

**Ministry of Higher Education  
and Scientific Research  
University of Babylon  
College of medicine**



# **Role of MRI in diagnosis of tendon and ligament injury of shoulder joint**

**A study submitted to Babylon University / College of  
Medicine / Surgery department (Diagnostic Radiology)  
as part of the requirements for obtaining a higher  
diploma by**

**Dr.**

**ALAA ABDULWAHID ABBAS**

**M.B.Ch.B**

**Supervised by**

**Prof. Dr.**

**HASANAIN AHMED JASIM**

**M.B.Ch.B., F.I.B.M.S (Rad.)**

**(Diagnostic Radiology Consultant)**

**1444 A.H**

**2022 A.D**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(وَلَقَدْ آتَيْنَا دَاوُودَ وَسُلَيْمَانَ عِلْمًا وَقَالَا

الْحَمْدُ لِلَّهِ الَّذِي فَضَّلَنَا عَلَى كَثِيرٍ مِّنْ

عِبَادِهِ الْمُؤْمِنِينَ)

صدق الله العلي العظيم

سورة النمل الآية 15

## **Supervisor certification**

I certify that that this thesis entitled " **Role of MRI in diagnosis of tendon and ligament injury of shoulder joint**" was prepared under my supervision in department of surgery as a partial fulfillment for the Degree of High Diploma in Radiology.

### **Signature:**

Supervisor: Professor. Dr. Hasanian Ahmed Jasim

Department of surgery/College of medicine/Babylon University

/ /2022

## **Examination committee**

We the examining committee, after this dissertation and examining the candidate Dr. **ALAA ABDULWAHID ABBAS** in It's context, found that it meet the standards and requirements as a dissertation in post graduate studies in Babylon university in partial fulfillment on Diploma of radiology.

**Chairman**

**Professor**

**Dr. Amjaad Majeed Hameed**

**Member**

**Prof.Dr**

**Jabir Hassan obaid al sanafi**

**D.M.R.D.**

**Member**

**Prof.Dr**

**Kassim Amir Hadi Taj Al-dean**

**F.I.B.M.S\_R.D.**

**Member and supervisor**

**Professor**

**Dr. Hasanian Ahmed Jasim**



**Recommendations of Dean of College of Medicine-  
Babylon University:**

**In view of the available recommendations, I forward this  
dissertation for the debate by the examining committee.**

**Professor Dr.  
Mohend Abbass Nori Alshalah  
The Dean of College of Medicine  
University of Babylon**

## **Acknowledgement**

-I would like to express my appreciation and gratitude to my GOD for blessing us to achieve this study.

-I would like express my deepest thanks to Professor. **Dr.Hasanian Ahmed Jasim** college of medicine/university of Babylon for his kind help, scientific guidance and advice preparation of this dissertation.

-My grateful thank to the teaching staff in the department of radiology.

-I would like to thank all those people who helped me to complete my work especially those working in Al-Hilla Teaching Hospital.

# **DIDICATION**

- **To my parents**
- **To my Family**
- **To my supervisor**
- **To my Mentor**
- **With Respect**

## Abstract

**Background:** Shoulder joint injuries are common pathology. The frequent dislocation that happened in shoulder due to sole shoulder structures. the MRI provide the brilliant and wide range of image of soft tissue structure exactly the labrum and rotator cuff.

**Aim of the study:** To evaluated the beneficial role of MRI in investigation the tendon and ligament injuries of shoulder joint.

**Patient and method:** A cross sectional study enroll 60 patients shoulder problem were included in study the started from 1<sup>st</sup> August 2021 to 1<sup>st</sup> September 2022 in Babylon teaching hospital. Patients included in the study under went a full history and physical examination. MRI was achieved on a high field system (1.5 Tesla) magnet unit (Philips) for shoulder. Data was collected and analyzed using SPSS 23.

**Result:** The mean age of our study patients was  $45.7 \pm 9.2$  and within range 20-60 years. Patients age below forty were constituted 43.6% and 56.4% above or equal forty years. The male were 58% and female 42%. Regarding the finding by MRI, 20.9% were normal in examination, biceps tenosynovitis were seen in 6.5%, 45 patients had rotator cuff injury 11(17.8%) patients with tendinopathy , 27 (43.6%) had partial tear and 11.2% with complete tear.

**Conclusion:** MRI have an supportive role in diagnoses grading and treatments arrangement of shoulder joint injuries. MRI is needed in order to evaluate the joint in more detailed manner than other modalities.

## List of Contents

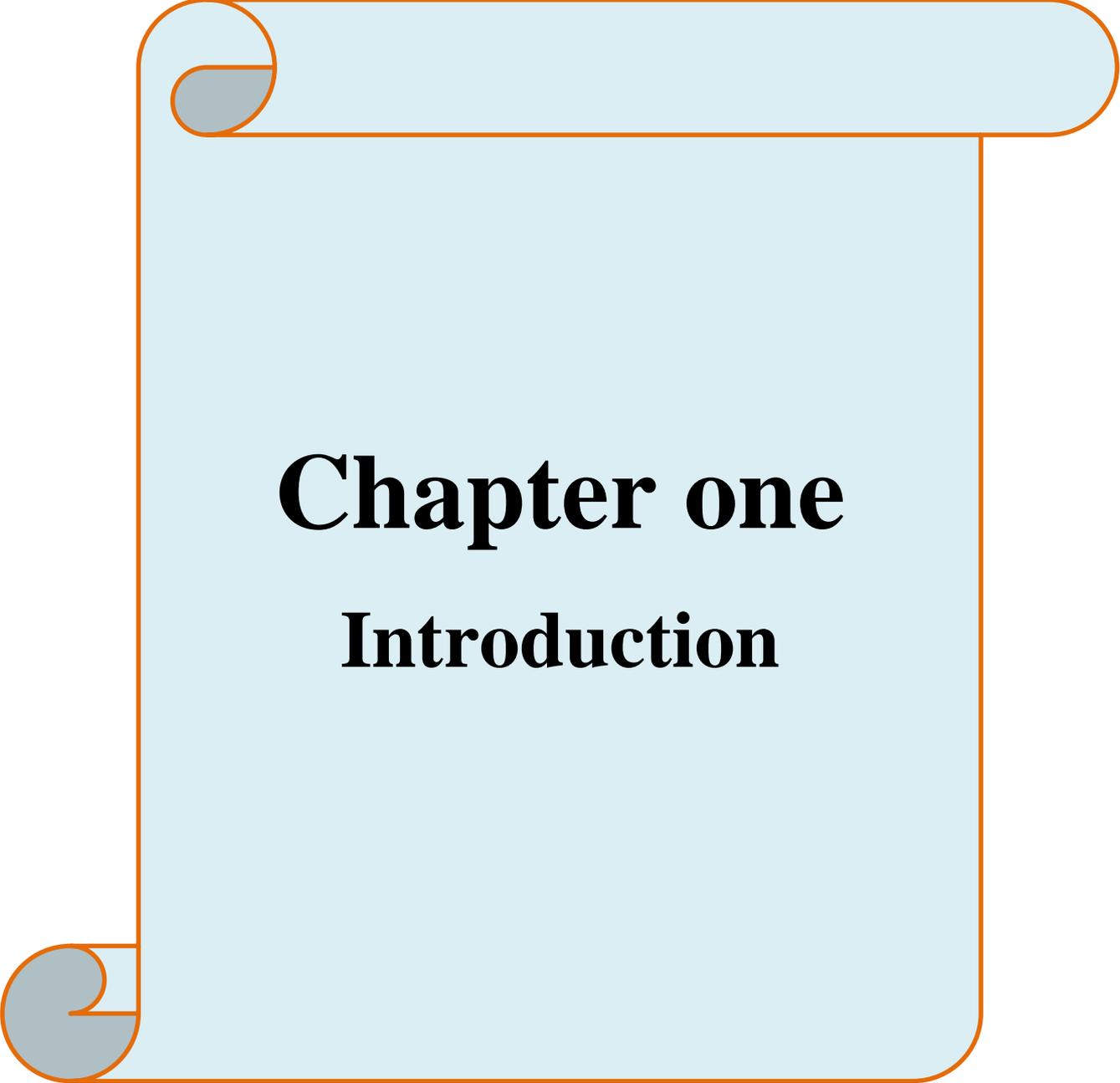
<b>Title</b>	<b>Page Number</b>
<b>Chapter one Introduction</b>	
Introduction	<b>1</b>
Indication for MRI in assessment of shoulder pathology	<b>3</b>
Magnetic resonance image	<b>4</b>
Aim of study	<b>4</b>
<b>Chapter Two Patients and methods</b>	
Patients and methods	<b>5</b>
Inclusion criteria	<b>5</b>
Exclusion criteria	<b>5</b>
Data collection	<b>5</b>
MRI instrument	<b>6</b>
Images analyses	<b>7</b>
Ethical approval	<b>7</b>
<b>Chapter Three Results</b>	
Results	<b>8</b>
<b>Chapter Four Discussion</b>	
Discussion	<b>16</b>
<b>Chapter five Conclusion and Recommendation</b>	
Conclusion	<b>20</b>
Recommendation	<b>20</b>
<b>Chapter six References</b>	
	<b>21</b>

## List of Tables

<b>No.</b>	<b>Tables</b>	<b>Page Number</b>
<b>1.</b>	Table 1: show demographic characters	<b>8</b>
<b>2.</b>	Table 2: show the clinical features of patients.	<b>9</b>
<b>3.</b>	Table 3: show MRI findings for patients.	<b>10</b>
<b>4.</b>	Table 4: site of rotator cuff muscle lesion.	<b>11</b>
<b>5.</b>	Table 5: show relation of lesion in regarding to age.	<b>11</b>

## List of Figures

<b>No.</b>	<b>Figures</b>	<b>Page Number</b>
<b>1.</b>	Figure 1: show age group distribution.	<b>9</b>
<b>2.</b>	Figure 2: show clinical features	<b>10</b>
<b>3.</b>	Figure 3: appear the types of lesion according to age group.	<b>12</b>
<b>4.</b>	Fig.4-A Normal supraspinatous muscle tendon in coronal T2 and T2 fatsa	<b>13</b>
<b>5.</b>	Fig.4-B Complete tear of supraspinatous muscle tendon in coronal T2 and T2 fatsat	<b>13</b>
<b>6.</b>	Fig.4-C Partial tear of long head of biceps muscle tendon in axial T2fatsat & coronal T2 fatsat	<b>14</b>
<b>7.</b>	Fig.4-D Tear in glenohumeral ligament, coronal T2 and T2 fatsat	<b>14</b>
<b>8.</b>	Fig.4-E Thickening of glenohumeral ligament, coronal T2 and T2 fatsat.	<b>15</b>
<b>9.</b>	Fig.4-F Partial tear in infraspinatous muscle tear, sagittal T2 fatsat & coronal T2 fatsat	<b>15</b>



# **Chapter one**

## **Introduction**

## Introduction

Shoulder joint injuries are common pathology. The frequent dislocation that happened in shoulder due to sole shoulder structure. In addition, there were various pattern of painful shoulder and variable causes, one of most common causes are shoulder impingement with many causative factor<sup>(1)</sup>. The authors categories it into structural and functional, structural factor include causes related to Acromion, acromio-clavicular joint, rotator cuff, coracoid process, bursa, and humerus <sup>(2)</sup>.

