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Original Research Paper

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IMAGING IN WRIST JOINT PATHOLOGIES - A CROSS SECTIONAL STUDY TO COMPARE RADIOGRAPHY, ULTRASOUND AND MRI FINDINGS.

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ABSTRACT

Purpose: To compare the effectiveness of radiography (X-rays), ultrasound (USG), and MRI in locating lesions around the wrist joint and to determine correlation between X-ray, USG and MRI findings in lesions around the wrist. **Methods :** The present cross-sectional study was carried out on 60 patients for the imaging of the wrist. Clinical data was recorded. Radiography, Ultrasound and MRI were recorded and major findings are tabulated in the excel sheet. A protocol for imaging of wrist lesions was created based on the accuracy of imaging studies. Initially radiograph was taken to look for the lesions/fractures followed by correlation of ultrasound and MRI findings. Imaging findings were tabulated. **Results :** The commonest symptom reported was pain observed in 49 (81.7%) of patients, followed by swelling in 17 (28.3%) and tingling in only 1 (1.7%) patient. There were 6 and 1 patients respectively positive for bone and soft tissue lesions by X-rays. That gave the incidence of 10% for bone lesions and 1.7% for soft tissue lesions using X-rays. There were 11 and 54 patients respectively positive for bone and soft tissue lesions by USG. That gave the incidence of 18.3% for bone lesions and 90% for soft tissue lesions using USG. There were 11 and 57 patients respectively positive for bone and soft tissue lesions by MRI. That gave the incidence of 18.3% for bone lesions and 95% for soft tissue lesions using MRI. **Conclusion :** The study concluded that in the patients presenting with pain, swelling or lesions around the wrist joint, radiography is the first modality of investigation. This should be followed by USG in order to look for fluid/ inflammation. MRI is mainly a problem-solving modality to further characterize a lesion detected on radiography/ USG.

KEYWORDS : trauma, tendons, ligaments, wrist, MRI, ultrasound, radiography

INTRODUCTION

Wrist is one of the most frequently injured area. Sports are a common cause of wrist injuries that require emergency room visits [1]. Overuse disorders, inflammatory conditions, vascular & neural lesions, and foreign bodies are conditions other than trauma that affect the wrist [2]. Pain is the main complaint for nearly one third of patients who go to hospitals. The treatment depends largely on the diagnosis made; for example, some traumatic conditions are treated very differently than inflammatory conditions [3, 4]. X-rays, ultrasound, CT scans, and MRI are a few of the imaging modalities that can be used for wrist imaging studies [5]. The initial and most popular imaging technique for evaluating bones is conventional radiography. Although radiography offers high resolution, contrast, and spatial orientation for bone injuries and lesions, it has limitations in resolving soft tissue details in cases of injury, mass lesion, and inflammation because all soft tissue structures attenuate X-rays nearly equally. It is also linked to a negligible amount of Ionising radiation exposure [5, 6]. USG is a dynamic imaging modality that is affordable, non-ionizing, easily accessible, and allows interaction with the patient. It can be used to assess soft tissue, superficial and/or erosive osseous lesions all around the wrist [7]. However, high resolution equipment and a highly skilled operator are both necessary for ultrasound [8]. For the thorough examination of bony lesions, CT is a useful modality, but it exposes the patient to radiation. As a result, it was not included in the research. The advantages of MRI over traditional imaging methods include the ability to directly see bone marrow, nerves, and hyaline cartilage, as well as superior clarity in the representation of ligaments, muscles, and tendons [3]. Without using contrast or subjecting the patient to radiation, all of these are possible. On MRI, small alterations like a bruise or stress fracture that do not manifest on radiography or a CT scan do so. The limitations of MRI are cost and duration. This study's goal was to compare the effectiveness of radiological techniques like X-rays, USG, and MRI in locating lesions around the wrist joint and to determine correlation between X-ray, Ultrasound and MRI findings in lesions around the wrist. This article was selected for presentation in the 10th annual conference of MSS (musculoskeletal society), AIIMS New Delhi

MATERIALS AND METHODS

Materials

X Rays using Konica Minolta DRX70 INA 203Z9D, Ultrasound using Philips IU 22, Philips affinity 30, Philips affinity 50, Philips affinity 70 (using high-frequency transducers (L15-7 Linear probe and L17-5 Hockey stick probe) and MRI using Philips Achieva 1.5 Tesla and Philips Ingenia 3 Tesla were performed.

