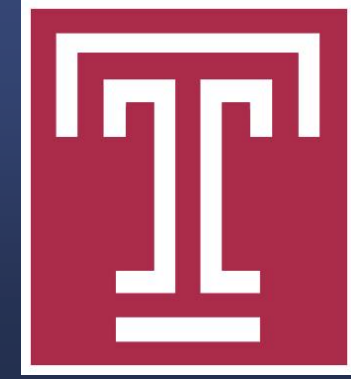


The relationship of the peroneus longus to the cuboid in midfoot Charcot neuroarthropathy

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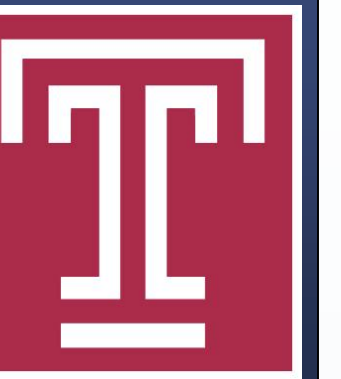


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Statement of Purpose and Literature Review

Wukich et al recently described a strong association between the objective parameter of cuboid height on the lateral radiographic projection and plantar foot ulceration in patients with midfoot Charcot neuroarthropathy [1]. They observed a statistically significant difference in cuboid height between midfoot Charcot patients with and without foot ulceration, and found that 40 (80%) of 50 patients with midfoot Charcot neuroarthropathy and a foot ulceration had a negative cuboid height.

Our group has also previously demonstrated a statistically significant relationship between a negative cuboid height with both consolidation of the 4/5th metatarsal-cuboid articulation (possibly indicating an abnormal retrograde effect of the forefoot on cuboid height) and with abnormalities of Meary's angle (possibly indicating an association between the medial and lateral columns during the pathogenesis and development of midfoot Charcot neuroarthropathy)[2].

These findings have lead us to investigate the involvement of the peroneus longus tendon in the pathogenesis of the midfoot Charcot neuropathy disease process. First, a structurally plantarflexed cuboid might be expected to place the peroneus longus tendon into a relatively subcutaneous position. This could make it at an increased risk as a portal for proximally-tracking infection, as well as serving as a relatively avascular wound base. Second, displacement of the peroneus longus from its normal course about the cuboid's promontory could also potentially result in medial column dysfunction and deformity due to its insertion on the base of the first metatarsal.

The objective of this investigation was to evaluate the position of the peroneus longus relative to the cuboid in a cohort of subjects with midfoot Charcot neuroarthropathy.



Figure 1: This figure demonstrates a patient with midfoot Charcot neuroarthropathy with an associated plantar-lateral midfoot ulceration secondary to a plantarly subluxed cuboid. The objective of this investigation was to evaluate the position of the peroneus longus relative to the cuboid in a cohort of subjects with midfoot Charcot neuroarthropathy. We hypothesize that a plantarly subluxed cuboid could potentially place the peroneus longus into a relatively subcutaneous position (theoretically resulting in an avascular wound bed and increased risk of proximal infection) and result in dysfunction of the function of the peroneus longus as it courses to its insertion on the first metatarsal (theoretically resulting in medial column dysfunction).

Methodology

Following IRB approval, we analyzed a consecutive series of 68 feet treated for midfoot Charcot neuroarthropathy. From this series we identified 14 foot MRIs which were performed prior to any type of surgical intervention. We subsequently had a board-certified musculoskeletal radiologist review the images specifically for findings of the peroneus longus. We asked him specifically to identify:

-Does the patient have a normal or abnormal/irregular promontory of the cuboid?

-Does the peroneus wrap around the promontory in a normal fashion, or is there evidence of subluxation?

-Does the peroneus tendon have a normal course from the cuboid to the first metatarsal base, or is there evidence of pathology (tear, adhesion, tendinosis, etc)?

Results

The promontory of the cuboid was observed to be abnormal/irregular in 35.7% of patients, the peroneus longus tendon was observed to be subluxed about the promontory in 21.4% of patients, and tendinosis and/or tearing of the peroneus longus was observed in 57.1% of patients. Subjectively, there did not appear to be any association between abnormal findings and the presence of a plantar wound, although the cohort size is underpowered to draw any definitive conclusions with respect to this.

Discussion

The results of this investigation provide some evidence of pathology of the peroneus longus tendon and the structure of the cuboid in the setting of midfoot Charcot neuroarthropathy. However, it is still unclear how these findings specifically relate to the progression of the osseous deformity and the development of soft tissue complications including wound formation. It is our hope that this unique information and corresponding images add to the body of knowledge with respect to the pathogenesis of midfoot Charcot neuroarthropathy, and lead to future investigations on this topic eventually resulting in a predictive model for plantar wound development in this patient cohort.