Anatomy of shoulder composed from two articulation, the gleno-humeral joints and the acromio-clavicular AC joints.

The gleno-humeral joints this comprised from the glenoid cavity with hemispheric head of the humerus to make an articulation between them. These articulation fixed by many ligaments, capsule, muscles and labrum ( the labrum is fibrocartilage loop attach to the glenoid). These labrum structure create more deeper and bowl-shaped hole on the glenoid, which in turn increase the fixation and stability of gleno-humeral articulations<sup>(3)</sup>.

There are four portions of labrum according to side anterior, posterior, superior and inferior.

Additionally, ligaments of gleno-humeral consist of superior, middle and inferior. All these ligament extend from near the labrum in anterior aspect of capsule to neck of humerus<sup>(4)</sup>.

The complex ligaments are inferior gleno-humeral one has two bands anterior and posterior, that facing the axillary pouch that characteristically adhere to the anterior inferior and posterior inferior labrum. There are substantial variations in the size and number of the ligaments of gleno-humeral articulation among persons<sup>(5)</sup>.

Additionally, the rotator cuff muscle consist of many muscle tendons, infraspinatus, supraspinatus, teres minor muscle and subscapularis, the first three muscles originated from scapula exactly from posterior surface of it, they end in insertion site on greater tuberosity of the humerus<sup>(6)</sup>. Acromio-clavicular AC joint it articulate between acromion and distal calvicle is synovial type surrounded by fibrous capsule which strength by trapezius muscle and AC ligaments. More over ligaments of coracoacromial and coracoclavicular give more stabilization to AC joints<sup>(7)</sup>.

Previous studies reported 70% of patients with shoulder pain come from pathology in rotator cuff diseases that account the most common etiology for shoulder complain<sup>(8)</sup>.

Variables rotator cuff tendons pathology may be due to tear, degeneration and inflammation. Many types of images modalities used to investigated the shoulder complain like ultrasound, radiographs, CT scan and the gold standard are MRI according to the American College of Radiology (ACR) in suitable characters for evaluation of traumatic and non traumatic shoulder pain in suspicion of rotator cuff pathology<sup>(9)</sup>.

Mean while the radiographs can give initial useful picture about the disease and ultrasound can beneficial in detect the full thickness tear in assessment of shoulder, whereas the MRI provide the brilliant and wide range of image of soft tissue structure exactly the labrum and rotator cuff<sup>(10)</sup>.

In certain situation the MR arthrography may be indicated in specific rotator cuff tear such as partial tear, tear in supraspinatus and articular side<sup>(11)</sup>.

Rotator cuff tendon diseases might be category in degeneration or inflammation of tendon and the causes can be intrinsic etiology like insult of tendon or overload exertion or extrinsic factor for example impingements by surrounding structure<sup>(7)</sup>.

MRI need by surgeon to presurgical planning mostly in rotator cuff injuries, because it give comprehensive pictures and detail it helpful for decision making to treatment schedule. It provide detail images of gleno-humeral joint for example accurate assessment of articulation and labrum and ligaments structure, also factors behind the causes and evaluation of conservative or surgical treatment<sup>(11)</sup>.

Image analysis of MRI for rotator cuff injuries repair are challenging, need special experience and familiar with normal and abnormal finding also type of surgical treatment and complication of it, and appearance post operative of tendons<sup>(10)</sup>.

Radiograph firstly aid in baseline images modalities for shoulder diseases. After this MRI are favorable modalities for next step evaluation of shoulder diseases and pain. Some occasion intra articular contrast are applied by MRI can give extra benefit and good visualization field of intra articular structure than the usual MRI<sup>(10)</sup>.

Regular systematic and clinical examination of shoulder best doing to reach a correct diagnosis with selection of suitable modalities to assessment of shoulder joint pathology and can find the causes such as extrinsic and intrinsic factors<sup>(9)</sup>.

In dynamic assessment of sub acromial disorders, rotator cuff tendonopathy and head of biceps muscle a ultrasound is excellent for evaluation in these situation<sup>(12)</sup>.

### **Indication for MRI in assessment of shoulder pathology are:**

- 1- Documentation of specific abnormal anatomy that related to cause of clinical syndrome of impingement.
- 2- Detect and description of rotator cuff diseases.

3- Assessment of gleno-humeral stability.

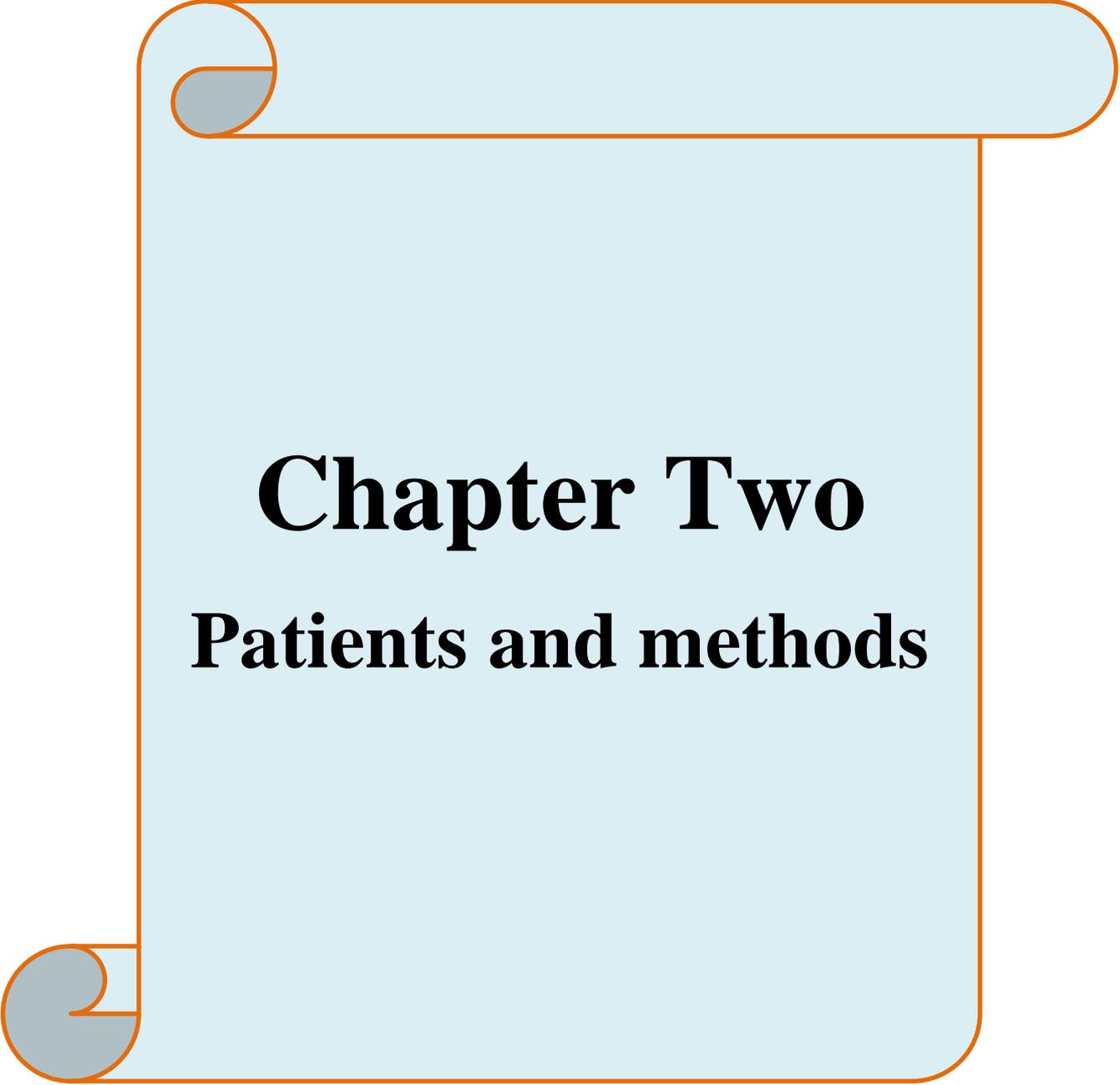
### **Magnetic resonance image**

An MRI consists of a large circular magnet which creates images of the tissues in the body without radiation. While plain x-rays show bones very well, MRI shows the soft tissue around the bones and joints<sup>(13)</sup>.

Conventional MRI for shoulder investigation recommended in three planes. First plane oblique coronal plane is attained in parallel to supraspinatus tendon and consider the very important position achievement. Other plane oblique sagittal plane used in assessment of tear of supraspinatus and infraspinatus also useful in evaluation of labrum. Typical shoulder pulses sequence comprise fast spinecho proton densities/ T2 weight with and without fat saturation, frequently appraising the joints in three plane, along with a T1 sequences to weigh the bone marrow<sup>(14)</sup>.

