Tendon Structure

- Tendons are mechanically responsible for the transmission of muscle forces to bone.
- Enthesis has four distinct zones; tendon, fibrocartilage, mineralised fibrocartilage (Sharpey’s fibres) and bone.
- Enthesis is subjected to tensile, compressive and shear forces, which may be four times the force of that at the muscle mid-substance.
Tendon Injury
Tendon Injury
Tendon Overuse

- Small repetitive strains lead to microinjuries
- Prostaglandins and Leukotrienes released
- PGE2 induces profound degenerative change when injected into tendon mid-substance
- LTB4 induces tendon oedema
Tendinopathy

- Lack of inflammatory cells in Chronic Tendinopathy
Tendinopathy

- Inflammation occurs in the early stages of tendinopathy
- Disappears once the degenerative process has begun
- Explanation for frequent lack of pain
Tendinopathy

- Mechanotransduction
- Molecular and genetic level
- Complex cascade of extracellular matrix gene expression and protein synthesis
Tendinopathy

- Careful balance of these pathways
- Appropriate positive change in tendon as a result of physical training
- Negative degenerative changes
Normal Tendon
Tendinopathy

• Angiofibroblastic Hyperplasia (Nirchl, 1979)
  • (i) increased cellular numbers
  • (ii) neovascularisation
  • (iii) increased neurochemicals
  • (iv) disordered collagen matrix

• Tenocyte Apoptosis (programmed cell death)
Tendinopathy
Rotator Cuff Tears

- A Brief History
  - Codman - Rim Rent of Supraspinatus
  - Critical area of Hypovascularity
  - Neer - External Impingement
Cuff EndoSkeleton

SubS  LHB  SupSp  InfSp
Cuff EndoSkeleton

SubS  LHB  InfSp
Cuff EndoSkeleton

SubS  LHB  SupSp  InfSp
Crescent Tear

SubS  LHB  SupSp

InfSp
Tear Progression

SubS  LHB  SupSp  InfSp
Tear Progression

SubS  LHB  SupSp  InfSp
Massive Tear

SubS

SupSp

InfSp

LHB
Cuff Dysfunction

Deltoid

Acromion

Humeral Head

Glenoid

Superior

Rotator Cuff
Cuff Tear Arthropathy
Management Goals

• Reduce Pain
• Maintain Function
Management Options

- Restore Anatomy
- Remove Pain Generators
- Rehabilitate
- Replace
Treatment Options

• **Restore Anatomy**
  • Rotator Cuff Repair
  • Quality / Mobility - tendon and muscle
Treatment Options

• **Restore Anatomy**

  • Rotator Cuff Repair

  • Quality / Mobility - tendon and muscle

  • Biology

    • Viable tenocytes in massive cuff tears = 0 (Carr et al)

• Partial vs Complete repairs
Massive Tear

SubS  |  SupSp  |  InfSp

LHB

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Treatment Options

• **Restore Anatomy**
  • Tendon Transfers
    • Latisimus Dorsi +/- Teres Major for Posterior Cuff
    • Pec Major for Anterior Cuff
Treatment Options

- Remove Pain Generators (non-surgical)
  - Analgesia
  - Injections
  - Nerve Blocks
    - Suprascapular
    - Lateral Pectoral

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Treatment Options

- **Remove Pain Generators (Surgical)**
  - Debridement / Decompression / Bursectomy / Tuberooplasty
  - Retain CoracoAcromial Arch
  - LHB Tenotomy / Tenodesis
  - Suprascapular Neurectomy
Treatment Options

- Rehabilitation
  - Painfree
  - Passive ROM
  - Anterior Deltoid Strengthening
Treatment Options

- Replace
  - Hemiarthroplasty
  - Reverse Geometry Shoulder
• Thank You
• Any Questions?