MRI for Paediatric Flat Foot: Is it Justified?

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INTRODUCTION

Radiological assessment of paediatric flat foot deformity includes AP, lateral and oblique plain radiographs. CT may be useful for assessing tarsal-coalition but the role of MRI imaging is unclear.

- MRI is useful if non-osseous coalition is fibrous (syndesmosis) or cartilaginous (synchondrosis)
- STIR sequences help to differentiate inflammatory changes (ligament and tendon pathology, e.g. peroneal and tib post insufficiency)
- MRI can additionally be helpful in cases of CN coalition - which may be very common and may not necessarily always be the cause of symptoms. MRI evidence of bone marrow oedema surround the synostosis increases confidence that the coalition is the cause of symptoms

This study aimed to determine whether MRI adds value to standard radiography in the assessment of paediatric flat-foot deformity.

METHODS

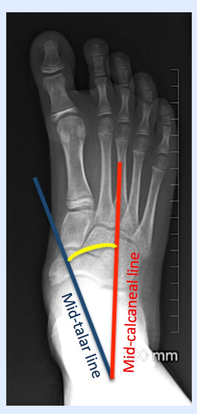
- Retrospective study in Tertiary Orthopaedic Hospital
- Pts <18yrs who had MRI following a clinical diagnosis of flat-foot were included

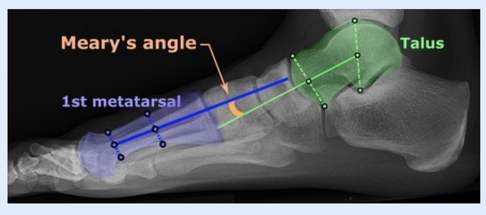
A. Clinical notes were analysed:

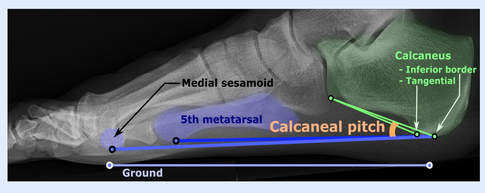
- *Presence, nature and severity of pain*
- *Clinical examination findings (flexible/rigid)*
- *Suspected clinical diagnosis*

B. Single Orthopaedic surgeon analysed radiographs and measured:

- ***AP** - Talo-calcaneal and talo-metatarsal angles*
- ***Lateral** - Meary's angle and Calcaneal-Pitch*



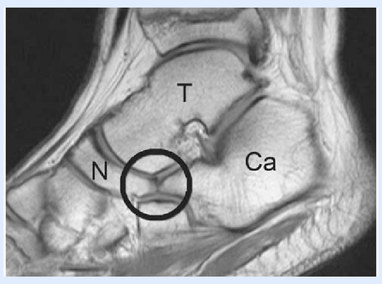




C. Musculoskeletal Radiologist classified radiographs:

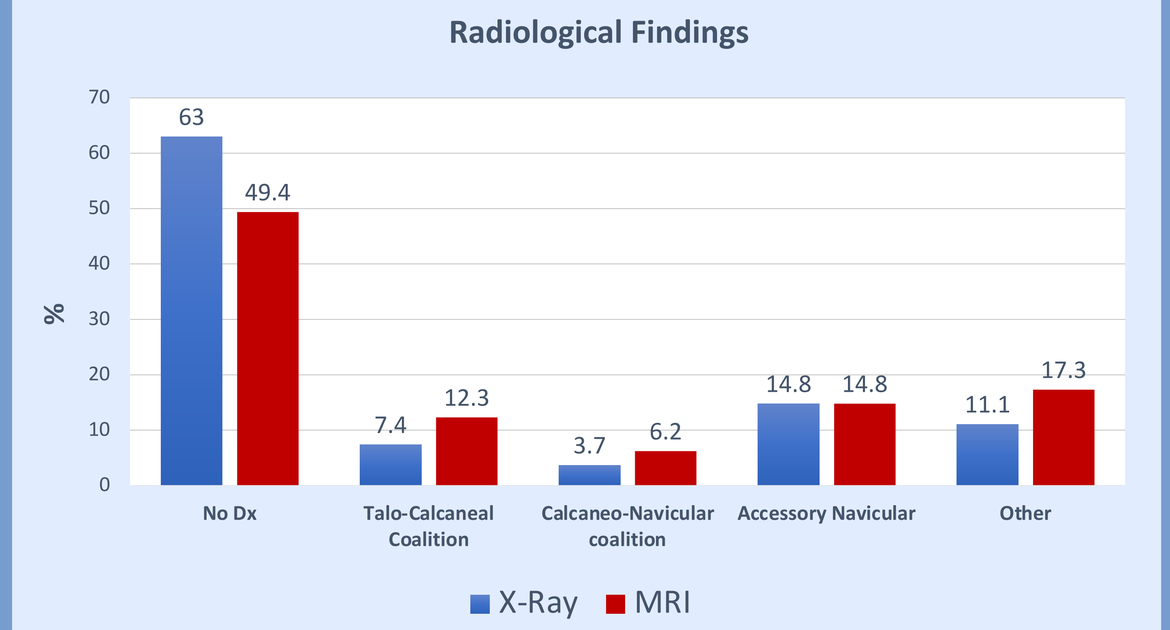
- *No underlying abnormality*
- *Talo-calcaneal coalition*
- *Calcaneo-navicular coalition*
- *Os-naviculare*
- *Other*