### **Aim of study**

To evaluated the beneficial role of MRI in investigation the tendon and ligament injuries of shoulder joint.



# **Chapter Two**

## **Patients and methods**

### **Patients and methods**

A cross sectional study enroll 60 patients shoulder problem were included in study the started from 1<sup>st</sup> August 2021 to 1<sup>st</sup> September 2022in Babylon teaching hospital.

### **Inclusion criteria**

- 1- patients had limiting in shoulder movement or painful shoulder.
- 2-age >18 years

### **Exclusion criteria**

- 1-shoulder dislocation and neoplastic lesion
- 2-patients had contraindication to MRI
- 3- patients had prior management for shoulder injuries
- 4- patient with history of joint disease such as osteoarthritis and bone fractures.
- 5- patients had complicated chronic diseases for example diabetes or hypertension.

### **Data collection**

Patients included in the study under went a full history and physical examination with guide of questionnaire that consist of part for demographic characters, part of chief complaints and history of present illness and laboratory investigation and lastly image findings.

### **MRI instrument**

MRI was achieved on a high field system (1.5 Tesla) magnet unit (Philips). Standard parameter for work of MRI as following:

field of views was 25 cm x 25 cm; scan thickness and gaps were 5 mm and 1.5 mm, respectively; and matrix were 257 x 257 or 513 x 513.

Systematic scanning sequences were used , included fast spinecho (TSE) T2-weight image (T2WI) short-term inversion recovery sequence (STIR) (among them, TR/TE were 5000/29 ms), and spinecho (SE) T1-weighted imaging (T1WI) .

Patients position in supine their head opposed to scanner bore. Arm is neutral and external rotated slightly. Surface coil binding and around to anatomic area of interest. The axial parts are vertical to long axis of body and aid to localizer to other planes. The coronal oblique plane is got vertical to glenoid face in parallel to supraspinatus muscle pathway and cover the area from infraspinatus to subscapularis. Other plane sagittal oblique is vertical to the coronal oblique which is parallel to glenoid face, it cover area from medially through scapular neck to greater tuberosity laterally. Images from axial plane might be helpful in assessment the subscapularis tendon, glenohumeral and glenoid labrum.

more over images from sagittal and coronal plane aid in assessment of labrum biceps tendon Acromio-clavicular joint tendons and muscles of supraspinatus and infraspinatus.

### **Images analyses**

Experience radiologist was evaluated MRI images, tendon of supraspinatus and infraspinatus tere minor tendon subscapularis are classified on degree of damage: no abnormalities, partial tear, complete tear and degeneration. Biceps also evaluated for tenosynovitis. Documentation will be reach according to tear of rotator cuff muscle or may be normal. Abnormal morphology was well-defined as clear tendon thinning or irregularity. The zone of incoherence characteristically displayed amplified signal intensity on T2WI.

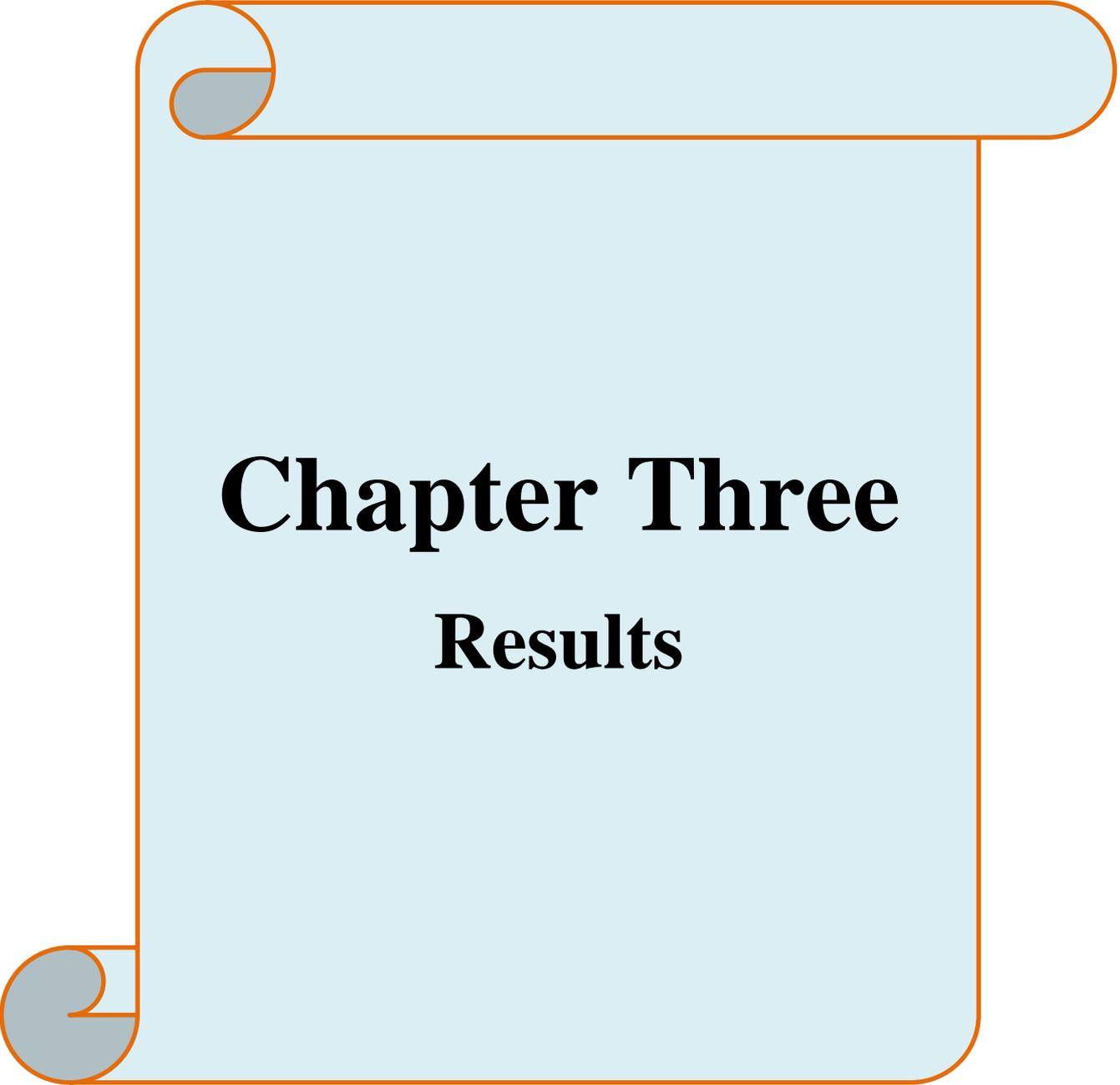
### **Ethical approval**

The study was approved by our institutional ethics committees and a written consent was obtained from each patient before participating in the study.

### **Statistical analysis**

Data was collected and included in a data based system and analyzed by statistical package of social sciences ((SPSS, Inc., Chicago, IL, USA)) version 23.

Parametric data were expressed as mean  $\pm$  standard deviation (SD) . While non-parametric data were expressed as percentages.



# **Chapter Three**

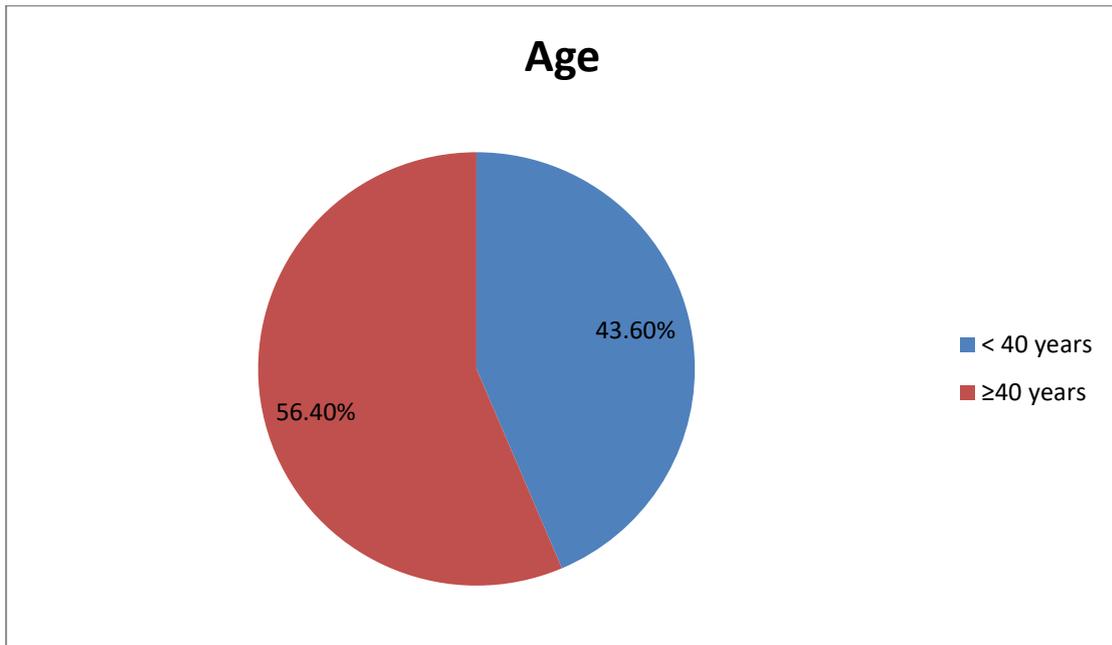
## **Results**

**Results**

The mean age of our study patients was  $45.7 \pm 9.2$  and within range 20-60 years. Patients age below forty were constituted 43.6% and 56.4% above or equal forty years. The male were 58% and female 42%. Heavy work presented by 30.7% and 69.3% had history of light work. Right side shoulder affected by 72.5% and left side affected in 27.5% of patients as in table 1.

