


Lateral Column Compression Syndrome




TEXAS STATE UNIVERSITY
The rising STAR of Texas

Pieter Kroon PT, DPT, OCS, FAAOMPT
Tim Kruchowsky PT, DPT, OCS, FAAOMPT

MTI **Cuboid Syndrome** TEXAS STATE UNIVERSITY
The rising STAR of Texas

- Cuboid syndrome is defined as a minor disruption or subluxation of the structural congruity of the calcaneocuboid joint.
- It is a poorly understood condition in both the athletic and non-athletic population and therefore, is often misdiagnosed and mistreated.




- Current treatment approaches fix the acute symptoms, but not the underlying cause of the problem, which leaves the patient vulnerable to repeat injuries.

Patterson S. Cuboid syndrome: a review of the literature. Journal of Sports Science and Medicine (2006) 5,597-606

MTI **Etiology** TEXAS STATE UNIVERSITY
The rising STAR of Texas






Extrinsic trauma:

- Isolated fractures are rare
- The mechanism of injury is usually plantarflexion of the hindfoot and midfoot against a fixed forefoot.
- The term "nutcracker fracture" describes compression of the cuboid between the calcaneus and the 4th and 5th MT.
- Plantar flexion/inversion sprains account for the majority of the cases reported.



Greaney RB, Gerber FH, Laughlin RL, et al (1983) Distribution and natural history of stress fractures in US marine recruits. Radiology 146:339-346


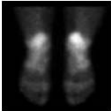
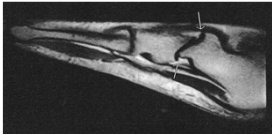
MTI **Differential Diagnosis** **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

Tarsal coalition 	Stress fracture 5th metatarsal 
Peroneal tendon subluxation 	Peroneal tendonopathy 
Anterior calcaneal process fracture 	

MTI **Imaging** **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

MRI and technetium bonescan are considered the gold standard imaging tools to identify fractures and bone stress injuries.

Though imaging has little value in the diagnosis of "cuboid syndrome" since bony anomalies are common in the midfoot and joint dysfunctions are, as a rule, undetectable on imaging.

MTI **Treatment** **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

Reported treatments include:

- Joint manipulation
- Low grade mobilizations
- Taping
- Orthotics, including a cuboid pad
- Graded load bearing activities


	
	

MTI Lateral Column Compression **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

A collection of signs and symptoms that occurs when the patient is not able to sufficiently stabilize the foot in standing.

For a variety of reasons the foot is not able to absorb normal loading during weightbearing.

The midfoot overpronates, and the forefoot ends up in a valgus position.

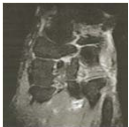
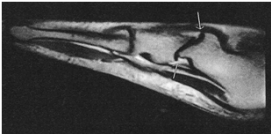


MTI Lateral Column Compression **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

This causes the medial column of the foot to elongate and the lateral column to compress.

The cuboid then gets caught between the hammer (calcaneus) and anvil (MT4-5) during normal weight bearing.

Subsequently it drops down in dysfunction ("dropped cuboid") or in extreme cases it will sustain a stress fracture.




MTI Contributing Factors **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

- There are a multitude of factors that contribute to the development of lateral column compression. Each factor needs to be evaluated in order to determine the cause of the syndrome.
- Often times it is not just one contributing factor, but a variety of factors that contribute to the complaints, including:
 - Anterior glide/medial rotation of the femur
 - Genu valgus – increased Q angle
 - Loss of talocrural extension
 - Soft tissue restrictions in the distal calf muscle
 - Poor mid and hindfoot strength
 - Poor calf strength
 - Poor structural stability of the foot

MTI Lateral Column Compression **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

- The lateral column compression syndrome appears to be the underlying movement impairment syndrome that drives many seemingly unrelated foot and ankle overuse injuries.
- In essence, when this movement impairment occurs, you just wait to see where the weakest link in that particular patient's body is, and that is where the breakdown will occur.
- The following injuries can be tied to the lateral column compression syndrome:
 - Joint dysfunction medial cuneiform/MT 1
 - Lateral impingement of the calcaneus
 - Achilles tendinopathy
 - Plantar fasciopathy
 - Medial tibial stress syndrome
 - Tarsal tunnel syndrome


