RESULTS

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The fifty one patients included in our study were divided into four groups according to the pathological findings (table 1). Some of these patients had more than one pathology.

Table (5) Number of cases; different pathologic group entities.

Group	Number of cases		pathology
	M	F	
Group I	10	3	Avascular necrosis
Group II	7	3	Ligamentous lesions and joint instability
Group III	2	6	Nerve entrapment syndromes
Group IV	12	8	Miscellaneous

Group I (Avascular necrosis):

Thirteen patients were examined; nine of them gave history of trauma. They were as follows:

Eight patients had avascular necrosis of the lunate bone.

Four cases showed avascular necrosis of the scaphoid secondary to fracture at its waist.

One had avascular necrosis of the triquetrum secondary to fracture.

MRI staging (according to the shape and signal pattern) of AVN of the lunate bone (Kienböck's disease) is shown in table (3).

Table (6) Number of cases with different MRI stages of Kienböck's disease

Stage	Shape	Signal pattern	No of patients
I/II	Normal	Bone marrow has low signal in T1& T2 WIs. Bright T2&STIR WI areas might be seen.	2
IIIA	Collapse + proximal migration of the capitate	Same as stage I/II	4
IIIB	Collapse + dislocation of the carpal bones	Same as stage IIIA	1
Stage IV	Degenerative arthrosis of the lunate (collapsed) and carpus	No regions of increased signal intensity appear on T2 or STIR WIs	1

As regard the ulnar variance degree in cases of Kienböck's disease, it was negative in 6 cases and neutral in 2 cases.

Table (7) MRI findings in group I (Avascular necrosis)

Case	AVN	Ulnar variance	Effusion	Synovial thickening	TFCT
1	lunate	-	+	+	+
2	lunate	neutral	-	-	+
3	lunate	-	-	-	+
4	lunate	neutral	-	+	+
5	scaphoid	neutral	+	+	-
6	scaphoid	neutral	-	-	-
7	Lunate	-	+	+	-
8	Lunate	-	+	+	+
9	triquetrum	-	-	-	+
10	Lunate	-	-	-	-
11	scaphoid	neutral	+	-	-
12	scaphoid	+	+	-	-
13	Lunate	-	-	-	-

Group II (Joint instability and Ligamentous injury):

Ten patients were found to have joint instability; four of them with distal radioulnar joint instability, four cases with dorsal intercalated segmental instability (DISI) and two cases with ventral intercalated segmental instability (VISI) patterns.

In cases of distal radioulnar instability there was dorsal ulnar subluxation in relation to the sigmoid notch. Disruption of the volar radioulnar ligament could be identified in all cases. Joint effusion was observed predominantly collecting within the radioulnar joint.

Patients with DISI pattern presented increase of the capitolunate angle associated with dorsal tilting of the lunate. The scaphoid tilts palmarly with an increased scapholunate angle. Scapholunate ligament tear is seen in three cases. One case was associated with degenerative arthritis (SLAC) and in another case capitate and lunate fractures were noticed.

Volar tilt of the lunate and increased capitolunate angle were seen in patients with VISI pattern. Associated triquetral and lunate fractures were seen in one case. Lunotriquetral ligament tear could be identified in both cases.

Associated traumatic triangular fibrocartilage tear (TFCT) was elicited in eight cases and degenerative TFCT in two cases.

Synovial thickening was noted in one case of this group and joint effusion in eight cases. The thickened synovium presented as low signal in T1WIs and emitted intermediate signal in T2 WIs.

Table (8) MRI findings in group II (Joint instability and Ligamentous injury)

Case	Instability	Ligamen-tous injury	TFCT	S.T	Eff	Associated lesions
1	DRUJ (dorsal)	Volar RUL	+ traumatic	-	+	-
2	DRUJ (dorsal)	Volar RUL	+ traumatic	-	+	-
3	DRUJ (dorsal)	Volar RUL	+ traumatic	-	+	-
4	DRUJ (dorsal)	Volar RUL	+ traumatic	-	+	-
5	DISI	SLL	+ traumatic	-	+	Capitate+lunate fractures
6	DISI	SLL	+ degenerative	-	-	-
7	DISI	SLL	+ traumatic	-	+	-
8	DISI	-	+ degenerative	+	+	SLAC
9	VISI	LTL	+ traumatic	-	+	Triquetrum+lunate fractures
10	VISI	LTL	+ traumatic	-	-	-

(S.T=synovial thickening, Eff=effusion, RUL=radioulnar ligament, SLL=scapholunate ligament, LTL=lunotriquetral ligament, SLAC=scapholunate advanced collapse)

Group III (Nerve entrapment syndromes):

EMG and sensorimotor nerve conduction studies showed evidence of carpal tunnel syndrome in seven cases. Three cases had space occupying lesions within the carpal tunnel, two of them with volar ganglion extending from the triscaphe articulation and the other with lipoma in the retro-tendineous space.

Increase signal intensity of the median nerve in T2 WIs was observed in the six cases. Four cases showed significant palmar bowing of the flexor retinaculum. In the seven examined cases the median nerve was enlarged at the level of the pisiform and flattened at the hamate bone level.

One case showed enlargement of the Guyon's canal by inflammatory process. The ulnar nerve appeared of normal dimensions and signal intensity.

Table (9) MRI findings in carpal tunnel syndrome cases

Case	EMG	Girth of the median nerve		BR	T2 signal
		At pisiform	At hamate		
1	+	enlarged	flattened	0.31	Increased
2	+	enlarged	flattened	0.24	Increased
3	+	enlarged	flattened	0.20	Increased
4	+	enlarged	flattened	0.08	Increased
5	+	enlarged	flattened	0.1	Increased
6	+	enlarged	flattened	0.26	Increased
7	+	enlarged	flattened	0.09	Intermediate
8	+	enlarged	flattened	0.12	Intermediate

(BR= Bowing ratio).

Group IV (Miscellaneous lesions):

This group includes twenty two cases with different lesions as follow (table 5):

Table (10)

pathology	No of patients
Lower end ulnar giant cell tumor	1
Tenosynovitis of the extensor and flexor tendons	7
Dislocation of the extensor carpi ulnaris tendon	1
Ganglion	8
Rheumatoid arthritis	5

In cases of rheumatoid arthritis the following MRI findings were elicited:

- Destruction of the articular cartilage of the intercarpal, radiocarpal and radioulnar joints with subsequent narrowing of the joint spaces.
- Synovial thickening and effusion; the signal pattern of the thickened synovium was low in T1 and of intermediate signal in T2 WIs. Two cases were injected with Gd DTPA contrast and they showed homogenous enhancement.
- Diffuse marrow edema of the carpal bones was observed in two cases.
- Only one case showed erosion of the ulnar styloid process.