**Table 1: show demographic characters**

Variables		Number	Percent
Age mean $\pm$ SD		45.7 $\pm$ 9.2	
Age	< 40 years	27	43.6%
	$\geq$ 40 years	35	56.4%
Gender	Male	36	58%
	Female	26	42%
Occupation	Heavy work	19	30.7%
	Light work	43	69.3%
Side of shoulder effected	Right	45	72.5%
	Left	17	27.5%

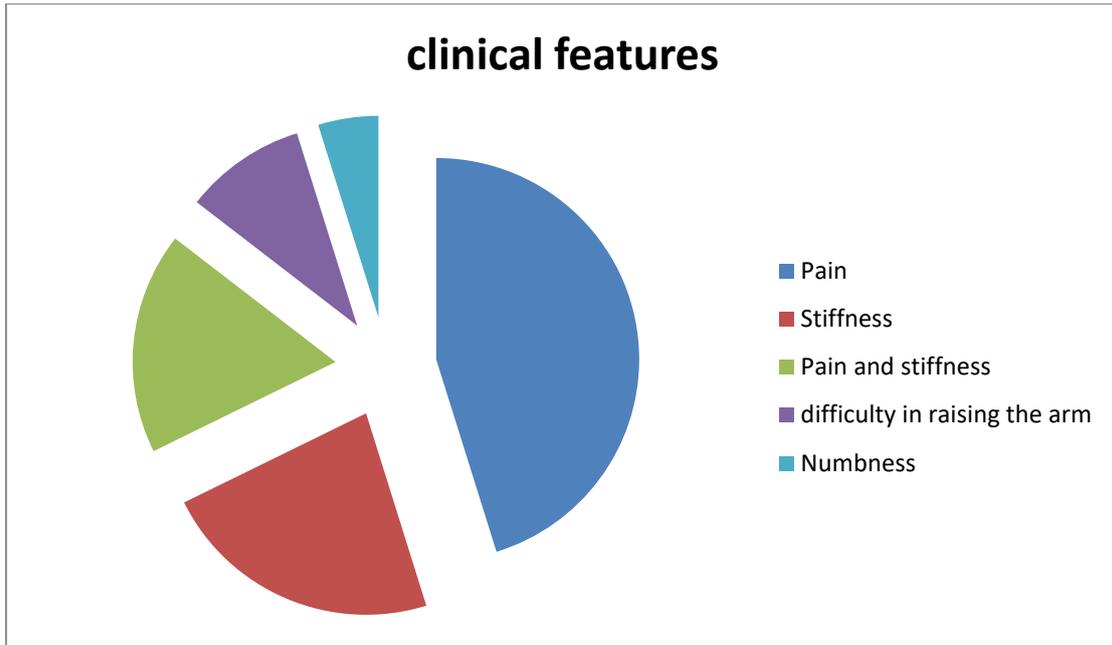


**Figure 1: show age group distribution.**

Table 2 reveal presenting features and complain criteria of patients, 45.2% of patients complain from pain, 22.5% with stiffness, both of pain and stiffness in 17.8%, 9.7% come with difficult in raising the arm and numbness seen in 4.8%.

**Table 2: show the clinical features of patients.**

Presenting features	Number	Percent
Pain	28	45.2%
Stiffness	14	22.5%
Pain and stiffness	11	17.8%
difficulty in raising the arm	6	9.7%
Numbness	3	4.8%



**Figure 2: show clinical features**

Regarding the finding by MRI, 20.9% were normal in examination, biceps tenosynovitis were seen in 6.5%, 45 patients had rotator cuff injury 11(17.8%) patients with tendenopathy , 27 (43.6%)had partial tear and 11.2% with complete tear as show in table 3. Table 4 show site of rotator cuff lesion, more than half in supraspinatus muscle (51.2%), 24.4% in infraspinatus muscle, 20% in subscapular and 4.4% in teres minor muscle.

**Table 3: show MRI findings for patients.**

finding by MRI		Number	Percent
Normal		13	20.9%
Rotator cuff pathology	Tendenopathy	11	17.8%
	Partial tear	27	43.6%
	Complete tear	7	11.2%
Biceps tenosynovitis		4	6.5%

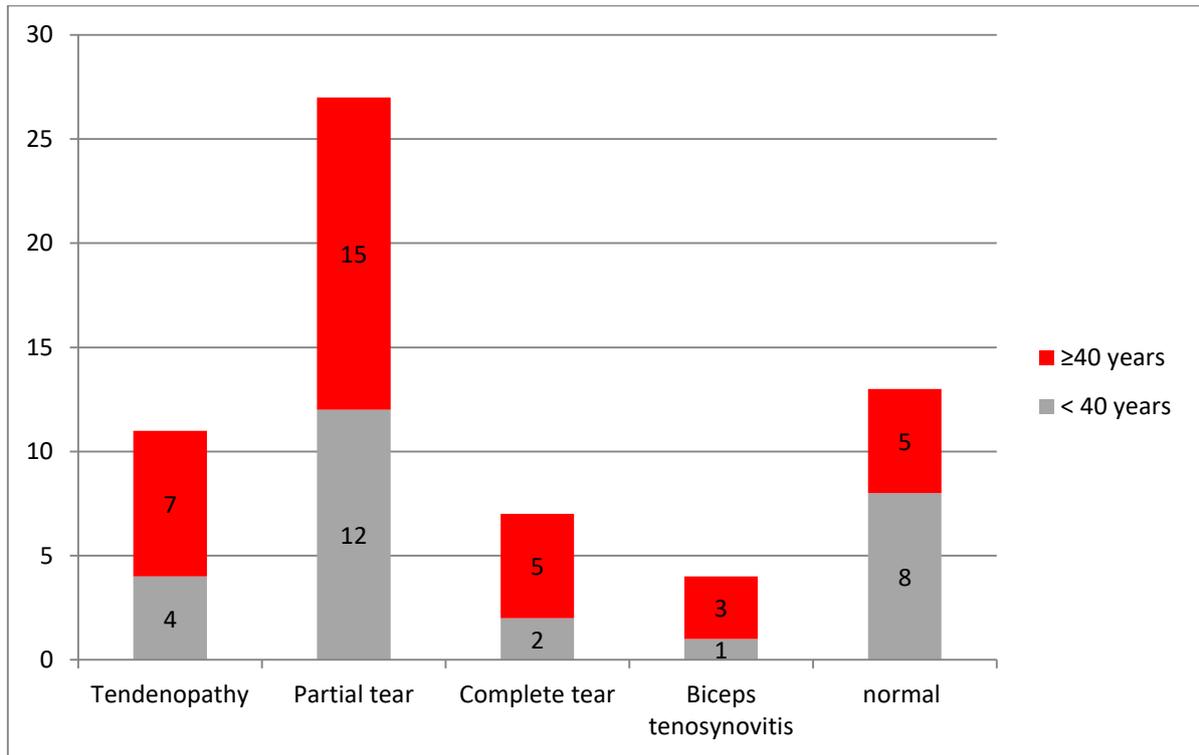
**Table 4: site of rotator cuff muscle lesion.**

Site of rotator cuff tear	Number	Percent from 45 patients
Supraspinatus muscle	23	51.2%
Infraspinatus muscle	11	24.4%
Subscapular muscle	9	20%
Teres minor tendon	2	4.4%

Finding in according to age group show most of injuries in age group more than  $\geq 40$  years, for partial tear seen in 15 in age  $\geq 40$  years and 12 less than forty, two patients with complete tear in younger patients while five in older patients. Same figure present in tenosynovitis three in older and only one in age group less than 40years, as in table 5.

**Table 5: show relation of lesion in regarding to age.**

finding by MRI		< 40 years	$\geq 40$ years	Total
Normal		8	5	13
Rotator cuff pathology	Tendenopathy	4	7	11
	Partial tear	12	15	27
	Complete tear	2	5	7
Biceps tenosynovitis		1	3	4
Total		27	35	62