Methods

A study was conducted over a duration of 24 months at a tertiary care hospital after institutional ethics committee approval for 60 patients of varying ages and gender with lesions around the wrist joint, who were referred for radiography, sonography, or MRI through convenience sampling. All patients underwent all three investigations. Patients presenting with pain, swelling, mass or limitation of movement of the wrist were included and excluded if they had laceration or painful skin lesions over the wrist and who did not consent to participate in the study.

RESULTS

The mean age of the patients was 37 ± 16.99 years.

The commonest symptom reported was pain observed in 49 (81.7%) of patients, followed by swelling in 17 (28.3%) and tingling in only 1 (1.7%) patient. There were 6 and 1 patients respectively positive for bone and soft tissue lesions by X-rays. That gave the incidence of 10% for bone lesions and 1.7% for

soft tissue lesions using X-rays. There were 11 and 54 patients respectively positive for bone and soft tissue lesions by USG. That gave the incidence of 18.3% for bone lesions and 90% for soft tissue lesions using USG. Table 1

Table 1: Xray, Usg And Mri Findings

		Frequency	Percentage (%)	
Gender	Male	35	58.3 %	
	Female	25	41.7 %	
Wrist laterality	Right	31	51.7%	
	Left	21	35 %	
	Both	8	13.3 %	
Trauma	No	36	60.0 %	
	Yes	24	40.0 %	
Symptoms	Pain	Yes	49	81.7 %
		No	11	18.3 %
	Swelling	Yes	17	28.3 %
		No	43	71.7 %
	Tingling	Yes	1	1.7 %
		No	59	98.3 %

The effectiveness of X ray for diagnosis of bone lesions was compared against MRI. Out of total 11 cases positive for bone lesions by MRI, 6 were reported as negative by X-ray. While out of total 49 patients negative for lesions of bone 1 was reported to be false positive by X-ray. The distribution is shown in table 2. The sensitivity was calculated to be 45.45%, specificity of 97.96%, positive and negative predictive value of 83.33% and 88.89% respectively, with accuracy of 88.33%

Table 2: Efficacy Of X-ray Against MRI For Bone Lesions

		MRI bone findings		Total
		Present	Absent	
X RAY bone findings	Present	5	1	6
	Absent	6	48	54
Total		11	49	60

The effectiveness of USG for diagnosis of bone lesions was compared against MRI. Out of total 11 cases positive for bone lesions by MRI, 2 were reported as negative by USG. While out of total 49 patients negative for lesions of bone 2 were reported to be false positive by USG. The sensitivity was calculated to be 81.82%, specificity of 95.92%, positive and negative predictive value of 81.82% and 95.92% respectively, with accuracy of 93.33%. Depicted in Table 3

Table 3: Efficacy Of USG Against MRI For Bone Lesions

		MRI bone findings		Total
		Present	Absent	
USG bone findings	Present	9	2	11
	Absent	2	47	49
Total		11	49	60

The effectiveness of X ray for diagnosis of soft tissue lesions was compared against MRI. Out of total 57 cases positive for bone lesions by MRI, majority i.e., 56 were reported as negative by X-ray. While out of total 3 patients negative for lesions of soft tissue by MRI were correctly identified by X-ray. The sensitivity was calculated to be 1.75%, specificity of 100%, positive and negative predictive value of 100% and 5.08% respectively, with accuracy of 6.67%.Depicted in Table 4

Table 4: Efficacy Of X-ray Against MRI For Soft Tissue Lesions

		MRI soft tissue findings		Total
		Present	Absent	
X-Ray soft tissue	Present	1	0	1
	Absent	56	3	59
Total		57	3	60

The effectiveness of USG for diagnosis of soft tissue lesions was compared against MRI. Out of total 57 cases positive for bone lesions by MRI, 4 were reported as negative by USG. While out of total 3 patients negative for lesions of soft tissue by MRI 1 was false positive by USG. The sensitivity was calculated to be 92.98%, specificity of 66.67%, positive and negative predictive value of 98.15% and 33.33% respectively, with accuracy of 91.67%.Depicted in Table 5

