
- Splinting

Splinting

- Long Opponens/Thumb spica
  - Full time → 3-4 weeks
  - Part time → 3-4 weeks + night use
  - Prefabricated versions appear to be less effective and less comfortable than a well-fitted custom splint
- Swigart et al. J. Hand Surg. 24A(1)1999
  - Stage I-II ～ 76 %
  - Stage III-IV ～ 54 %
  - sufficient symptomatic relief to allow continued activities with intermittent time-limited splint use
  - 19% progress to surgery
Injections Under US Guidance

- Steroid is cytotoxic to chondrocytes.
- Temporary relief.

Operative Indications

- Persistent pain
- Functional disability
- Failure conservative treatment
- Compliant patient

Principles of Surgery

- Pain relief
- Maintain function/strength
  - Grip
  - Pinch
- Ligamentous stability
- Carpal height
- Hyperextension collapse at MCP joint
  - Cause of failed surgical treatment
- Intraoperative Staging
  - Assess cartilage erosion: T-M, S-T joints
### Surgical Options

- Trapeziuim Excision
- Excision + Rolled Tendon Graft (ANCHOVY)
- Silicone Arthroplasty
- Arthrodesis
- Osteotomy 1st MC
- Volar Ligament Reconstruction (EATON Procedure)
- Ligament Reconstruction + Tendon Interposition Arthroplasty (LRTI) (BURTON)
- Double Interposition Arthroplasty
- Interposition Costochondral Allograft
- Cemented Arthroplasty
- Ceramic Arthroplasty

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### Trapeziuim Excision

  - Excision of the trapeziuim for osteoarthritis of the trapeziometacarpal joint
  - Loss of pinch strength
  - Instability CMC joint
  - Proximal MC migration
  - MCP hyperextension instability

Trapeziuim excision should be limited to the painfully arthritic TM joint in the low-demand elderly patient without evidence of significant subluxation.

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### Arthrodesis – TM Joint

- Younger patients (<50 yrs) + High demand
- Advantages
  - Reliable pain reduction
  - Maintain ADLs
  - Improved grip
- Disadvantages
  - Adjacent joint arthrosis
  - ROM (key pinch)
  - Hand flattening
  - MCP hyperextension
  - Nonunion 13%-29%

Advantages
- Reliable pain reduction
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Disadvantages
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- ROM (key pinch)
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- Nonunion 13%-29%
Anchovy
.

Trapezium Excision
.
Rolled Tendon Graft
.
FCR tendon interposition
.
  . 30% Decrease pinch strength
  . 50% Loss joint space @ 6 yrs
.
APL tendon interposition
.
Robinson J. Hand Surg. 16A:504-9, 1991
  . 39 patients
  . 50% excellent (no pain, full ROM, normal grip)
  . 35% good (75% ROM)

Silicone Arthroplasty
.
Lower demand + Rheumatoid
.
Concerns:
  . Weakness
  . Dislocation
  . Fracture
  . Deformation
  . Osteolysis
  . Synovitis
  . Immunologic alterations

Silicone Arthroplasty
.
Sollerman J. Hand Surg. 13B 1988
  . 12 year f/u
  . 51-84 % carpal erosion

Pellegrini, Burton J. Hand Surg. 1996 20A
  . 4 year f/u
  . 25% clinical failure
  . 35% subluxation
  . 50% loss of height
Osteotomy

- Base of thumb metacarpal, unload volar portion TM joint
- Wilson JBJS 65B:179, 1983
  - Eaton Stage II
    - 23 osteotomies
    - 30° dorsal closing wedge
    - 12 yrs f/u
    - no revisions
    - all patients satisfied
    - “fully functional”
- Indications:
  - High demand hand
  - Young laborer

Volar Ligament Reconstruction

Radial ½ FCR distal, ulnar ½ proximal
Hole in thumb MC base – dorsal to volar
Deep to APL
Deep to intact FCR
Final anchor point APL

Eaton et. al. J. Hand Surg. 9A(5) 1984
- Eaton Stage I-II
- 50 reconstructions
- Avg age 45 yrs
- f/u – 7 years
- 95% good-excellent result
Ligament Reconstruction with Tendon Interposition Arthroplasty (LRTI)

- Burton RI, Pellegrini VD. J. Hand Surg. 11A(3) 324-32, 1986
  - Excision trapezium
  - Volar ligament reconstruction (FCR sling)
  - Interposition Arthroplasty (Anchovy) – FCR

LRTI - Results
Double Interposition Arthroplasty

- Eaton Stage IV
- Maintains height ratio
- PPx/MC-T
- 95% good → excellent functional outcome
- 3 yr f/u

Recommendations

- Stage I (Laxity + Instability)
  - Eaton Procedure (Volar Ligament Reconstruction)
- Stage II-III
  - Low demand
  - LRTI
  - Trapezium excision/interposition anchovy
  - High demand
  - Arthrodesis
  - MC osteotomy
- Stage IV
  - Double Interposition LR
  - LRTI + excision trapezium
  - Trapezium excision (low demand)

CMC Interposition Arthroplasty
Ligament Reconstruction Tendon Interposition Arthroplasty

In 1973, Eaton and Littler described reconstruction of the anterior oblique beak ligament by using a distally based half radial portion of the flexor carpi radialis tendon. The flexor carpi radialis tendon is passed through a bony channel at the base of the first metacarpal to its dorsum, where it is routed around the abductor pollicis longus and then back onto itself. This reinforces the volar, dorsal, and radial aspects of the trapeziometacarpal joint capsule. The ligaments

The trapeziometacarpal joint is hinged open from the dorsum to reveal the ligaments. The deep anterior oblique (beak) ligament (DAOL) is consistently implicated in trapeziometacarpal joint disease progression. Other ligaments include the superficial anterior oblique ligament (SAOL), the posterior oblique ligament (POL), the dorsoradial ligament (DRL), the dorsal intermetacarpal ligament (DIML), the intermetacarpal ligament (IML), the dorsal trapeziotrapezoid ligament (DTT), and the dorsal trapezioid-second metacarpal ligament.