Surgeon’s perspective - tendinopathy

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Tendinopathy..... How does it happen?

Mechanical stresses on the tendon with repetitive loading

Impingement of the tendon between adjacent structures (bones, ligaments) and impaired blood supply
Physiology

• Remarkable response to stress
  • Exercise induces tendon diameter increase
  • Inactivity or immobilization causes rapid atrophy

• Young athletes- repetitive stress response to the tendon causes severe degeneration

• Age-related decreases in cell density, collagen fibril diameter and density
  • Older athletes have higher injury susceptibility
Causes

**Intrinsic Factors**
- Age – ‘mature’ tissues heal less efficiently
- Chronic disease – diabetes, rheumatoid arthritis, connective tissue disease
- Biomechanics – adverse mechanical stress

**Extrinsic Factors**
- Repetitive activity in work, sport or leisure
- Often a sudden burst of DIY activities (gardening, painting)
- Sport – an increase in training load
Pathology

- Tendon histopathology: there is not much inflammatory change in symptomatic tendons

- Pathological process is mucoid degeneration with inadequate repair and remodeling.

- Loss of tightly bundled collagen structure and increased proteoglycan ground substance in tendon

- Evidence of neovascularization, with growth of nerve fibers into tendon
Presentation

Pain → Swelling

Deformity and Dysfunction related to the tendon
Why is there pain?

- Pain is due to neovascularization and neural growth

- Irritation of mechanoreceptors by vibration, traction or shear forces, which trigger nociceptive receptors by neurotransmitters such as substance P and by biomechanical irritants

- Modern treatments aim to reverse the neovascularization and encourage healing and remodeling
Assessment

Reduced ROM limited by tightness in muscle

Swelling

Pain on impingement of the affected tendon
Imaging

Not usually required to make a clinical diagnosis

Used to exclude other pathology and plan surgery

Ultrasound – preferred option

Partial tears are quite a common finding, even in asymptomatic tendons especially better picked up on MRI
When is surgery indicated

- In chronic cases > 10 weeks
- Failed conservative therapy
- Failed steroid injections
- Steroids have a role in treating any associated bursitis
- Physiotherapy with an eccentric loading programme has greater long term benefits, but if failed
How big is the problem?

- 30% > risk in runners (Kujula et al 2007)
- More active population and hence seen in all ages
- Repetitive loads on the tendon- fatigue failure
- Insufficient recovery leads to further micro-tears (Millar et al 2010)
- Improper repair leading to degenerative changes in the tendon (Kujula 2007)
Involvement in foot and ankle:

- Posterior tibial tendon
- Achilles tendon
- Peroneal tendons
- Tibialis anterior tendon
- And smaller tendons
Posterior Tibial tendon

• Tibialis post tendon arises from posterior compartment

• Present deep initially, but becomes superficial later

• Just post to medial malleolus

• Inserts in all tarsal bones except talus with multiple slips
Anatomical reasons for dysfunction

- Relative hypo-vascular
- Sharp angle turn of tendon behind medial malleolus
- Involvement of synovium at early stage and limited space
Pathophysiology

- Synovitis and hypovascularity
- Tendinosis
- Degenerative micro-tears initially
- Stretching and attenuation of tendon
- Further macroscopic tears
- Loss of arch - flat foot
- Sub-talar joint arthritis
Clinical stages - stage 1

- Pain and tendonitis, but normal working tendon
- Swelling near medial side of ankle
- Can be missed at this stage!
Stage 2

- More inflammation leads to elongation in tendon
- Flexible flat foot
- Pain increases and becomes more localised
- Instability in foot and restricted walking
Stage 3

- Pain starts to disappear from medial side of ankle and becomes more on lateral side

- Impingement bet fibula and calcaneum

- Fixed hind-foot and no correction passively

- More flattening of foot and midfoot break
Stage 4

- Rigid fixed flatfoot
- Associated with Pan talar arthritis
Management

• Goes with the stages of the disease

• Associated conditions should be addressed

• Rheumatologists involvement may be required
Stage 1 management

- Mainly non-operative
- Arch supports, quarter inch medial heel, sole wedge
- Ultra-sound
- Immobilisation in cast if required
- NSAIDS
- Surgery for decompression of tendon and teno-synovectomy
Stage 2 management

Mainly surgical

Either lateral column lengthening or
- tendon decompression, FDL tendon transfer and medial calcaneal sliding osteotomy

Repair of tendon is usually not enough

Occasional reports on split tib Ant transfer
Calcaneal medial shift osteotomy

• Lateral incision

• Medial shift of calcaneum

• Fixation using screw
FDL tendon transfer with internal brace and repair of spring ligament
Stage 3 management

Usually surgical

End stage flat foot with hind foot or triple joint arthritis

Surgery is usually salvage with arthrodesis
Arthrodesis
Stage 4 disease

- Usually very disabling
- Results are disappointing
- Many surgeries may be required
- Pan talar Fusion using retrograde nail from calcaneum upwords
TTC fusion / Pan talar fusion

- Nail inserted to fuse hindfoot joints
- Leads to stiff foot and ankle
- Correction of deformity is possible
Achilles tendinopathy

Types (Cooke et al. 2009)

- Insertional (Haglund's, bursae, posterior impingement types)
- Mid-portion (reactive, disrepair and degenerate types)
Anatomy

- Largest tendon in the body
- Origin from gastrocnemius and soleus muscles
- Insertion on calcaneal tuberosity
- Lacks synovial sheath
- Has a para tenon
Insertional Achilles tendinopathy
Insertional tendinopathy- <50%

Multiple surgical options (elias et al, Johnson et al, maffuli et al, Wagner et al, Watson et al)