Table 5: Efficacy Of USG Against MRI For Soft Tissue Lesions

		MRI soft tissue findings		Total
		Present	Absent	
USG soft tissue findings	Present	53	1	54
	Absent	4	2	6
Total		57	3	60

DISCUSSION

The current research aimed to compare the results of x-ray, ultrasound, and magnetic resonance imaging on lesions located in the wrist. We included 60 patients who had wrist lesions in our analysis. The ages of the patients ranged from 6 to 81, with a mean of 37 ± 16.99. In a sample of 60 patients, 35 (58.3%) were female and 25 (41.7%) were male. In their study, Hampole AB [3] et al. included 50 patients with a history of non-traumatic painful wrist. The subjects ranged in age from 25 to 65, with a mean age of 42.32 ± 12.63. Females outnumbered males by a ratio of 32 to 18, or 64 percent to 36 percent. Data from 34 patients were accessed, and according to Alzaidi SA et al, the mean (SD) age was 40.1 (15.5) years, with 67.6% of participants being women and 32.4% being men (range: 5 to 70 years) [9]. In their study, patients aged 21 to 45 had the highest proportion of patients with soft-tissue swellings.50 patients were included in the study by El-Deek, A.M.F et al., with 35 men and 15 women ranging in age from 12 to 62 years. All of the patients who were examined reported having wrist pain [10].

In a study by Hampole AB et al., the distribution of symptoms revealed that it was similar to the current study's subjects' chief complaints, which were pain (40 percent), swelling (6 percent), numbness, and restricted movement [3]. In terms of dexterity or sinistrality, both sides had an equal (50 percent) distribution, according to Alzaidi SA et al [9].The wrist joint's anatomy is quite intricate, and the cartilage and ligaments that make up its small structures measure only a few millimetres. A thorough physical examination, a careful review of the medical history, and a plain radiograph are the first steps in the evaluation of wrist pain. Additional diagnostic tests like computed tomography, MRI, and ultrasound may be ordered if a diagnosis cannot be made [11].

Diagnostic imaging is difficult because the wrist and hand are made up of numerous small structures with intricate morphologies and anatomical variations. An ideal imaging modality to evaluate pathologic conditions affecting joints is magnetic resonance imaging (MRI), which has high spatial and contrast resolution and can characterize bone and soft tissue without using ionizing radiation [9]. Bones, joints, and soft tissues are all involved in pathological wrist conditions. There are many different pathological conditions, including ligament and tendon tears, tendinopathies, entrapment neuropathies, lipomas, neural lesions, ganglion cysts, and giant cell tumors [12, 13].

For many reasons, plain film radiographs-the foundation of medical imaging-should be the first line of defense against any wrist pathology. In addition to providing low-cost, non-invasive, and quick results, radiographs are also a great first option for diagnosis following a careful physical examination due to their widespread use across all medical specialties. Additionally, radiographs frequently provide additional data to more sophisticated imaging. For instance, radiographs are frequently easier to understand when soft tissue calcifications like hydroxyapatite deposition disease (HADD) are present [5,14,15].

In the current study, a total of six patients had positive X-rays for bone lesions, and one patient had a positive X-ray for soft tissue lesions. When X-rays were used to determine the presence of lesions, the incidence was found to be 10% for bone and 1.7% for soft tissue. Two people in the study population had mild osteopenia, and X-rays showed fractures of the scaphoid bone, osteophytes, distal radioulnar joint (DRUJ) instability, collapse of the lunate, migration of the capitate bone, and a fracture proximal pole of the scaphoid in one person each. Although only one patient experienced swelling of soft tissues in the thumb area. USG is a quick, affordable, and dynamic imaging technique. In an axial view or a longitudinal view of a USG, ligaments and tendons show up as echogenic structures as multiple parallel lines or as multiple dots. It is thought to be an excellent modality for diagnosing wrist ganglion cysts because it is incredibly suitable for finding fluid collections. Dynamic scanning is also useful for ruling out tendon rupture, whether partial or total. There are two drawbacks to this method, though, which reduce its value. Unlike other imaging modalities, USG is highly operator dependent and does not visualize the bone structures [12,16].

