



“COMPARISON OF SENSITIVITY AND SPECIFICITY OF USG AND MRI IN VARIOUS ANKLE & FOOT PATHOLOGIES”

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ABSTRACT

MRI and Ultrasonography are the two most commonly used imaging modalities for imaging ankle and foot. The exquisite soft-tissue contrast resolution, noninvasive nature, and multiplanar capabilities of MR imaging makes it especially valuable for the detection and assessment of a variety of soft-tissue disorders of the ligaments (eg, sprain), tendons (tendinosis, peritendinosis, tenosynovitis, entrapment, rupture, dislocation), and other soft-tissue structures (eg, anterolateral impingement syndrome, sinus tarsi syndrome, compressive neuropathies [eg, tarsal tunnel syndrome, Morton neuroma], synovial disorders). Ultrasound is well-suited for imaging the tendons and ligaments of the ankle. Knowledge of anatomy and bony landmarks is essential for scanning the ankle accurately and efficiently.

KEYWORDS : Foot, Ankle, Ultrasound, MRI.

Introduction:-

MR imaging has also been shown to be highly sensitive in the detection and staging of a number of musculoskeletal infections including cellulitis, soft-tissue abscesses, and osteomyelitis. In addition, MR imaging is excellent for the early detection and assessment of a number of osseous abnormalities such as bone contusions, stress and insufficiency fractures, osteochondral fractures, osteonecrosis, and transient bone marrow edema.

For specific indications ultrasonography is an efficient and inexpensive alternative to MRI. In most cases ultrasonography can be performed more rapidly and efficiently than MRI.

Materials and Methods

Initially patients were subjected to MRI evaluation and then are evaluated on ultrasonography. The procedure was explained to the patients and written informed consent was taken.

INCLUSION CRITERIA:

All patients presenting to the hospital with ankle pain who were referred for MRI were included in this study.

EXCLUSION CRITERIA:

- Patients with contraindications for MRI such as patients with
- a) Brain aneurysmal clip
 - b) Implanted neural stimulator
 - c) Implanted cardiac pace maker
 - d) Cochlear implant
 - e) Ocular foreign body
 - f) Metal shrapnel
 - g) MRI incompatible orthopedic fixative devices
 - h) Patients with surgery of uncertain type where the presence of metal clips or wires cannot be excluded.

All the patients underwent MR imaging using SIEMENS B17 AVANTO 1.5Tesla MRI machine. Knee array coil was used for scanning.

MR Imaging protocol:

FS PD FSE sequences are performed in all three orthogonal planes with matrix size 320x256, slice thickness of 3mm.

FS T1 FSE sequences are performed in axial and sagittal planes with matrix size 320x256, slice thickness of 3mm.

3D Gradient sequence is performed with matrix size of 320x280,

slice thickness of 1 mm and flip angle of 8.

Whenever required STIR sequences were performed.

Whenever required like in infective pathologies Post contrast FS T1 FSE sequences were performed in all three orthogonal planes with matrix size 320x256, slice thickness of 3mm.

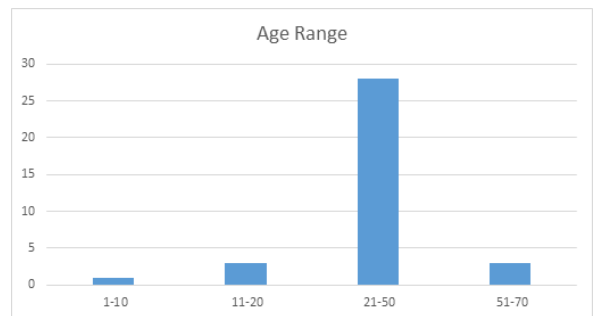
Later on patients were subjected to ultrasonography examination using high frequency linear transducer on Voluson E8 and Philips IU 22 (C9-3).

MRI and ultrasonography findings were obtained in each patients. These findings were used for comparative analysis.

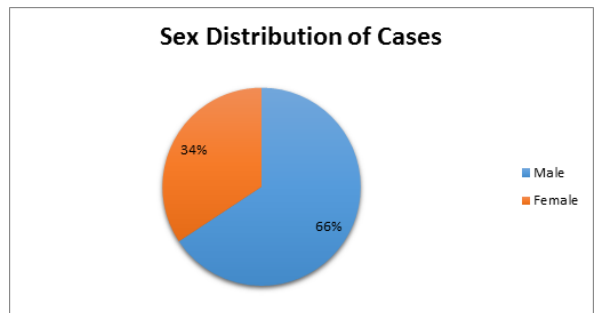
Results:-

Gender Distribution

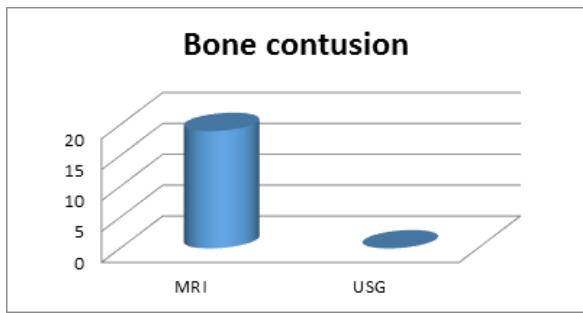
Most of cases in our study were in 21yrs to 50yrs group.