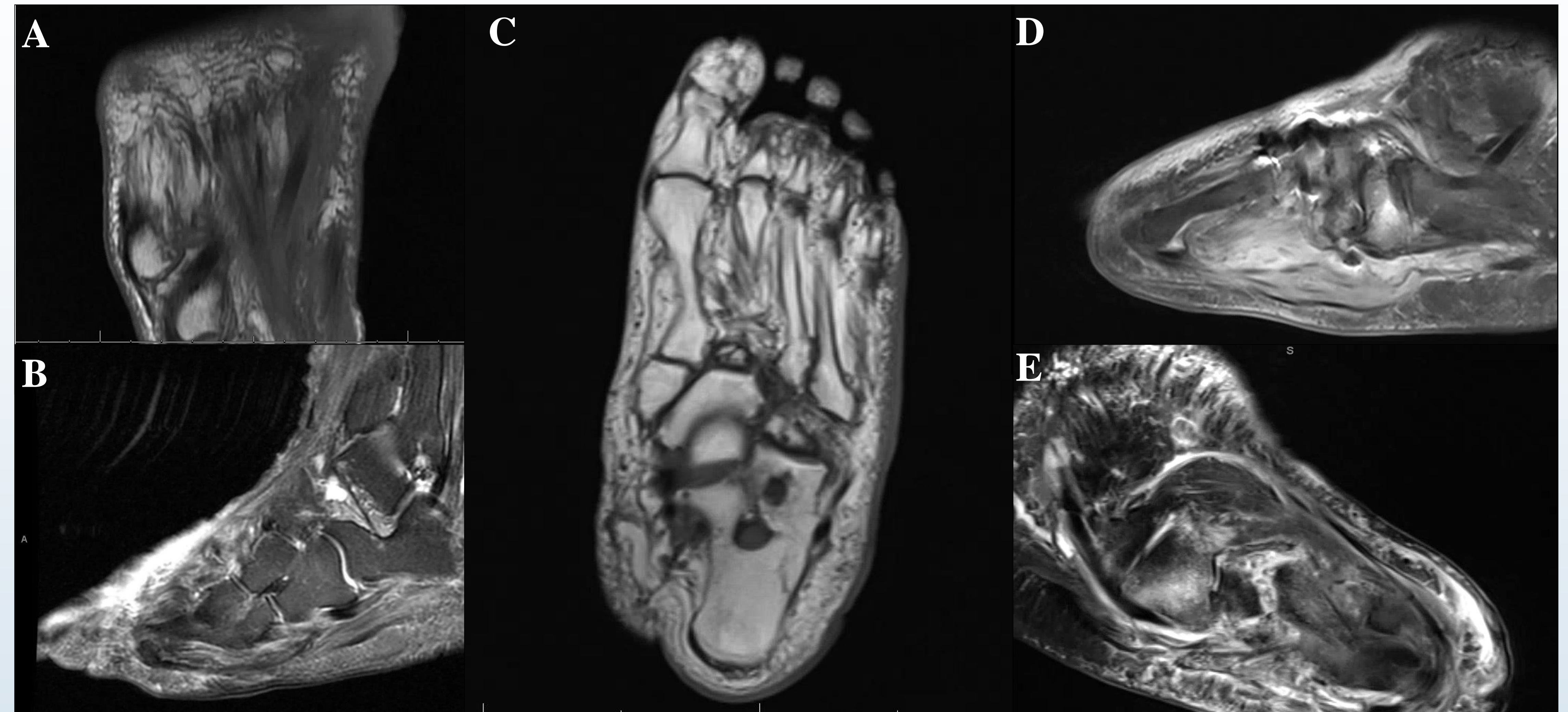


FIGURE DESCRIPTIONS:

- Figures A and B demonstrate relatively normal peroneus longus tendons (white arrows) coursing around cuboid promontories without irregularity or abnormality.
- Figure C demonstrates a diseased peroneus longus tendon subluxed from the cuboid's promontory.
- Figure D demonstrates a diseased peroneus longus coursing around a relatively shallow promontory.
- Figure E demonstrates a relatively normal peroneus long tendon subluxed over the cuboid promontory.

References

- [1] Wukich DK, Raspovic KM, Hobizal KB, Rosario B. Radiographic analysis of diabetic midfoot charcot neuroarthropathy with and without midfoot ulceration. Foot Ankle Int. 2014 Nov; 35(11): 1108-15.
- [2] Meyr AJ, Sebag J. The relationship of cuboid height to plantar ulceration and other radiographic parameters in midfoot Charcot neuroarthropathy. Presented in poster format at the 2016 APMA annual scientific conference and currently undergoing the peer-review process.