For obtaining and interpreting US images, it is also crucial to comprehend imaging artifacts like anisotropy, normal variations, the appearance of anatomical structures both normally and abnormally, and familiarity with the equipment (probe selection and machine settings). The strength of ultrasound as a diagnostic tool is its capacity to evaluate soft tissue structures. For the evaluation of osseous abnormalities and pathology, it has little to no use [17,18].

In the current study, USG detected bone lesions in 11 patients and soft tissue lesions in 54 patients. In other words, USG had an incidence of 18.3 percent for bone lesions and 90.0 percent for soft tissue lesions. Bone USG findings included erosive changes of the triquetral bone, a fracture of the scaphoid bone, a fracture of the pisiform and triquetral bones, a fracture of the proximal pole of the scaphoid bone, a hypoechoic lesion, osteophytes at the dip joints, and an unstable radioulnar joint. Our findings demonstrated that, with the exception of 4 patients, USG can be used in conjunction with MRI to assess the majority of wrist lesions. Due to MRI's multiplanar capabilities and high soft tissue contrast resolution, it is also able to detect intraosseous lesions and marrow signal changes in addition to soft tissue pathologies. MRI is useful for evaluating tendon pathologies as well [12,19].

Among those who had an MRI performed, 11 were found to have bone lesions, while 57 had soft tissue lesions. This equated to an MRI lesion incidence of 18.3 percent in bone and 95.0 percent in soft tissue. The most common type of lesion was tenosynovitis (17 cases) (in Figure 1), followed by TFCC tears (7), ganglion cysts (5) (in Figure 3), carpal tunnel syndrome (4) (in Figure 2), TFCC degeneration (3), inflammatory arthritis (2) (Figure 4), simple cysts (2), synovial thickening (2), and TFCC injuries (2). While in 1 case each: inflammatory arthropathy, chronic ecu tendinopathy, degenerative arthropathy, minimally displaced pisiform and triquetral fractures, scaphoid fractures with scapholunate ligament tears, distal radius giant cell tumor, scaphoid fracture with joint effusion, scapholunate ligament degeneration, scapholunate ligament tears, synovitis, synovitis with TFCC tear.

Using X-rays, Hampole AB et al. found that 46 (92%) of the subjects had normal findings, while the remaining 4 (8%) had abnormal findings. According to their ultrasound results of focal masses in the wrist joint, the cystic infection was present in 4 (8%) of the study participants while it was absent in 46 (92%) of them [3]. Based on the cystic affected aspect, the solid mass was discovered in the affected wrist in 3 (6%) of the participants and was absent in 47 (94%) of them. The results of the MRI revealed bone marrow edema in 33 (66%) of the subjects, bone erosions in 1, tendon involvement in 13, TFCC and ligament involvement in 18, and bone erosions in 1. 40 (80%) of the subjects had intramuscular or subcutaneous edema, 2 (4%%) had deep soft tissue masses, and 33 (66%) had joint effusion.

When Sumit K. et al performed a wrist ultrasound on 44 patients, they found 41 (93%) to have an ultrasound abnormality. The presence of cystic/solid soft tissue masses was the most frequent pathology identified on ultrasound; it was present in 17/44, or 38.59% of patients. Of the 17 patients, 15 (88.23%) had ganglion cysts, of which 2 (11.76%) had hemangiomas. Of the ganglion cysts, 46.6 % were clinically occult [20].In a study of 50 patients, El-Deek, A.M.F et al. reported 50 cases of various pathologies, including tendinopathy (20 cases; 40%), TFCC tears (8 cases; 16%), simple ganglion (8 cases; 16%), solid masses (3 cases; 6%), foreign bodies (2 cases; 4%) and CTS (9 cases; 18 percent) [10].