D. Independent Radiologist blindly classified <u>MRI</u> in same way



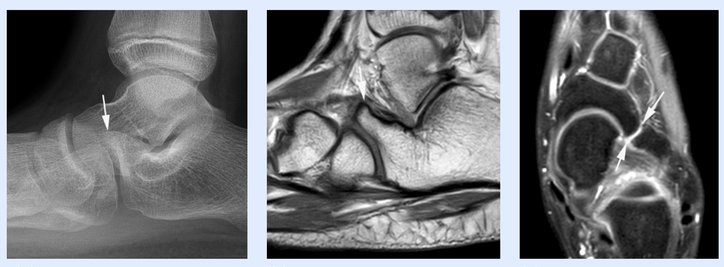
RESULTS

- 81 feet in 57 patients
- Mean age 12.5yrs
- Pain was present in 87.7% of feet
- Most clinically-diagnosed talo-calcaneal and half of calcaneo-navicular coalitions had rigid flatfoot.
  Most other clinical diagnoses had a flexible flatfoot.



Radiographic Diagnosis	XR	MRI
No specific diagnosis	63 % (n=51)	49.4% (n=40)
Talo-calcaneal coalition	7.4% (n=6)	12.3% (n=10)
Calcaneo-navicular coalition	3.7% (n=3)	6.2% (n=5)
Accessory navicular	14.8% (n=12)	14.8% (n=12)
Other	11.1% (n=9)	17.3% (n=14)

- Of 51 cases with no diagnosis on X-Ray, MRI diagnosed:
  2x CN coalitions, 2x TC coalitions, 5 os naviculare , 11 other Dx, and confirmed no specific diagnosis in 31 (61%)
- MRI diagnosed 'other diagnoses' in 14 cases missed on XR: *Talar and Navicular OC lesions, Hindfoot impingement, Fracture, Peroneus brevis tendinosis, Navicular-cuneiform coalition, Neurofibromatosis-1 & Subtalar joint arthropathy*
- Of 6 TaloCalcaneal coalitions diagnosed on XR, MRI confirmed the coalition in 4 pts & excluded it in 2 pts
- Of 3 CalcaneoNavicular coalitions diagnosed on XR, MRI confirmed the dx in 1 patient, diagnosed TaloCalcaneal in 1 & excluded it in 1
- MRI found a diagnosis not seen on x-ray alone in 23.5% cases (*14.6% flexible flatfoot pts, 38.5% rigid flatfoot pts*) e.g. tarsal coalition
- MRI confirmed the absence of specific pathology on radiography in 61%


(a) (b) (c)

11yo boy presenting with a flexible flatfoot:

(a) Lateral radiograph demonstrates a flatfoot deformity and a prominent anterior process of the calcaneus (arrow-a).

(b) Sagittal T1W TSE and MR images shows prominent anterior process of the calcaneus (arrow-b)

(c) Axial SPAIR confirms non-osseous **calcaneo-navicular coalition** (arrow-c)

CONCLUSION

- **MRI provided additional relevant diagnostic information in 23.5% cases, either identifying a lesion not seen radiographically or correcting a radiographic diagnosis.**
- **MRI confirms absence of pathology in 61%**
- **We therefore recommend the routine use of ankle MRI for paediatric patients presenting with painful of rigid flat foot deformity as it provides valuable information useful for management that is not provided with plain radiography alone**

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