Tendinopathy and Iliotibial Band Syndrome: Understanding Pathology Informs Treatment

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Invitation

- Address the contemporary use of one or more therapeutic modalities
At the foundation of therapeutic interventions for musculoskeletal conditions lies a diagnosis (medical, functional)
Purpose

- Consider therapeutic interventions from a perspective of new understandings of two relatively common musculoskeletal conditions
- Highlight the links between diagnosis from a tissue and biomechanical perspective and treatment recommendations
Tendinopathy

- Tendinosis
- or
- Tendinitis
- Implication of “itis”
- Implications of labeling in treatment
What it is:
A closer look at a degenerative process

- Ultrasonography
  - Fiber disorganization
  - Hypoechoic islands
  - Increased fluid volume
  - Increased diameter
  - Neovascularization
Transverse View 5 cm prox insertion
Ultrasound: Achilles Rupture
Neovascularization

Collagen Organization: H&E
Signs and Symptoms

- Pain
  - Why is tendinopathy painful?

- Stiffness
  - What does loss of stiffness imply?
Neovascularization

- Not always present
- Resolution has been associated with symptom relief
- May be present in asymptomatic individuals
What it is not: highlights of the literature

- “There is some scientific support in the literature for the diagnosis of tenosynovitis and tendinosis as a pathologic entity. Actual inflammation of tendon tissue consistent with tendonitis has not been seen clearly in patho-anatomic studies”
What it is not: bottom line

- Tendinopathy is not an inflammatory condition based upon contemporary understanding of an acute inflammation > repair process.

- PGEs elevated but not neutrophil, macrophage counts
Treatments suggested for “itis”

- Ultrasound & phoresis (how many have used US to treat a tendinopathy?)
- NSAIDs
- Friction massage
- LLLT
- Exercise
- Superficial heat and cold
Ultrasound etc.

- “Therapeutic ultrasonography, corticosteroid iontophoresis, and phonophoresis are of uncertain benefit for tendinopathy.”

- Why would we treat a non-inflammatory condition with anti-inflammatory medication or suggest we promote resolution of an inflammatory condition with ultrasound, especially in light of the absence of evidence of efficacy?
Friction massage

- No benefit but limited to ECRB and ITB - further investigation needed

NSAIDs

- NSAIDs are recommended for short-term pain relief but have no effect on long-term outcomes.

NSAIDs

“Overall, a short course of NSAIDs appears a reasonable option for the treatment of acute pain associated with tendon overuse, particularly about the shoulder. There is no clear evidence that NSAIDS are effective in the treatment of chronic tendinopathy in the long term.”

LLLT

- Mixed results
- Systematic reviews do not support use of LLLT for tendinopathy
- Results may be parameter specific
Bottom line - we have much to learn regarding LLLT and the treatment of tendinopathy

Additional data are needed before LLLT with specific treatment parameters (wavelength, dose etc.) can be recommended for general care
Exercise

- Limited levels of evidence exist to suggest that EE has a positive effect on clinical outcomes such as pain, function and patient satisfaction/return to work when compared to various control interventions such as concentric exercise (CE), stretching, splinting, frictions and ultrasound.
Effective treatment - exercise

- Achilles and patella
  Evidence of response to progressive eccentric loading

Less benefit with insertional Achilles pathology often including bursitis, Haglund’s deformity
Effective treatment-exercise

- Evidence of benefit of closed chain incline squat in management of patella tendinopathy
- Posterior tibialis: preliminary evidence of benefit with brace (FAO) -> orthotic and eccentric loading
A New Approach

- Glyceryl Trinitrate Patches
- Evidence of effectiveness - new solution based on a new understanding of tendon pathology?
GTN

- GTN reduced pain with activity at 12 & 24 wks, reduced night pain at 12 wks, reduced tenderness at 12 wks, decreased pain after the hop test at 24 wks, and increased ankle plantar flexor mean total work compared with the baseline 24 wks. 78% of GTN group were asymptomatic with activities of daily living at six months, compared with 49%) in placebo group. The mean effect size for all outcome measures was 0.14.

- Paoloni et al. Topical Glyceryl Trinitrate Treatment of Chronic Noninsertional Achilles Tendinopathy. JBJS (Am) 2004; 86:916-922
GTN


- “This study has failed to support the clinical benefit of GTN patches previously described in the literature. In the available tissue samples, there did not appear to be any histological or immunohistochemical change in Achilles tendinopathy treated with GTN compared with those undergoing standard nonoperative therapy.”
Concerns with “Recovery”

- Resolution of symptoms does not imply structural repair
- Evidence of repair
  - Decrease diameter
  - Resolution of vascular in-growth
  - Improved fiber organization and resolution of hypoechoic islands
- No treatment universally effective - fuller understanding of pathology needed to advance treatment
Current best practice? EdUReP+

- Educate the patient
- Unload - active rest, brace as indicated
- Glyceryl Trinitrate Patch?
- Reload - eccentric training
- Prevent - training errors, too rapid of a return to sport
A new tale: complaint of lateral knee pain

- Active graduate student in good health
- Pain on lateral aspect of right knee 10d
- Insidious onset
- Unable to run more than 1 1/2 miles before onset of disabling pain
Physical examination of right knee

- Full motion
- No effusion
- No laxity
- Exquisitely tender over lateral femoral condyle
Diagnosis?