Compared to magnetic resonance imaging (MRI), X-ray for bone lesions showed a low sensitivity (45.45%), a high specificity (97.16%), a higher positive predictive value (83.33%), a lower negative predictive value (88.19%), and an accuracy of 88.33. The sensitivity of X-rays for soft tissue lesions was only 1.7 percent, but they were higher percent specific, had a higher positive predictive value and a lower negative predictive value (5.08 percent), for an overall accuracy of 6.6 percent.

Soft tissue structures cannot be clearly defined and fully characterized on plain radiographs. On plain radiographs, soft tissue damage like ligamentous and tendon derangement is not always immediately visible. Since the ligaments and tendons cannot be seen on radiographs, these types of injuries must be determined by inference from radiographic findings. The static images created by common x-ray equipment also don't offer a lot of functional assessment of joint structures. More details about the osseous structures' functional alignment and an assessment of the joint space can be found in weight-bearing or stress images [21].

Moreover, USG's efficacy in diagnosing bone lesions was more reliable, with an accuracy of 93.33 percent, a sensitivity of 81.82 percent, a specificity of 95.92 percent, a positive predictive value of 81.82 percent, and a negative predictive value of 95.92 percent. Since USG's predictive abilities are similar to those of MRI, it follows that USG is the preferred method for detecting bone lesions. On the other hand, X-ray has been found to be useful due to its higher specificity and can be used to rule out true negatives. Compared to MRI, for soft tissue lesions, USG had an overall accuracy of 91.67 percent, its sensitivity for soft tissues was 92.98 percent, but its specificity was only 66.67 percent. It also had a better positive predictive value of 98.15 percent but a poor negative predictive value of 33.33 percent. Indicating that USG is better at detecting true positive results, whereas X-ray is better at detecting true negative results.

MRI showed normality in a patient who had undergone USG for bone, which was indicative of instability at the radioulnar joint and soft tissue with a TFCC tear. In the second patient, MRI confirmed USG's diagnosis of synovitis, although MRI detected a minimal joint effusion in the soft tissues, while USG and MRI revealed no abnormalities in the underlying bone. MRI confirmed scapho-lunate ligament degeneration and TFCC degeneration in two patients, which were reported to be normal by USG imaging.

According to Hampole AB et al analysis, USG showed 100% sensitivity and specificity for tendinopathy, solid masses, and

CTS. The sensitivity and specificity of MRI for tendinopathy, TFCC, simple ganglion cysts, and solid masses were both 100% [3].For USG, Alzaidi SA et al reported that the sensitivity and specificity for ganglion cysts and GCTTS were both 100% [9].Sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of USG Vs MRI were reported by El-Deek, A.M.F et al. at 79.2%, 96.1%, 95.0%, 83.3%, and 88.0% and 89.8%, 98.0%, 97.8%, 90.9%, and 94.0% respectively [10].

Overall sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of USG vs MRI were 79.2%, 96.1%, 95.0%, 83.3%, and 88.0% and 89.8%, 98.0%, 97.8%, 90.9%, and 94.0% respectively. By sharpening the contrast between healthy structures and areas of pathology, magnetic resonance arthrography has been shown to increase sensitivity and diagnostic accuracy in identifying injuries to the TFCC and intrinsic wrist ligaments [22,23].

According to Kaddah RO et a comparison's of MRI and MRA, the overall sensitivities for each were 84.21 percent and 92.98 percent, respectively. Both also had 100% specificity, 100% positive predictive value, 52.63 percent and 71.42 percent negative predictive value, and accuracy of 88.15 and 94.36 percent, respectively. Their study demonstrated the added benefit of MR arthrography over MRI by demonstrating its high sensitivity and specificity in ligamentous pathologies [24].

The complex technique of magnetic resonance imaging (MRI), which uses controlled magnetic field interactions on imaging subjects, is more adept than any other imaging modality at identifying the structures and characteristics of soft tissues. Based on the anticipated signal intensity of the specific anatomic structure following interactions with the magnetic field, MRI distinguishes between normal and abnormal soft tissues. Contrast between ligaments, tendons, fat, and muscle can be seen much more clearly on an MRI than it can on a CT scan, and it is almost undetectable on plain film imaging [25].