**Figure 3: appear the types of lesion according to age group.**

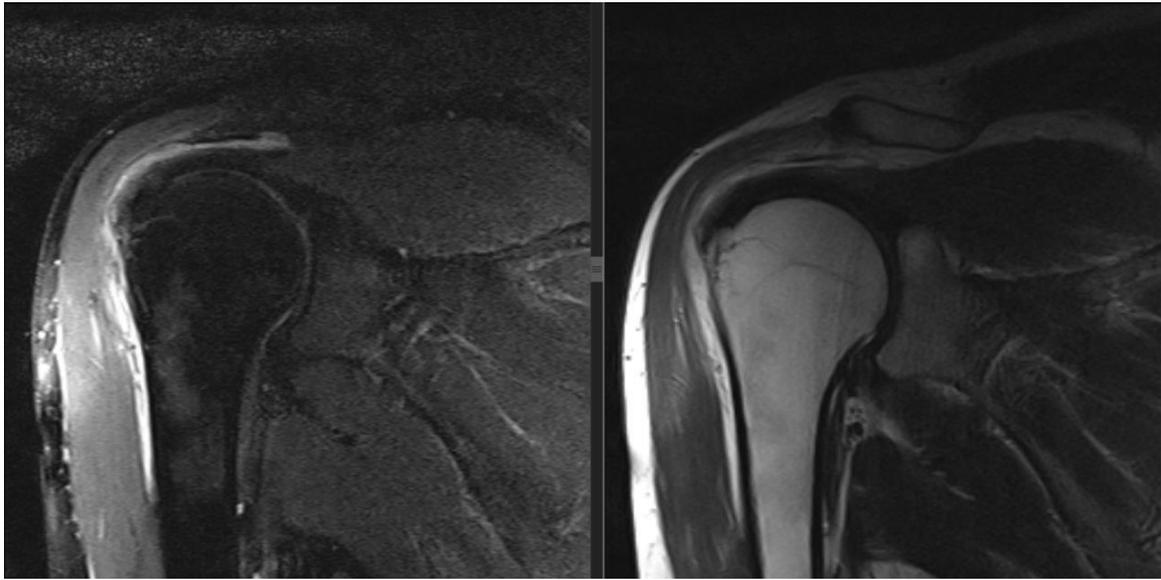


Fig.4-A Normal supraspinatous muscle tendon in coronal T2 and T2 fatsa

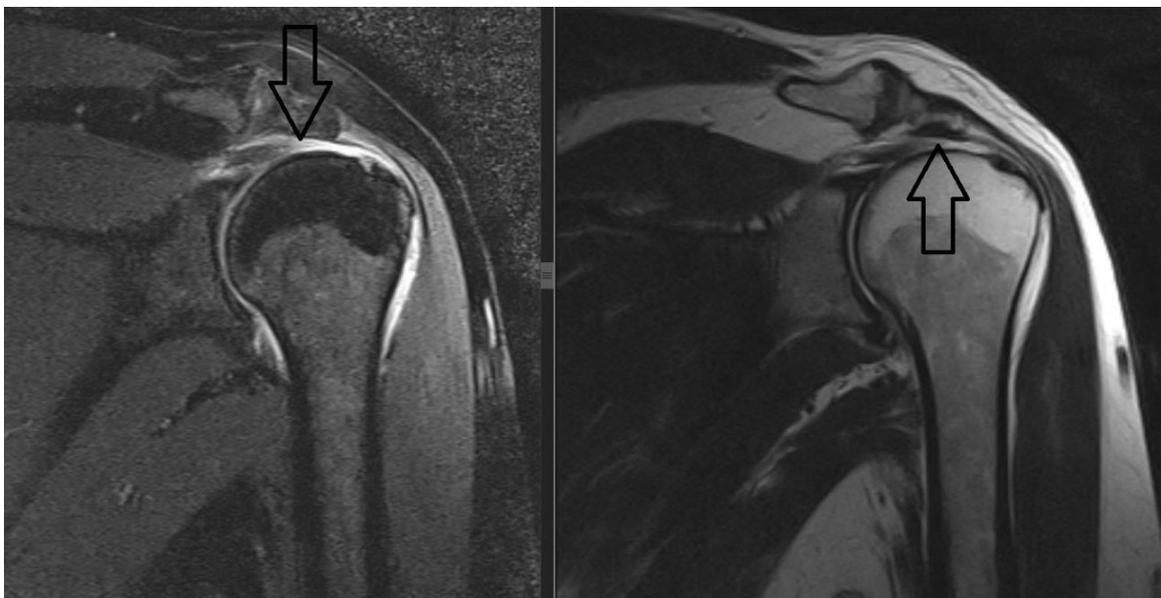


Fig.4-B Complete tear of supraspinatous muscle tendon in coronal T2 and T2 fatsat

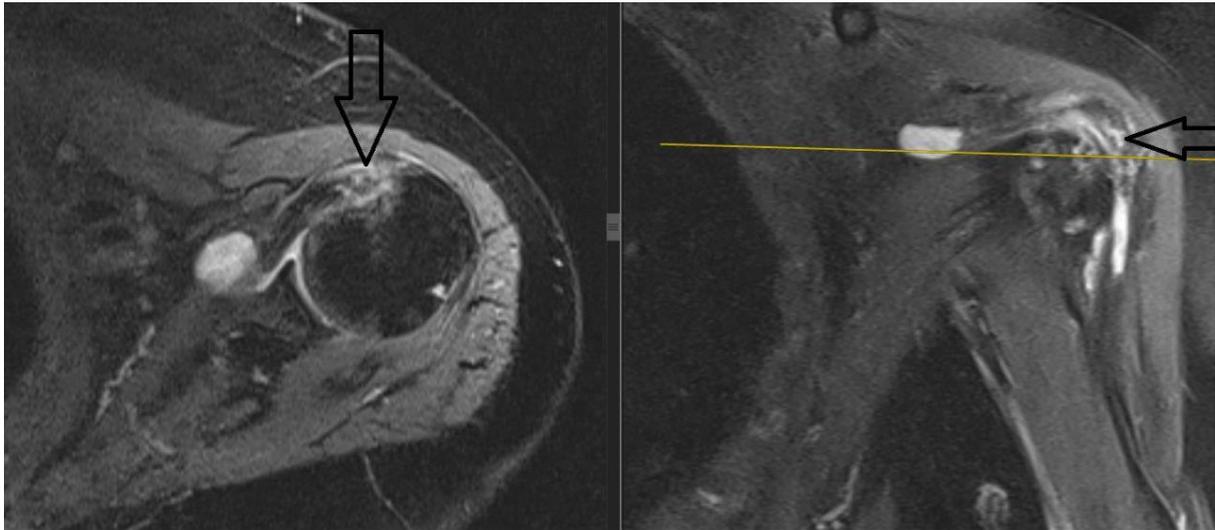


Fig.4-C Partial tear of long head of biceps muscle tendon in axial T2fatsat & coronal T2 fatsat

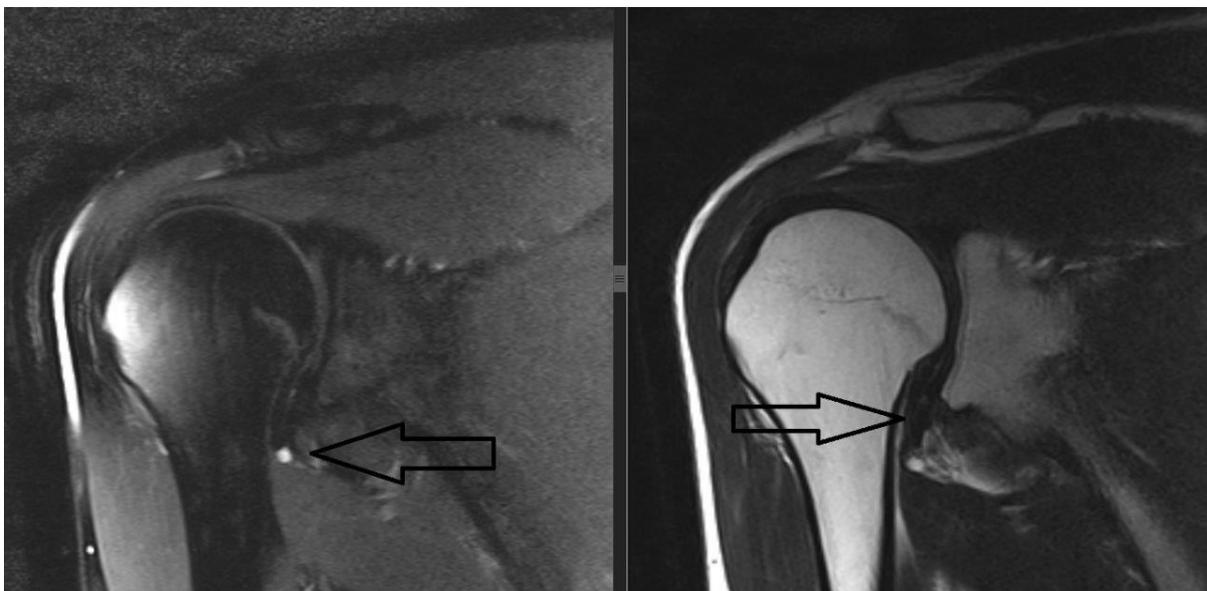


Fig.4-D Tear in glenohumeral ligament, coronal T2 and T2 fatsat

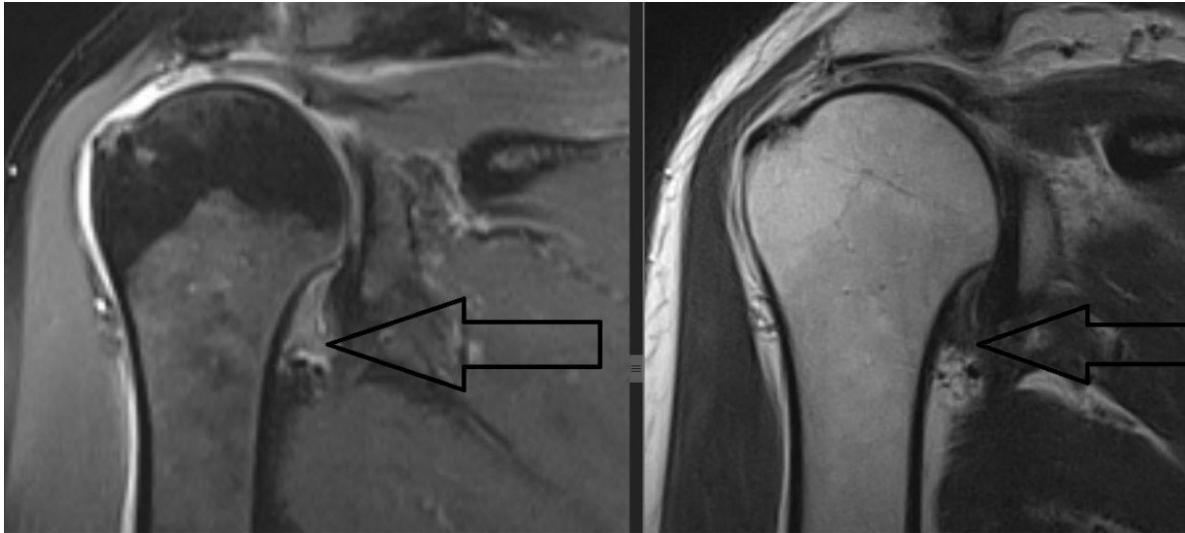


Fig.4-E Thickening of glenohumeral ligament, coronal T2 and T2 fatsat.