If you hear hoof beats think of horses!!
Nothing tricky

- Athlete evaluated as experiencing Iliotibial Band Friction Syndrome
- What is it?
- How is the condition best treated?
Iliotibial Band Friction Syndrome
Varying opinions on the etiology of the injury
Biomechanics

- With knee extension, the ITB is anterior to the lateral femoral epicondyle.
- With greater than 30 degrees of knee flexion, the ITB is posterior to the lateral femoral epicondyle.

What is a possible cause of iliotibial band friction syndrome?

Overuse may cause shortening of the ITB. The knee goes from flexion to extension and excessive pressure from the ITB causes friction over the lateral femoral epicondyle. This repeated motion produces inflammation of the underlying structures and causes pain.

http://www.nismat.org/ptcor/itb_stretch/
Iliotibial band syndrome

- The **continual rubbing** of the band over the lateral femoral epicondyle, combined with the repeated flexion and extension of the knee during running may cause the area to become inflamed.

Sports Injury Clinic

- Runners Knee (Iliotibial band syndrome)
  - http://www.sportsinjuryclinic.net/cybertherapist/front/knee/irunnersknee.html syndrome)
When the knee flexes, the ITB moves posteriorly along the lateral femoral epicondyle. Contact against the condyle is highest between 20° and 30° (average 21°), so when the band is *excessively tight or stressed*, the ITB rubs more vigorously. The space deep to the ITB is believed to have an adventitial bursal extension from the synovial capsule.

Treatment??

- Stretching
- Ultrasound
- Transverse friction
- Etc.
Second thoughts?

- Does the fascia become tight? (or is there evidence that it can be substantially stretched?)
- The fascia is well anchored to the femur and does not rub on the femoral condyle!
The functional anatomy of the iliotibial band during flexion and extension of the knee: implications for understanding iliotibial band syndrome.

Fairclough et al, J Anat. 2006 Mar;208(3):309-16
“the ITB is simply a thickened, lateral part of the fascia lata. It completely surrounds the thigh, is anchored to the femoral shaft by the lateral intermuscular septum and is continuous with the patellar retinacula”
“Furthermore, we have shown that the ITB is firmly attached to the distal femur by strong, obliquely orientated, fibrous strands that can be regarded as tendon entheses. Thus, the ITB is unlikely to roll forwards and backwards during flexion and extension of the knee, but could move slightly in a medial-lateral direction.”
“The impression of a rolling movement is likely to be an illusion created by a sequential shifting of tensile load within the ITB. Its fibres are tensioned in sequence from anterior to posterior as the knee flexes.”
If the band does not roll across the lateral femoral condyle what would explain this commonly experienced and widely recognized problem?
Is Iliotibial band syndrome really a friction syndrome? Fairclough et al
“Nevertheless, slight medial-lateral movement is possible and we propose that ITB syndrome is caused by increased compression of a highly vascularised and innervated layer of fat and loose connective tissue that separates the ITB from the epicondyle.”

*bursitis cannot be ruled out but .......

“The MR finding suggested soft tissue inflammation and/or edema rather than focal fluid collection in a bursae”
“Our view is that ITB syndrome is related to impaired function of the hip musculature and that its resolution can only be properly achieved when the biomechanics of hip muscle function are properly addressed.”
Treatment

Reviewed 4 reports investigating NSAIDs, deep friction massage, phonophoresis vs immobilization, and corticosteroid injection

Outcome data confounded by other interventions (ice, stretching, rest)
This review highlights both the paucity in quantity and quality of research regarding the conservative treatment of ITBFS. There seems limited evidence to suggest that the conservative treatments that have been studied offer any significant benefit in the management of ITBFS.
Back to our patient

- Very hypertonic over TFL
- Tender along course of palpatably tight ITB
- Palpation, long-sit suggestive of right anterior innominate rotation, T-L junction hypomobility
- Antecedents?
Treatment

- Mobilization of T-L jct, instruction in right knee to chest muscle energy and hip flexor muscle stretching 2-3 times each day.
- Initial treatment reduced TFL hypertonus and ITB tenderness
- Resume activity as tolerated
Outcome

- Able to resume running without limitation within 5 days
Additional considerations

- Runners - distance, surface, level of fitness, heel strike angle
- Cyclists - saddle height, cleat peddle interface, distance
Anatomical and MRI investigations suggest that pain over the lateral femoral condyle associated with ITB friction syndrome is not associated with friction but rather fat pad entrapment.

Tensioning of the ITB is due to proximal muscle / joint dysfunction.

Treatment should be directed at identifying and then treating the mechanical sources of ITB tensioning.
Bottom line

- Understanding of the pathoetiolog is essential to treatment decisions
- A multimodal approach (injection, manual therapy, therapeutic exercise) may yield optimal (early return to full sport participation) treatment results
Future directions

- Value of local interventions (corticosteroid injection, etc) warrants investigation in light of a revised view of the pain generator
Questions and Discussion
Thank you !!