The preferred test for diagnosing soft tissue tumors, tendon and ligament injuries, and vertebral osteomyelitis is an MRI [26-28]. Radiography rules out any bony lesions and soft tissue swelling if any. Radiographs are helpful for the diagnosis of soft tissue mineralization in triangular fibrocartilage ligament (TFCC) lesions such as hydroxyapatite deposition disease (HADD) or chondrocalcinosis, which can be difficult to appreciate on MRI. Unsuspected fracture or arthritis may be identified on radiographs which explains ulnar-sided pain without the need for additional expensive imaging. Radiographs help determine the presence and type of matrix present in a bone lesion (chondroid versus osteoid). Some bone lesions have a characteristic or pathognomonic appearance on radiographs, such as non-ossifying fibroma.

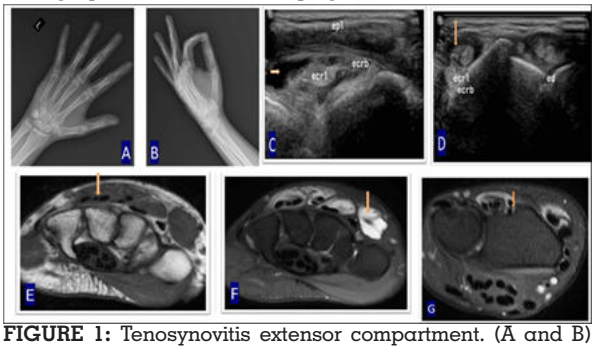

FIGURE 1: Tenosynovitis extensor compartment. (A and B) Radiographs of wrist AP and oblique view. No significant abnormality noted. (C and D) USG images showing Synovial thickening and effusion involving extensor carpi radialis longus (ecrl), extensor carpi radialis brevis(ecrb), extensor pollicis longus (epl), and extensor digitorum(ed) tendons denoting multiple extensor tendon tenosynovitis. (E and F) T1 and PDFS WI showing fluid collection with synovial thickening around the tendons of extensor digitorum and indicis, extensor carpi radialis longus and brevis. (G) PDFS Axial showing effusion along the extensor pollicis longus and other extensor tendons.

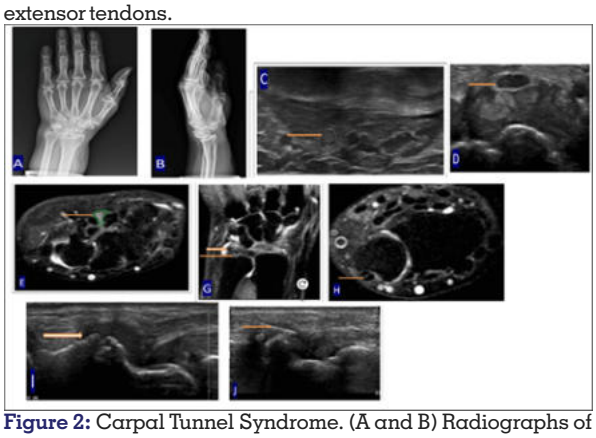

Figure 2: Carpal Tunnel Syndrome. (A and B) Radiographs of wrist AP and Lateral view. No significant abnormality noted. (C) USG image showing altered cross sectional area of the median nerve at the level of pronator quadratus, approximately 9 sq. mm. (D) USG image showing Cross sectional area of the median nerve at the level of flexor retinaculum was approximately 13.2 sq. Mm. (E) Compression of the median nerve in the carpal tunnel at level of hamate hook, cross sectional area more than 15 sq mm. (F) Marrow edema of distal half of scaphoid as well as adjacent trapezium bone. (G) Bulky, ill-defined Triangular fibrocartilage (TFC) with poorly visualized ulnar attachments - likely to be due to chronic degeneration. Effusion surrounding the medial aspect of TFC & the distal radioulnar joint (DRUJ). There was negative ulnar variance. (H) Split appearance of ECU tendon suggestive of chronic tendinopathy and low-grade partial tear. (I) USG image showing Osteophytes were noted in 1st CMC joint with grade I synovial thickening without any hyperaemia. (J) USG image showing 1 cc of 40 mg/ ml triamcinolone injected into the right 1st carpo-metacarpal joint under US guidance. Pt reported pain relief.