Techniques revolve around 5 procedures

3 studies showed benefit of Postero-medial/midline incisions, resection of bony prominence, excision of bursa, calcific deposits and reattachment of TA using suture anchors

2 studies described all above, but augmentation using FHL tendon transfer and plantaris tendon
Drilling of anchors and reattachment of tendoachilles
If > 50% tendon degenerate, FHL harvesting and attachment to calcaneus
Arthroscopic techniques

• Endoscopic calcaneoplasty is a relatively new procedure

• Published literature suggests mixed outcomes (van Dijk, Maffuli et al)

• Higher learning curve
• Incomplete resection being the problem
Our experience

15-16
42 patients
VAS 9.5-3

4 recurrences
repeat surgery required

We see approximately 30-40 patients each year who require surgery - open preferred to arthroscopic at present.

Most are recreational athletes with a small percentage being semi-professional/professional.

We routinely audit the procedures.

Usually get AOFAS and VAS scoring pre op.

Offering arthroscopic techniques now..

VAS drop from 10 to 3 in last audit cycle with significant improvement in daily activities including sports and early return to sports.
Non-insertional Achilles Tendinopathy

• Diagnosis with history and clinical examination

• Pain, most intense on first moving after a period of rest

• Clinical tests- Palpation test, tendon loading tests, Royal London Hospital test

• Imaging
How common is the problem?

Very common (Pearce et al. EFORT open review 2016)

37.3/100000 in European population

Represent 55-60% of the total spectrum of TA disorders

Combination of inflammation and degeneration

Training errors, drugs such as steroids can contribute to its development
Who needs operation

• Up to 50% need surgery (Faro et al 2013)

• Risks of open surgery is around 11% (Maquirrain et al)

• Open surgery has 50-100% success rates with traditional excision of tendinosis with or without FHL augmentation
Surgical Management

• Tendoscopy - will be discussed shortly

• MIS procedure - stripping of para tenon and anterior fat pad (Alfredson et al)

• Open technique - stripping, excision of area of tendinosis and augmentation of tendon using FHL or plantaris tendon
Tendoscopy

- Under direct vision
- Promising initial results seen with minimal complications
- Steep learning curve

Marquirriain Arthroscopy 2002
Marquirriain J Foot Ankle Surg 2013
Calder et al 2014
Resection of plantaris tendon - is it needed??

- Symptoms most often on medial side has led to the postulation of plantaris involvement

- Good results with both endoscopic and minimally invasive techniques

- Prospective study of 32 elite athletes at mean 23 months showed 90% success rates (Calder/ Pollock et al 2014)

- Resection of neo vascularisation by shaving

- In our unit we are still identifying the role of this procedure

Alfredson et al 2015
Open technique Principles

- Excise fibrotic adhesions
- Remove degenerated nodules
- Make multiple incisions in tendon to detect intratendinous lesions and restore vascularity
- Defects can be sutured in side-to-side fashion or left open
- If large lesions excised, reconstruction procedures may be required
Open Technique

• Prone position
• Posterior longitudinal incision; slightly medial to midline
• Sural nerve protected

• Pre-achilles fascia opened longitudinally; paratenon exposed
• Careful separation of paratenon from tendon

• Important to free full tendon from adherent diseased paratenon

• Unhealthy scarred tendon debrided, leaving adjacent healthy longitudinal fibres and repair of the tendon
Our experience

- Mostly with open technique
- We aim to offer arthroscopic treatment to the correct indications

- AOFAS scoring/VAS scoring
- 2015-2016= 25 patients (M/F 17/8)
- VAS dropped from 9 to 2
- AOFAS scoring 26 to 90
- Excellent outcome measures for these conditions as we have audited our own results

- Small percentage of patients can benefit with Ostenil tendon injection
Achilles Tendon Rupture

• Antecedent tendinitis/tendinosis in 24%

• 75% of sports-related ruptures happen in patients between 30-40 years of age.

• Most ruptures occur in 4cm proximal to the calcaneal insertion.
Management Goals

• Restore musculotendinous length and tension.

• Optimize gastro-soleus strength and function

• Avoid ankle stiffness
Surgical Management

- Preserve anterior para-tenon blood supply
- Beware of sural nerve
- Debride and approximate tendon ends
- Use 2-4 stranded locked suture technique
- May augment with absorbable suture
- Close para-tenon separately
Percutaneous versus open repair

Percutaneous repair

Open repair
Mini-open technique

1. **Outcome of achilles tendon ruptures treated by a limited open technique.** Jung HG, Lee KB, Cho SG, Yoon

2. **Repair of achilles tendon rupture under endoscopic control.** Fortis AP, Dimas A, Lam

3. **Minimally invasive repair of ruptured Achilles tendon.** Chan SK, Chu
Mini-Open techniques
Neglected ruptures

- Becoming a common problem

- Especially in elderly population

- Reduces strength significantly and leads to recurrent falls

- Assessment can be tricky
Surgery in neglected ruptures

- Prone position
- Isolation of FHL tendon
- Tendon transfer into the calcaneum and fixation using screw
- We have treated 10 cases so far with this technique
Neglected TA ruptures

Our experience

Review article in February OPN 2018 - M. Salim and R Limaye

Very difficult problem to resolve

Pre-op MRI to identify the gap, plan surgery and offer FHL tendon transfer

Excellent outcomes achieved in all 10 patients operated so far.
Conclusion

Common entity in sports and in non-sports population

Surgical management only indicated after failed non-operative measures in various conditions

Outcomes should be aimed to the needs of the individual patient- however can achieve predictable outcomes in correct indications
Thank you