The CMC Joint

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Disclosures

- I am a paid consultant for Arthrex
- In this talk I will discuss the Arthrex Tight-Rope as a treatment option for CMC DJD
- I receive no royalties from the use of the Tight-Rope
- I am not being reimbursed for this presentation

Epidemiology

- Most common site of osteoarthritis
- Female predominance: 10-15:1
  - Greater curvature, less congruity, smaller surface areas
  - 15% female incidence (Haara JBJS 1994)
  - 25% post-menopausal women (Armstrong 1994)
  - Greater in Asian and white populations
- Other factors
  - Occupational, family history, obesity, ligamentous laxity, hormonal differences, trauma
  - Ehlers-Danlos: avg age of CMC arthrosis is 15 yrs (Gamble 1989)
Radiographs

- Eaton and Littler (JBJS 1973)
  - Stage 1: Normal articular contours, slight widening of joint space, < 1/3 subluxation in any plane
  - Stage 2: Osteophytes < 2mm, slight narrowing of joint space, instability with stress views, > 1/3 subluxation in any plane
  - Stage 3: Osteophytes > 2mm, joint space narrowing, > 1/3 subluxation in any plane
  - Stage 4: Advanced degenerative changes, joint space is very narrow with cystic and sclerotic changes, pantrapezial arthrosis

Stage 1

- Normal articular contours
- Slight widening
- < 1/3 subluxation

Stage 2

- Osteophytes < 2mm
- Slight narrowing
- Instability with stress views
- > 1/3 subluxation
Stage 3
- Osteophytes > 2mm,
- Joint space narrowing
- > 1/3 subluxation

Stage 4
- Advanced degenerative changes
- Joint space is very narrow
- Cystic and sclerotic changes

Stage 5 ???
- No mention in Eaton’s classification
- Scaphotrapezoidal arthrosis (Pan-trapezial)
Treatment

- Non-operative
  - Activity modification
  - NSAIDs
  - Injections
  - Opponens splints
  - Thenar muscle conditioning

Non-operative Treatment

- Swigart et al. (JHS 1999)
  - 114 patients, 130 thumbs
  - 76% improvement for stage 1-2 with splinting
  - 54% improvement for stage 3-4 with splinting
  - 54% and 61% improvement at 6 months after splinting

- Berggren et al. (SJPRS 2001)
  - 33 patients over 7 years
  - Occupational therapy and splinting were successful in helping
    70% (23/33) to avoid surgery in first 7 months
  - Only 2 of 19 ultimately had surgery at 7 years

Non-Operative Treatment

- Day et al. (JHS 2004)
  - Prospective study of 30 thumbs
  - Steroid injection + 3 weeks of splinting
  - Long term relief with Stage 1 disease (5/6)
  - Less reliable with Stage 2/3 (6/17) or Stage 4 (1/7)
  - 40% regardless of staging had long term relief
Surgical Treatment

- #1 RELIEF OF PAIN
- #2 FUNCTION AND STRENGTH

Surgical Treatments

- Ligament reconstruction
- Simple trapeziectomy / hematoma-distraction
- Abduction-Extension Osteotomy
- Arthrodesis
- Implant Arthroplasty
- Ligament Reconstruction and Tendon Interposition (LRTI)
- Suspensionplasty – Tightrope or APL

Ligament Reconstruction

- Eaton and Littler (JBJS 1973)
  - Reconstruction of the palmar thumb ligament with GBE tendon
  - Predicated on pre-arthritisic joint
  - Indicated with hypermobile joint – radial subluxation
  - Initial studies showed good-excellent results (Eaton 1984, Lane 1987)

- Freedman (JHS 2000)
  - 23 thumbs, 15 year follow-up
  - 90% long term satisfaction
  - 8% showed radiographic changes
  - 108% pinch and 105% grip strength

Eaton and Littler (JBJS 1973)

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Extension Osteotomy

Extension Osteotomy:
Unloads Palmar Portion of the CMC Joint
Alters Force Vectors During Pinch
Effective in Early stage disease
 Doesn’t burn bridges for later arthroplasty