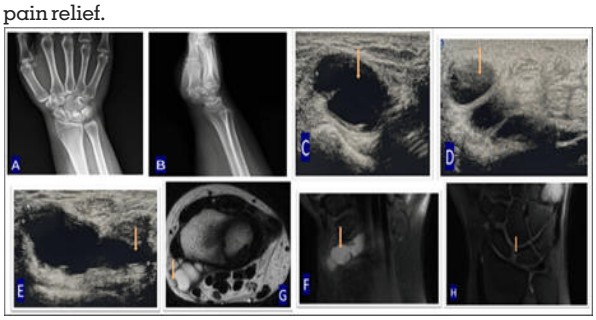

Figure 3: Ganglion Cysts. (A and B) Radiographs of wrist Lateral and AP view. No significant abnormality noted. (C and D) USG images showing synovial thickening involving bilateral radio-carpal joints. (E) USG image showing synovial sheaths of bilateral extensor carpi ulnaris (ECU) tendons were thickened near the ulnar styloid process. (F) MRI STIR Axial image showing ill-defined soft tissue swelling around extensor carpi ulnaris tendon. (G) MRI STIR Coronal image showing inter-carpal synovial thickening with minimal effusion. Focal areas of marrow edema at proximal ends of triquetral and hamate and radial aspect of lunate, suggestive of inflammatory arthritis. (H) MRI STIR COR showing disruption of the volar component of scapho-lunate ligament with minimal widening of the scapho-lunate distance and a small erosion along the radial cortex of lunate bone. This appeared to be the origin of ganglion cyst.

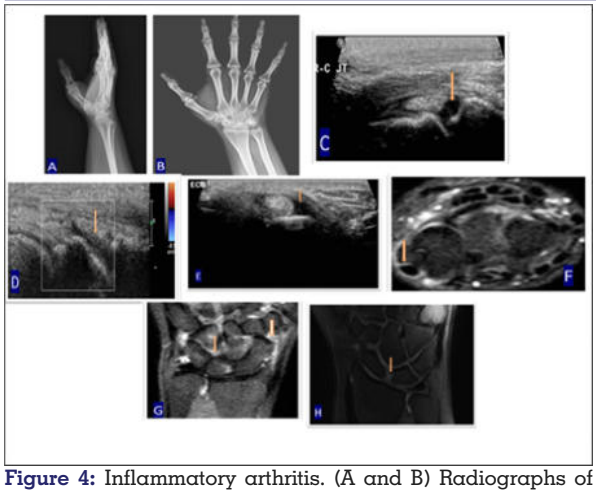

Figure 4: Inflammatory arthritis. (A and B) Radiographs of wrist Lateral and AP view. No significant abnormality noted. (C, D) USG images showing synovial thickening involving bilateral radio-carpal joints. (E) USG image showing synovial sheaths of bilateral extensor carpiulnaris (ECU) tendons were thickened near the ulnar styloid process. (F) MRI STIR Axial image showing ill-defined soft tissue swelling around extensor carpi ulnaris tendon. (G) MRI STIR Coronal image showing inter-carpal synovial thickening with minimal effusion. Focal areas of marrow edema at proximal ends of triquetral and hamate and radial aspect of lunate, suggestive of inflammatory arthritis. (H) MRI STIR COR showing disruption of the volar component of scapho-lunate ligament with minimal widening of the scapho-lunate distance and a small erosion along the radial cortex of lunate bone. This appears to be the origin of ganglion cyst.

Limitation Of Study

USG was observer dependent. So certain findings were correlated and confirmed with MRI study. MRI is expensive and time consuming. Due these factors, it is not the first choice of investigation in the present study.

CONCLUSIONS

The present study was conducted to determine correlation between X-ray, Ultrasound and MRI findings in lesions around the wrist. The commonest symptom reported was pain followed by swelling and tingling.In majority of patients the lesions were on right wrist, followed by left and both respectively. The study concluded that in the patients presenting with pain, swelling or lesions around the wrist joint, radiography is the first modality of investigation. This should be followed by USG in order to look for fluid/inflammation.

MRI is mainly a problem-solving modality to further characterize a lesion detected on radiography/USG.