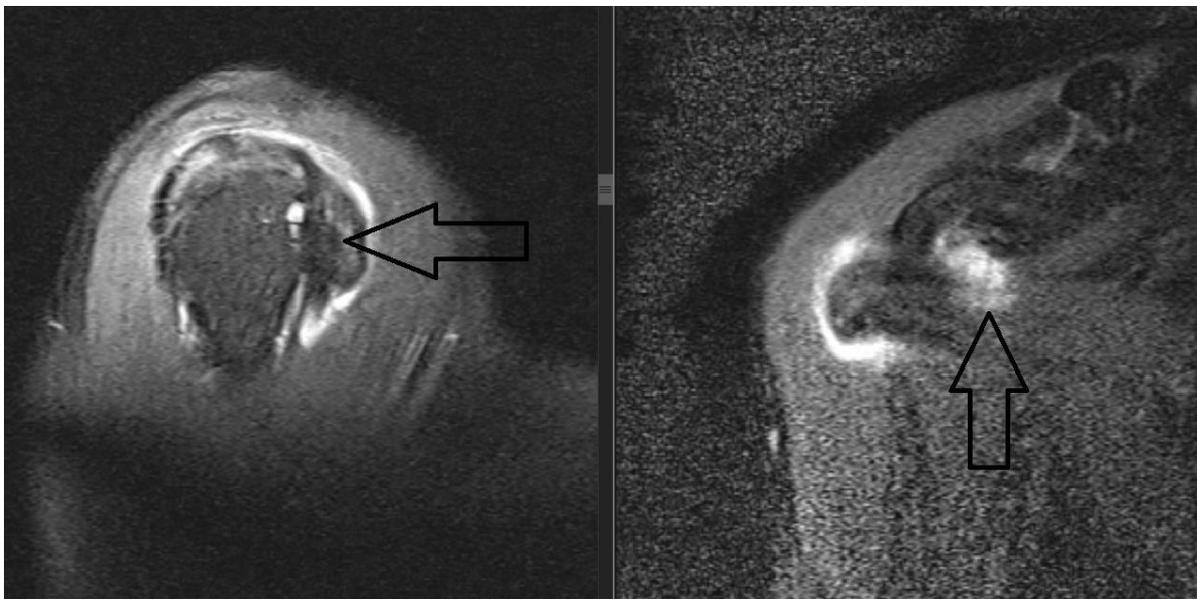
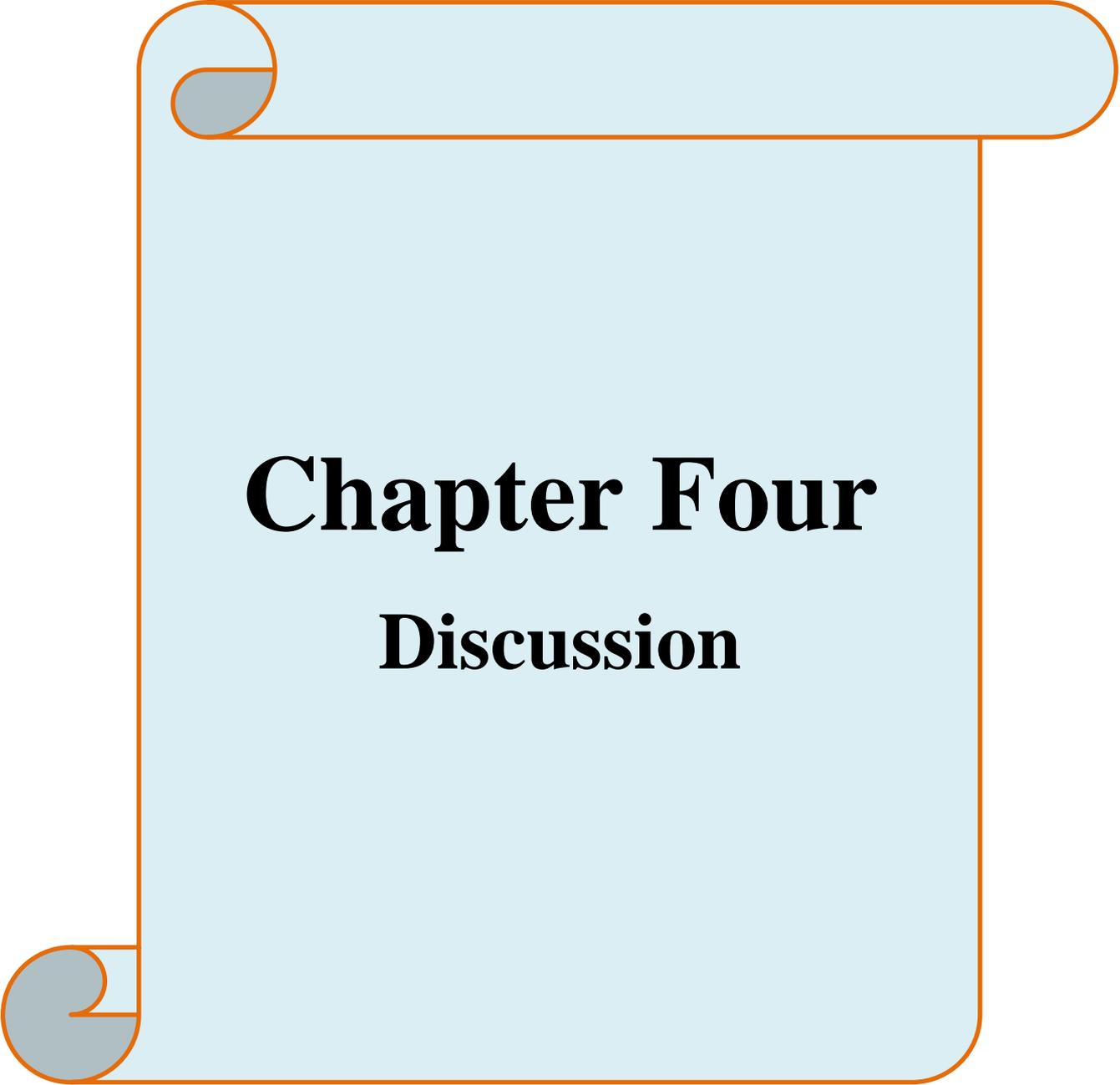


Fig.4-F Partial tear in infraspinatus muscle tear, sagittal T2 fatsat & coronal T2 fatsat



# **Chapter Four**

## **Discussion**

### Discussion

The great joint in the body had highly freedom and motion was the shoulder joint. Therefore it has large chance of instability and subject to damage. Pain is a common presentation for shoulder joint<sup>(15)</sup>.

Imaging plays an important role in the assessment of post traumatic shoulder disorders includes ultrasono-graphy and conventional magnetic resonance<sup>(16)</sup>.

Images modalities by MRI become helpful instrument for assessment of muscle and skeletal in general with special surface coil. Therefore MRI pictures of shoulder has many benefit in comparison to traditional methods. The shoulder joints are surrounding by soft tissue for support so need multiple plane study to evaluated, the MRI give multiplanar imaging it superior to CT scan image<sup>(17)</sup>.

Investigation modalities by MRI obviously show rotator cuff tendons and muscles, this aid in diagnosis any abnormal finding and could be precise quantified the location of tear<sup>(18)</sup>.

The mean age of our study patients was  $45.7 \pm 9.2$  and within range 20-60 years. Patients age below forty were constituted 43.6% and 56.4% above or equal forty years. The male were 58% and female 42%. It in consistent with study by Koganti et al<sup>(19)</sup>.

Wengert GJ, study of sixty seven patients male was 47 and 20 female age range from 18- 70 years, with mean age 39.5years<sup>(20)</sup>.

Mamoun et al study included patients with age range (20 – 60 years) and 60% of sample were male<sup>(21)</sup>.{15}other authors enrolled Fifty patients, with age range from 19 to 67 years (mean age 43 years)<sup>(22)</sup>.

Islam El-Hefnawi reported 64% of sample were female and male 36% of total sample, mean age 45 years and age range 25-65 years<sup>(1)</sup>.

Other author reported 64 male and 48 female, age range from 20 - 72 year and with mean age  $50.2 \pm 9.8$  years<sup>(23)</sup>.

Our study differed from study by Yu et al. who reported female predominance 58.3% with no significant difference in age (average age was 49.5 years)<sup>(24)</sup>.

A study by Koganti et al, they study 50 patients with rotator cuff disease 52% were males and 48% were females, with no significant difference among group regarding gender<sup>(19)</sup>.

Our patients mostly presented with right side shoulder affected by 72.5% and left side affected. It in line with prior study Mamoun et al<sup>(21)</sup>.

Islam El-Hefnawi reported right side was the more affected side in 34 patients and left side in 16 patients<sup>(1)</sup>. Also Xingzhen Hu study 29 left side shoulder and 71 right side<sup>(23)</sup>.

Our patients were revealed presenting features and complain criteria , 45.2% of patients complain from pain, 22.5% with stiffness, both of pain and stiffness in 17.8%, 9.7% come with difficult in raising the arm and numbness seen in 4.8%. it in consist with Mamoun et al<sup>(21)</sup>. and El-Hefnawi<sup>(1)</sup>.

Koganti et al. {16 study48 patients , they reported 40% of patients frequent complain from pain alone, 20% of them complain from stiffness in joint, 18% of patients had both combination pain and stiffness, 14% show difficult in arm raising and numbness presented in two patients only which consider less common symptoms<sup>(19)</sup>.

Xingzhen Hu reported more frequent complain in 110 patients in his study are pain and limitation of shoulder movement<sup>(23)</sup>.

Regarding our finding by MRI, 20.9% were normal in examination, biceps tenosynovitis were seen in 6.5%, 45 patients had rotator cuff injury 11(17.8%) patients with tendenopathy , 27 (43.6%)had partial tear and 11.2%

with complete tear show site of rotator cuff lesion, more than half in supraspinatus muscle (51.2%), 24.4% in infraspinatus muscle, 20% in subscapular and 4.4% in teres minor muscle. It agree with study El-Hefnawi et al<sup>(1)</sup>.

A study presented pathology of shoulder muscle in 112 patients, supraspinatus tendon abnormal presentation seen in 97 patients while subscapularis tendon in 6 patients show abnormal appearance in addition, only two patients with abnormal morphology of teres minor tendon whereas infraspinatus tendon abnormal pathology in seven patients<sup>(23)</sup>.

Islam El-Hefnawi reveal 20% with complete tear and partial tear in 28%, biceps tenosynovitis was seen in 32%<sup>(1)</sup>.

