Ankle Equinus & Athletes

Amol Saxena, DPM, FACFAS
Palo Alto Medical Foundation
Palo Alto, CA USA
HeySax@Aol.com
The Equinus Conundrum

- Over-rated by some
- Neglected by others
- Poorly studied by all: e.g. how much dorsiflexion should be gained?
- Does lengthening really make a difference?
- A lot of research on Diabetics, but what about the rest of the population?
What about equinus in athletes?

Anecdotally: Dan Marino Achilles was repaired “over-lengthened” & needed a Plantarflexion-assist brace

Has anyone ever studied athletes who have had an Achilles or gastroc lengthened?

Is there anyone out there?
Database of Endoscopic Gastrocnemius Recession

Since 2000, 243 procedures
16 on “athletic”
3 on 2 High School volleyball players
5 on 4 runners (one diabetic)

Usually asymmetric post-traumatic contractures but some w “flatfoot deformity”
Dogma of Equinus

Tighter side is worse off...is this true?

Randomize pts w Equinus & see if their outcomes are different

What you might find may surprise you!

Patients with normal ankle dorsiflexion can get the same pathology i.e. Achilles Tendonosis, Plantar Fasciitis, non-union, forefoot pathology etc.
Why Lengthen the posterior group?

- Decrease propulsion/force on forefoot
- Decrease compression on midfoot
- Decrease tension/torque on calcaneus
- Post-traumatic contracture

So why do Cavus feet have a high Calcaneal Inclination & supposedly tight Achilles?
In states/countries where no posterior lengthening is performed, is the recurrence of deformity, midfoot breakdown & results any different?

Look before you leap
Ankle Equinus: What is Normal?

Textbook: 10° w Knee Ext, > 10° w Knee flexed

Reality...5° w KE & 10° w KF (DiGiovanni et al, JBJS 2002) or...

3° w KE & 9° w KF (Grady & Saxena JFAS 1991)

0° KE & 5° KF Adolescent Athletes (Saxena JAPMA 2003)

Tabrizi et al 6 & 11, 13 & 21 (controls)
Are More People in Equinus?

Most Athletes are & they are not having their posterior complex lengthened (weaken propulsion)

Delp & Zajac (Clin Orthop 1991): 1 cm TAL caused 30% weakening & 2 cm caused 80% of posterior complex

Error in measurement? Technique?
Latest Biomechanics disproves Root biomechanics and many other assumptions of foot & ankle ROM

2017 Jarvis Foot & Ankle Research et al: Ankle “equinus” is normal

Full-text will be posted in AAPSM May Newsletter
Which foot has the pathology?
Ankle dorsiflexion: why does he have heel pain?
Gastroc vs Gastroc-Soleus?

Most have Gastroc tightness

If you lengthen Gastroc, still maintain Soleus

Diabetics do have different Achilles tendons microscopically, so a “TAL” may be fine for them, though greater risk for Calcanéal Ulcers
Aronow et al: FAI 2006

Static test of triceps contracture

Similar contracture through gastroc or soleus suggesting...

Lengthening gastroc would give similar clinical benefits with potentially less morbidity
Equinus Foot Type & Gait

Less heel contact time, so faster propulsion
A beneficial state in early evolution?
No coach ever said run more on your heels to run faster.
Look at a track meet or other speed sports
"On your toes the faster one goes"
Olympic Pole Vault Gold Medalist in Equinus
Double Partial Rupture 1+ Yr Old: Is there any proof anything more than a repair/debridement would work?
Happy Debridement
So why do their heels touch the ground if they are in equinus?

- Hyperextend their knees?
- Stronger anterior muscle group (plyometrics & backward drills)
- Soccer & basketball players have relatively less chronic Achilles tendonosis due to back-pedaling
So What about Stretching?
Ankle Equinus

- Stretching increases DF by about 2° over 6 mos in younger pts
- The Myotendonous Jcn & Muscle fibers are stretched
- Achilles Tendon weakens at 4% and fails at 8% i.e. an Achilles is 10 cm long, can it lengthen 5mm (5%)?
- BK & AK Casting/splinting?
So who needs lengthening?
What I consider: 0° or greater equinus along with...

- Midfoot DJD
- Hx of Forefoot Ulcers (but not necessarily other pathology)
- When re-aligning rearfoot i.e. calcaneal osteotomy
- Asymmetry, post-trauma
- NON-SPASTIC, Neurologically Normal
Which would you rather have, a Gastroc or an Achilles Tear?
Keep in mind:

There are no controlled studies on this.

So far posterior lengthening in any patient population other than diabetics is anecdotal.

Consider strengthening anterior leg in athletes as opposed to stretching posterior leg-eccentrics!

Pioneers get the arrows slung.
What about Eccentric strengthening?

Eccentrics introduced too early promote over-lengthening in a healing rupture—doing shortenings!

I have noticed a significant increase in my Achilles Tendon rupture patients getting “stretched out” when this is introduced too early!

Eccentrics only for tendinopathy not ruptures!
Eccentrics: Up with “2”
Eccentrics: “Down w One”
do 3x10 reps on flat initially
Algorithm for addressing Equinus in athletes
So when do I address an athlete’s equinus surgically… never?
Visit or email
HeySax@AOL.com