Trapeziometacarpal Arthrodesis

- Indications:
  - Painful instability
  - < 50 years old in high-demand profession
  - Affords joint stability, strength, pain relief
  - “Key Pinch” position
    - 30-40° Palmar Abduction
    - 10-20° Radial Abduction

- Complications:
  - Adjacent joint degeneration
  - Compensatory hypermobility
  - Non-union
  - Immobilization

Trapeziectomy

- Simple Trapeziectomy:
  - Briefly described in 1949
  - Good pain relief
  - Can lead to weakness/instability

- Interposition Arthroplasty
  - Hemion 1970
  - ½ of FCR or PL

- Hematoma and Distraction Arthroplasty
  - Addressed metacarpal migration
  - No long-term studies
  - Habtes (2003): 96% satisfaction rate at 2 yrs
  - Gray and Marks (2007): 63% 10y. Comparable results to other tx.
**Ligament Reconstruction and Tendon Interposition – (LRTI)**

- Reconstruction of beak ligament
- 3 Principles
  - 1. Trapeziectomy
  - 2. Anterior oblique ligament reconstruction
  - 3. Interposition to reduce impingement/migration

**Evolution of the procedure over time**
- 1949 - Gervis: Trapeziectomy
- 1970 - Fromison: “Anchovy” procedure
- 1973 - Eaton and Littler: Ligament reconstruction
- 1986 - Burton and Pellegrini: LRTI

**LRTI**

- Burton and Pellegrini (1986)
  - 25 procedures are reviewed with average follow-up of 2 years
  - LRTI improved pinch strength, grip strength endurance, and restored thumb web space better than silicone implant arthroplasty
  - Proximal migration averaged only 11% with LRTI (vs 50%)
  - Subluxation averaged only 7% with LRTI (vs 35%)
  - Excellent results were achieved in 23 thumbs or 92% of cases
  - No deterioration of function or stability with 2 year follow-up
Tightrope Fixation

- Technique of Suspensionplasty using an implant to suspend the 1st metacarpal to the 2nd Metacarpal
- Acts to prevent proximal migration of the 1st metacarpal during healing
- Can lead to faster recovery times and earlier rehab
Tightrope Outcomes
- Yao, J et al. Suture-Button Suspensionplasty for Thumb Carpometacarpal Arthritis: A Minimum. 2-Year Follow-Up. JHS 2013
  - 21 patients at a minimum of 2 year follow up
  - Outcomes were similar to other procedures historically described
  - Faster rehabilitation and return to function
  - Similar complication rates

Tightrope Complications
  - Report of index metacarpal through suture button hole
  - Unique complication of tightrope
Surgical Outcomes

- Tomaino et al (JBJS 1995)
  - Key pinch strength took at least 6 years to equal preoperative value
  - Average follow-up of 9 years
  - 24 thumbs in 22 patients
    - Average grip strength increased 93% from pre-op
    - Average key pinch strength increased 34%
    - Tip pinch strength increased 65%
  - Stress radiographs showed an average subluxation of the metacarpal base of 11% and subsidence of only 13%

- Kreigs-Au et al. (JBJS 2004)
  - Prospective randomized study
  - 31 patients, 48 month follow-up
  - Trapeziectomy and ligament reconstruction with and without interposition
  - No difference in strength or pain scores
  - No difference in proximal migration at rest or stress

  - 183 thumbs
  - Evaluate trapeziectomy, PL interposition, and LRTI
  - 1 yr follow-up
    - 82% had good pain relief
    - 68% had return to activities by 1 yr
  - No differences between treatment options at 1 year
Complications

- Proximal migration / Impingement
- MCP hyperextension
  - >30° - observation vs pinning
  - <30° - consider stabilization procedure
- Nerve injury: dorsal sensory branches of radial n.
- Radial artery injury
- Infection (<1%)
- CRPS (as much as 8% with LRTI)

Does It Matter What We Do?

- Treatment…..Does it matter?
  - Trapeziectomy with/without tendon interposition not better than other techniques.
  - Arthrodesis not better than other techniques (non-union 8-20%).
  - LRTI not better than other techniques (some studies, higher complications).
  - Implant arthroplasty may be better in short term; no long term f/u studies.

* They all do well as long as the arthritic TZ is excised and concomitant STT arthritis is addressed.