MTI Lateral Column Compression **TEXAS STATE UNIVERSITY**
The rising STAR of Texas




MTI Hindfoot/midfoot Neutral **TEXAS STATE UNIVERSITY**
The rising STAR of Texas



MTI Patient's Preferred Posture TEXAS STATE UNIVERSITY
The rising STAR of Texas



MTI Hindfoot/midfoot Neutral TEXAS STATE UNIVERSITY
The rising STAR of Texas



MTI Patient's Preferred Posture TEXAS STATE UNIVERSITY
The rising STAR of Texas



MTI Patient's Preferred Posture **TEXAS STATE UNIVERSITY**
The rising STAR of Texas



MTI Hindfoot/midfoot Neutral **TEXAS STATE UNIVERSITY**
The rising STAR of Texas



MTI Hindfoot Mechanics **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

- The hindfoot plays a crucial role in lateral column compression syndrome.
- The required amount of ankle extension for running and walking is 15-20 degrees but when talocrural extension is limited, the body will have to find a different way to bring the body weight forward during the gait cycle.
- Most frequently, this compensation is achieved by tibial internal rotation, calcaneal eversion and midfoot pronation which in turn, leads to lateral column compression.

MTI **Hindfoot Mechanics** **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

- During the gait cycle, the foot needs to be able to transition from a torque converter during stance phase to a rigid lever during toe off.
- This locking and unlocking mechanism of the midfoot, is driven by the subtalar joint.
- During heelstrike the calcaneus everts, which unlocks the midtarsal joints, allowing the foot to become a torque converter.
- During toe off, the calcaneus inverts, which locks the midtarsal joints, allowing the foot to become a solid lever necessary for efficient toe off.
- If the subtalar joint is in dysfunction and not able to convert from eversion to inversion, the midtarsal joints will stay unlocked and will in essence drive the midfoot into overpronation/forefoot abduction during toe off.


MTI **Assessment** **TEXAS STATE UNIVERSITY**
The rising STAR of Texas

Things to consider during assessment:


- Posture
- Single leg stance
- Single leg stance ¼ squat
- Tarsal mobility testing: TC joint, subtalar joint, midtarsal joints
- Strength testing: gastrocnemius, soleus, FDL, FDB, lumbricals/interossei

MTI **Treatment** **TEXAS STATE UNIVERSITY**
Joint Manipulation The rising STAR of Texas


Restore proper joint function in affected joints, which allows for restoration of normal hind/midfoot mechanics.




TC joint




Subtalar Joint




TC Joint




Cuboid




TC Joint




Exercises




- The essence of the exercise portion of the treatment is that the patient needs to be taught to find subtalar/midfoot neutral and then superimpose LE/trunk activities.
- This is much like rehab principles we use in low back pain patients, where we teach them to find lumbar spine neutral and then superimpose UE/LE activities to increase the degree of difficulty.
- Towel crunches
- Stretching
- Heel raises
- Single leg presses/curls kickback



Golfer's Squat




Standing TKE



Stagger stance



References



- Mazerolle, S. (2007). Cuboid syndrome in a college basketball player: a case report. *Athletic Therapy Today*, 12(6):9-11.
- Durrall, C. (2011). Examination and treatment of cuboid syndrome: a literature review. *Sports Health*, 3(6):514-519.
- Jennings J, Davies G.(2005). Treatment of cuboid syndrome secondary to lateral ankle sprains: a case series. *Journal of Orthopedic and Sports Physical Therapy*, 35(7):409-415.
- Newell SG, Woodle A. (1981). Cuboid syndrome. *Phys Sports Medicine*. 9:71-76.
- Marshall P, Hamilton W. ((1992). Cuboid subluxation in ballet dancers. *The American Journal of Sports Medicine*, 20(2):179-175
- Matthews LG, Claus AP. (2014). Two examples of "cuboid syndrome" with active bone pathology: why did manual therapy help? *Manual Therapy*, 19:494-498
- Patterson S. (2006). Cuboid syndrome: a review of the literature. *Journal of Sports Science and Medicine*, 5:597-606
- Miller T, Pavlov H, Gupta M, Schultz E, Greben C. (2002). Isolated injury of the cuboid bone. *Emergency Radiology*, 9:272-277
- Yu S, Dardani M, Yu S. (2013). MRI of isolated cuboid stress fractures in adults. *AJR*, 201:1325-1330.