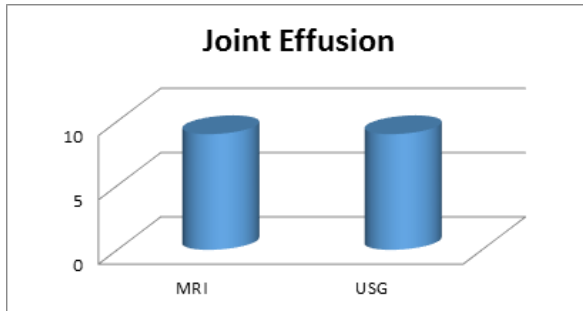
Majority of cases (66%) with ankle & foot pathologies were male.



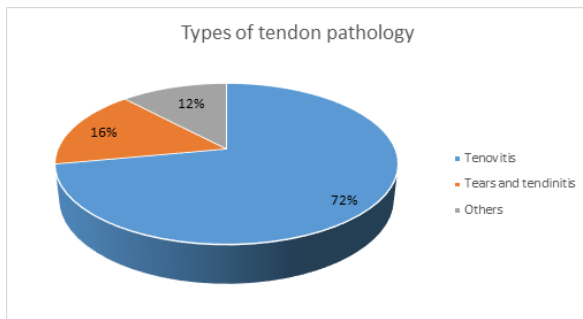
MRI has higher detection rate of bone contusion than USG.



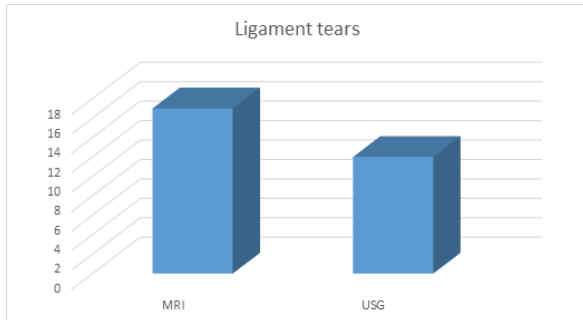
Both USG & MRI are equally sensitive & specific in detection of Joint effusion.



Tenosynovitis was most common pathology of tendon detected in this study.



MRI is more sensitive & specific in detection of Tendon tear in present study.



DISCUSSION:-

Ankle joint is one of the most common joint to get injured due to trauma. MRI is the most commonly used imaging modality to diagnose ankle and foot pathology. MRI provides good soft tissue resolution multiplanar capabilities. It is helpful in diagnosis of tendons, ligaments, nerves, joints and occult bone pathologies. In recent years ultrasonography is increasingly used in musculoskeletal pathologies because of high resolution, short scanning time and patient compliance. Color doppler is useful in assessment of vascularity.

Ultrasonography is useful in assessment of ligament injuries. MRI detected 17 ligament injuries and ultrasonography evaluation

revealed 12 ligament injuries out of 17. Ultrasound was not able to detect 1 out of 7 anterior talofibular ligament injury which was a grade I ligament injury. Ultrasound evaluation of posterior talofibular and talocalcaneal ligaments were difficult. 1 posterior talofibular and 2 talocalcaneal ligament injuries were not detected on ultrasonography which were detected on MRI. Ultrasonography was able to detect 1 out of 2 tibiospring ligament injuries which were detected on MRI.

These findings are similar to study conducted by Petra Milz et al. Ultrasonography and MRI detected joint effusion in 9 patients. Ultrasonography was equally sensitive as MRI in detecting joint effusion. Of these, 6 were due to trauma. Ultrasonography readily detected joint effusion in these patients. MRI showed bone contusion in 4 of these 6 patients. Ultrasonography was useful as an initial investigation in detecting joint effusion due to trauma but MRI provided additional information like bone contusions.

CONCLUSION

The present study was undertaken to evaluate the usefulness of ultrasonography in evaluation of various ankle and foot pathologies and to compare its findings with that of MRI.

Ultrasonography is cost effective, time saving alternative to MRI in evaluation of ankle and foot pathologies. Ultrasonography is able to detect nearly all of the tendon injuries because of its high resolution. The study results were comparable to MRI in evaluation of tendon pathologies. Ultrasonography is the initial modality of imaging in ankle trauma. It can easily pick up signs of trauma like joint effusion, tendon and ligament tears. Most commonly injured ligament is anterior talofibular ligament which is well visualized on ultrasonography. Ultrasonography was able to detect grade II and grade III ligament injuries. Ultrasonography has limitation in evaluation of some of the ligament injuries because it is difficult to get good images of some of the ligaments like posterior talofibular and talocalcaneal ligaments. MRI plays a better role in evaluation of ligament injuries. Also MRI is able to detect bone contusions and marrow edema.

Ultrasonography is useful in evaluation of infective conditions of ankle and foot. It provides an overview of involved structures, soft tissue, collection and tenosynovitis. However exact extension of disease is difficult to assess on ultrasonography. MRI provided detailed extent of the pathology. MRI is also useful in detection of osteomyelitis which can be detected on ultrasonography to a limited extent.

Ultrasonographic findings of Achilles tendon xanthoma was nearly comparable to MRI findings. Ultrasonography was sufficient for the diagnosis of Achilles tendon xanthoma. Ultrasonography lacked in providing exact extension of tendon involvement by the xanthoma.

Ultrasonography is equally useful as MRI in detecting stress fractures. Because of high resolution it can detect cortical breach, callus formation and adjacent soft tissue edema.

Ultrasonography useful and has nearly comparable results as MRI in evaluation of ankle pathology. It has high sensitivity in evaluation of tendon pathology, joint effusions and stress fractures. It has high sensitivity in evaluation of talofibular ligament assessment which is the commonest ligament to get injured in ankle trauma. So it should be used as initial tool in assessment of ankle trauma. To look for bone contusions or marrow edema MRI is required. Ultrasound because of its high resolution, cost effectiveness and time saving method can be the only required investigation in most of the ankle pathologies.

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