Other authors stated tendons of supraspinatus where mostly affected followed by other tendon of rotator cuff subscapularis and infraspinatus. While teres minor not found in their study patient. and 54% presented with partial tear<sup>(1)</sup>, which is agreement of study by of Koganti et al

the supraspinatus tendon was the most afflicted followed by the subscapularis and infraspinatus. Teres minor was not found in any of the study's patients<sup>(19)</sup>.

The discrepancy is in part based on study demographics and threshold for age-related change<sup>(25)</sup>.

Finding in according to age group show most of injuries in age group more than  $\geq 40$  years, for partial tear seen in 15 in age  $\geq 40$  years and 12 less than forty, two patients with complete tear in younger patients while five in older patients. Same figure present in tenosynovitis three in older and only one in age group less than 40years these result agreement with previous study by Koganti et al<sup>(19)</sup>.

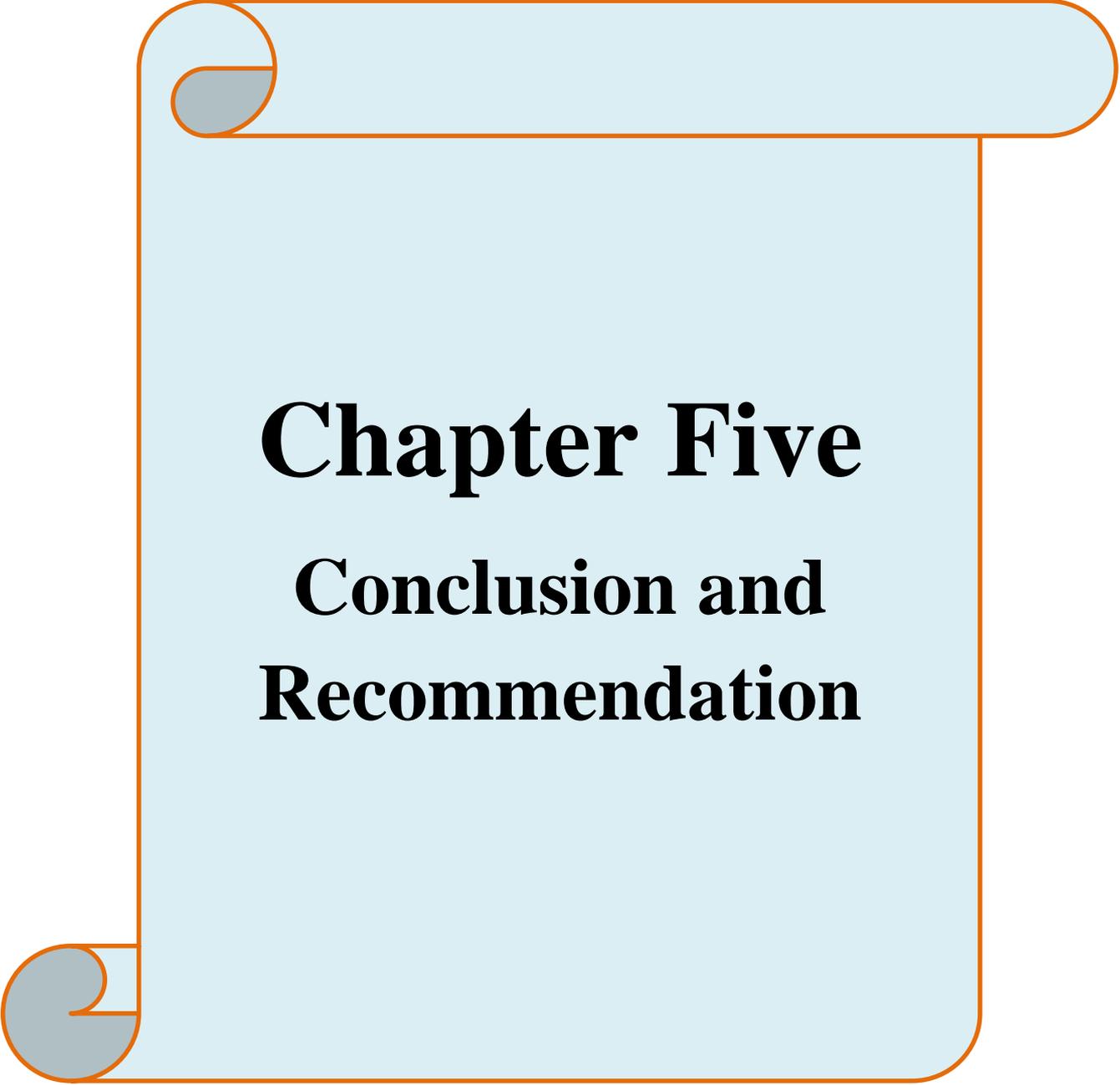
According many studies show the incidence of rotator cuff injuries increase with age mostly effect fifth and sixth decade of life which appear predominant occurrence. authors stated the pathogenesis of injury of muscle

through intrinsic processes<sup>(26)</sup>. Investigation of microvascular pathway appear limited of vascularization in cuff tissues when individual become older. These finding match many thesis stated degeneration of tendon seen more prevalent with advance age<sup>(27)</sup>. Our study find the tear more common in age over 40 years.

The partial thickness tear appear on MRI is focal dis continuity of the tendons with great signal intensity on T2-weight image. There might be finding of surface distressing and change in tendons caliber<sup>(28)</sup>.

Fat suppression sequence could aid show the tendons weakness. Some high grade partial thickness bursa side tear might be incorrect for full thickness tear<sup>(28)</sup>.

MRI can assess the amount and outline of rotator cuff irregularities, detect anomalies of the cuff muscle and neighboring structure, and propose mechanical inequality inside the cuff<sup>(10)</sup>. Additionally , MRI can offer facts about RCT including tears dimension, is required for optimal treatment planning and prognostic accuracy<sup>(9)</sup>.



# **Chapter Five**

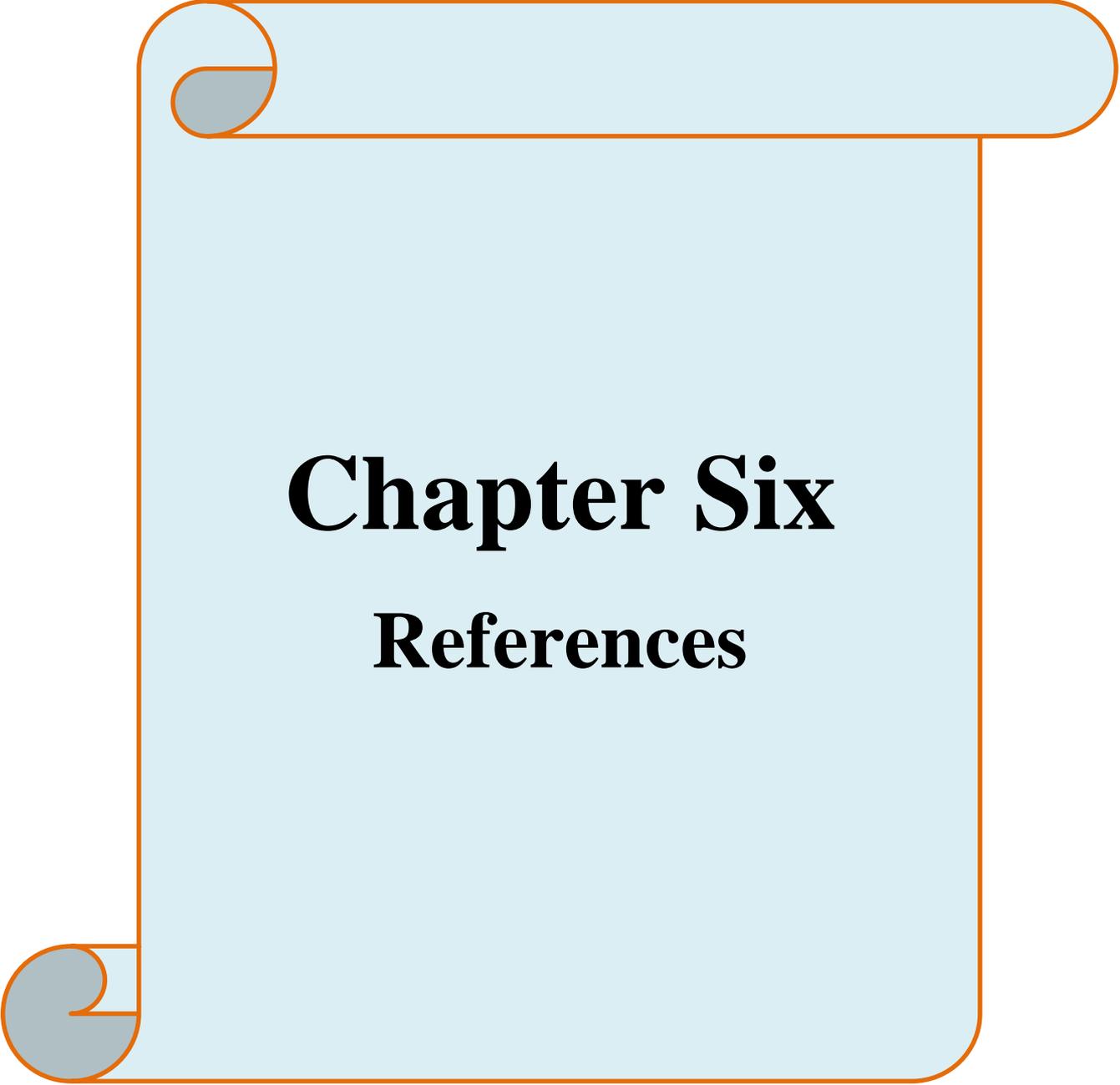
## **Conclusion and Recommendation**

### **Conclusion**

1. MRI have an supportive role in diagnoses grading and treatments arrangement of shoulder joint injuries. MRI is needed in order to evaluate the joint in more detailed manner than other modalities.
2. MRI findings most seen in older age group more than forty years.
3. Rotator cuff are effected more than other muscles in shoulder and supraspinatus is common site.

### **Recommendation**

1. We suggest to used MRI as one of line of images modalities in
2. each suspected case of shoulder joint problem.
3. health promotion target vulnerable age group of shoulder injuries such as healthy life style.
4. New advance and researches in MRI have provide added potential use for assessing shoulder instabilities.



# **Chapter Six**

## **References**

**References**

1. Islam El-Hefnawi Abdel Fattah El-Shewi , Hatem Mohamed El Azizy and Amr Abd El Fattah Hassan Gadalla .Role of dynamic ultrasound versus MRI in diagnosis and assessment of shoulder impingement syndrome. *Egyptian Journal of Radiology and Nuclear Medicine* (2019) 50:100.
2. Cadogan A, Laslett M, Hing WA, et al. A prospective study of shoulder pain in primary care: prevalence of imaged pathology and response to guided diagnostic blocks. *BMC Musculoskelet Disord* 2011; 12: 119.
3. Piper CC, Hughes AJ, Ma Y. Operative versus nonoperative treatment for the management of full-thickness rotator cuff tears: a systematic review and meta-analysis. *J Shoulder Elbow Surg* 2018; 27: 572-576.
4. Amini B, Beckmann NM, Beaman FD. ACR appropriateness criteria shoulder pain-traumatic. *J Am Coll Radiol* 2018; 15: S171-S188.
5. Small KM, Adler RS, Shah Sh, et al. ACR appropriateness criteria shoulder pain-atraumatic. *J Am Coll Radiol* 2018; 15: S388-S402.
6. Little wood C, May S, Walters S. Epidemiology of rotator cuff tendinopathy: a systematic review. *Shoulder Elbow* 2013; 5: 256-265.
7. Chang EY, Szeverenyi NM, Statum S. Rotator cuff tendon ultrastructure assessment with reduced-orientation dipolar anisotropy fiber imaging. *AJR Am J Roentgenol* 2014; 202: W376-378.
8. Kalia V, Freehill MT, Miller BS. Multimodality imaging review of normal appearance and complications of the postoperative rotator cuff. *AJR Am J Roentgenol* 2018; 211: 538-547.
9. Khoschnau S, Milosavjevic J, Sahlstedt B. High prevalence of rotator cuff tears in a population who never sought for shoulder problems: a clinical, ultrasonographic and radiographic screening study. *Eur J Orthop Surg Traumatol* 2020; 30: 457-463.

- 10.Sharma G, Bhandary S, Khandige G. MR imaging of rotator cuff tears: correlation with arthroscopy. *J Clin Diagn Res* 2017; 11: TC24-TC27.
- 11.Huang T, Liu J, Ma Y. Diagnostic accuracy of MRA and MRI for the bursal-sided partial-thickness rotator cuff tears: a meta-analysis. *J Orthop Surg Res* 2019; 14: 436.
- 12.J. S. Roy, C. Braen, J. Leblond et al., “Diagnostic accuracy of ultrasonography, MRI and MR arthrography in the characterization of rotator cuff disorders: a systematic review and metaanalysis,” *British Journal of Sports Medicine*, vol. 49, no. 20, pp. 1316–1328, 2015.
- 13.E. McCrum, “MR imaging of the rotator cuff,” *Magnetic Resonance Imaging Clinics of North America*, vol. 28, no. 2, pp. 165–179, 2020. {1
- 14.Pavic R, Margetic P, Bensic M, Brnadic RL. Diagnostic value of US, MR and MR arthrography in shoulder instability. *Injury*. 2013; 44 Suppl 3:S26–32.
- 15.M. J. Tuite, “Magnetic resonance imaging of rotator cuff disease and external impingement,” *Magnetic Resonance Imaging Clinics of North America*, vol. 20, no. 2, pp. 187–200, 2012.
- 16.Arirachakaran A, Boonard M, Chaijenkij K, Pituckanotai K, Prommahachai A, Kongtharvonskul J. A systematic review and meta-analysis of diagnostic test of MRA versus MRI for detection superior labrum anterior to posterior lesions type II-VII. *Skeletal Radiol*. 2017; 46(2):149–60.
- 17.Roy JS, Braen C, Leblond J, Desmeules F, Dionne CE, MacDermid JC, et al. Diagnostic accuracy of ultrasonography, MRI and MR arthrography in the characterisation of rotator cuff disorders: a systematic review and meta-analysis. *Br J Sports Med*. 2015; 49(20):1316–28.
- 18.Gill TK, Shanahan EM, Allison D, Alcorn D, Hill CL. Prevalence of abnormalities on shoulder MRI in symptomatic and asymptomatic older adults. *Int J Rheum Dis*. 2014 Nov;17(8):863-71.

- 19.Koganti D V, Lamghare P, Parripati V, et al. (January 08, 2022) Role of Magnetic Resonance Imaging in the Evaluation of Rotator Cuff Tears. *Cureus* 14(1): e21025. DOI 10.7759/cureus.21025.
- 20.Wengert GJ, Schmutzer M, Bickel H, Sora M-C, Polanec SH, Weber M, et al. (2019) Reliability of high-resolution ultrasound and magnetic resonance arthrography of the shoulder in patients with sports-related shoulder injuries. 2019:PLoS ONE 14 (9): e0222783.{3
- 21.Hatem Abd Elnasser Abbass Mamoun, Yosef Mohamad Fahim, Mohamad Talaat Mohamad. Comparative study of Ultrasound and MRI in diagnosis and assessment of shoulder impingement syndrome. *AIMJ* March 2022 . 160-165.{15
- 22.Magdy Abbas Mohamed Elfawal, Osama Abdulla Dawoud, Mohamed Safwat Shalaby and Ahmad Abdulla Hussein Alnaggar. Role of ultrasound and magnetic resonance imaging in traumatic shoulder joint injuries. *Z.U.M.J.*2013Vol.19; N.4; 590-599. {12
- 23.Xingzhen Hu, Xiaoxing Wang, Weisi Mao, Lingling Ying, and Zongzhang Huang .Magnetic resonance imaging classifications of rotator cuff tear are associated with different shoulder outcome scores. *Journal of Nanomaterials*: Volume 2021, Article ID 9918812, 6 pages.{1}
- 24.Xiao-Kun Yu, Jian Li, Le Zhang, Lei Li, Jin-Xing Li and Wen-Bin Guo.Magnetic resonance imaging evaluation of the correlation between calcific tendinitis and rotator cuff injury. *BMC Medical Imaging* (2022) 22:24.{11
- 25.Elizabeth A. Roy, Ian Cheyne, Gordon T. Andrews, Bruce B. Forster. Beyond the Cuff: MR Imaging of Labroligamentous Injuries in the Athletic Shoulder. *Radiology*: 2016: Volume 278: Number 2. {7
- 26.Kralik SF, Singhal KK, Frank MS, et al. Evaluation of gadolinium deposition in the brain after MR arthrography. *AJR Am J Roentgenol* 2018; 211: 1063-1067.

27. De Maeseneer M, Van Roy P, Shahabpour M. Normal MR imaging anatomy of the rotator cuff tendons, glenoid fossa, labrum, and ligaments of the shoulder. *Radiol Clin North Am* 2006; 44: 479-487.
28. Aria Ashir, Alecio Lombardi, Saeed Jerban, Yajun Ma, Jiang Du, Eric Y. Chang. Magnetic resonance imaging of the shoulder. *Pol J Radiol* 2020; 85: e420-e439.

## المُلخَص

**الخلفية:** إصابات مفصل الكتف من الأمراض الشائعة. الخلع المتكرر الذي يحدث في الكتف بسبب هياكل الكتف. يوفر التصوير بالرنين المغناطيسي مجموعة رائعة وواسعة من صورة بنية الأنسجة الرخوة بالضبط الشفا والكفة المدورة.

**الهدف من الدراسة:** تقييم الدور المفيد للتصوير بالرنين المغناطيسي في فحص إصابات الأوتار والأربطة في مفصل الكتف.

**المريض والطريقة:** دراسة مقطعية شملت 60 مريضاً من مشاكل الكتف تم تضمينها في الدراسة التي بدأت من 1 أغسطس 2021 إلى 1 سبتمبر 2022 في مستشفى بابل التعليمي. خضع المرضى المشمولين في الدراسة إلى تاريخ كامل وفحص بدني. تم إجراء التصوير بالرنين المغناطيسي على وحدة مغناطيسية عالية المجال (1.5 تسلا) (Philips) للكتف. تم جمع البيانات وتحليلها باستخدام SPSS 23.

**النتيجة:** كان متوسط عمر مرضى الدراسة  $45.7 \pm 9.2$  وضمن نطاق 20-60 سنة. المرضى الذين تقل أعمارهم عن الأربعين يشكلون 43.6% و 56.4% فوق أو ما يعادل أربعين سنة. كان الذكور 58% والإناث 42%. فيما يتعلق بالنتائج بواسطة التصوير بالرنين المغناطيسي ، كانت 20.9% طبيعية في الفحص ، وشوهت العضلة ذات الرأسين والتهاب غمد الوتر في 6.5% ، و 45 مريضاً أصيبوا في الكفة المدورة 11 (17.8%) مصابين باعتلال الأوتار ، و 27 (43.6%) يعانون من تمزق جزئي و 11.2% مع تمزق كامل. .

**الخلاصة:** التصوير بالرنين المغناطيسي له دور داعم في تشخيص الدرجات وترتيب العلاجات لإصابات مفصل الكتف. هناك حاجة إلى التصوير بالرنين المغناطيسي لتقييم المفصل بطريقة أكثر تفصيلاً من الطرائق الأخرى.



وزارة التعليم العالي والبحث العلمي

جامعة بابل

كلية الطب

# دور الرنين المغناطيسي في تشخيص اصابات الاوتار والاربطة لمفصل الكتف

دراسة مقدمة الى جامعة بابل / كلية الطب / فرع الجراحة ( الاشعة  
التشخيصية) كجزء من متطلبات نيل شهادة الدبلوم العالي من قبل الدكتور

**علاء عبد الواحد عباس**

كلية الطب / جامعة بابل

بأشراف

**أ.د. حسنين احمد جاسم**

استشاري اشعة تشخيصية