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TG Conceived the study, participated in the design of the study, analyzed the results and drafted the manuscript.

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CH Conceived the study participated in the design of the study, contributed to interpretation of data and assisted in drafting of the manuscript.

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Running title: Shoulder pain and MRI

Abstract

Aim: The aim of this study was to determine the prevalence of structural shoulder pathology using Magnetic Resonance Imaging (MRI) in three groups of older people; those with current shoulder pain, those with a previous history of shoulder pain and those with no history of shoulder pain, within a community-based sample.

Methods: Thirty subjects (ten within each of the three groups) participated in the study. Subjects were recruited by telephone and underwent a clinical examination of shoulder and neck range of movement (to ensure pain was not referred from the neck). Subjects completed the Shoulder Pain and Disability Index (SPADI) and underwent MRI and X-ray of the relevant shoulder. The X-rays and MRI were read independently by two experienced musculoskeletal radiologists blinded to each participant's symptoms. The MRIs were read using a structured reporting system.

Results: The mean range of shoulder movement on both the right and left sides was lower for the current pain group compared to both the no and previous pain groups. On X-ray, there was no significant difference between groups in terms of glenohumeral and/or acromioclavicular degenerative changes. Tendinosis and tears of the rotator cuff were present in the majority of participants in each group. Labral abnormalities were rare amongst all groups.

Conclusion: Shoulder pathology is apparent in both symptomatic and asymptomatic shoulders and clinical symptoms may not match radiological findings. The cost burden

of ordering MRI scans is significant and the relevance of the findings are questionable when investigating shoulder pain.

Key words: shoulder disorders, magnetic resonance imaging, pain.

Introduction

Shoulder pain is common in the population and can place a significant burden on individuals in terms of difficulties undertaking paid work, household tasks or leisure activities[1]. Life time prevalence of shoulder pain has been shown to range between 6.7 and 66.7%, with one month prevalence between 18.6 and 31% and point prevalence between 6.9 and 26%. This range in prevalence has been attributed to differences in case definition[1]. Despite its high prevalence and the potential for long term disability many patients do not seek early medical assistance[2, 3].

Plain radiology, ultrasound (US) and Magnetic Resonance Imaging (MRI) have each been used diagnostically to assess the causes of shoulder pain. Comparison has also been made between US, MRI and arthroscopy. Teefey et al[7] examined 124 consecutive patients with US and MRI. Of these, 71 then proceeded to arthroscopy to confirm the US and MRI findings. When assessed against the arthroscopy results, the MRI and US were comparable in terms of both identifying and measuring the size of RC tears with US identifying 45 of 46 full thickness tears, and MRI identifying all 46. In terms of partial tears US identified 13 of 19 partial thickness tears, and MRI 12. Thus the overall accuracy of both tests was calculated to be 87%.

MRI is a widely used diagnostic tool in assessment of shoulder pain. It has demonstrated high diagnostic validity for the detection of full thickness rotator cuff tears, has the advantage over US of being able to detect other aspects of the rotator cuff (e.g. muscle atrophy) and gives information about cartilage in the glenohumeral (GHJ) and acromioclavicular (ACJ) joints[7]. However, few MRI studies have examined the prevalence of shoulder abnormalities in asymptomatic individuals. In 1995, an MRI

study of 100 asymptomatic individuals aged between 19-88 years, of which 48% were aged over 60 years, demonstrated a prevalence of RC tears of 34%. The frequency of RC tears (both full and partial) increased with age but remained compatible with painless, normal, functional activity[8]. Using the same study population, ACJ osteoarthrosis was present in approximately 75% of participants while one third had subacromial spurs and ACJ fluid was present in nearly all participants[9]. Similar results have also been found using US, with abnormalities found in 96% of a sample of 51 asymptomatic male subjects. The most common issues identified were thickening of the subacromial-subdeltoid bursa, tendinosis of the supraspinatus and ACJ osteoarthritis (OA)[10]. More recent work by Fredericson et al[11] demonstrated that MRI changes exist in the shoulders of asymptomatic elite athletes similar to those that are also treated with surgery.

While the prevalence of pathology in both symptomatic and asymptomatic shoulders has been shown to be high when using both US and MRI, the association between pathology and symptoms is poorly understood. Over 200 consecutive patients who presented with shoulder pain were examined by Cadogan et al[12] using ultrasound and MR arthrography. The RC and subacromial bursa were the structures with the highest prevalence of pathology. Guided diagnostic blocks were then performed. There was a positive response to diagnostic blocks into the subacromial bursa in 34% of participants and a positive response to ACJ injection in 14%. Of the remaining participants, 16% demonstrated a positive response to injection into the GHJ. However over one third had no response to the injections, indicating that the cause of the pain was not identified.

This paper describes a study which aimed to determine the prevalence of structural pathology using MRI in three groups of older people; those with current shoulder pain, those with a previous history of shoulder pain and those with no history of shoulder pain, within a community-based sample. Similar studies in knee pain have allowed identification of lesions such as subchondral bone edema which have been associated with knee pain and progression of knee OA[13, 14]. However, in the general population, incidental mensical changes on knee MRI have also been shown be common, even in the absence of symptoms and the prevalence of the tears increases with age[15].

Materials and Methods

Participants were obtained from the North West Adelaide Study (NWAHS), a longitudinal cohort study of 4056 randomly selected adults aged 18 years and over at the time of recruitment from the northern and western regions of Adelaide, South Australia. This sample region represents approximately half of the metropolitan area of Adelaide (total population of approximately 1.2 million) and almost one-third of the population in South Australia (population of approximately 1.6 million)[16]. The study commenced in 1999 to 2003 with Stage 1, Stage 2 was conducted between 2004 and 2006 and Stage 3 was conducted between 2008 and 2010, with the aim of to providing longitudinal measured and self-reported data to assist in increasing the ability of strategies and policies to prevent, detect and manage a range of chronic conditions[17]. Data were collected for the study using a Computer Assisted Telephone Interview (CATI), a self-completed questionnaire and a clinic assessment at each stage[17, 18];

however the questions relating to shoulder pain, asked in Stage 2 and Stage 3, were asked as part of the CATI.

Recruitment

Potential participants for this study were identified from the NWAHS database in the following manner. In Stage 2, participants were asked "Have you ever had pain or aching in your shoulder, either at rest or when moving, on most days for at least a month?" In Stage 3, participants were asked "Over the past month, have you had pain or aching in either or both of your shoulders, either at rest or when moving, on most days?" Respondents who replied in the negative to both questions were identified as those with no current or previous shoulder pain; those who responded in the affirmative to the shoulder pain question in Stage 2 were those with previous shoulder pain and those who responded "yes" to both questions were those with current shoulder pain. Participants were also excluded if they were not currently aged between 55 and 74 years and if they self-reported that they had doctor diagnosed rheumatoid arthritis in either Stage 2 or Stage 3.

Each potential participant was telephoned and given an outline of the study which indicated that their shoulder and neck range of movement would be examined and that a short questionnaire would need to be completed. They were also advised that following the completion of the assessment, they would undergo a shoulder X-ray and MRI scan. It was then confirmed that those with no current or previous shoulder pain still remained pain-free; that the pain had not returned to the same shoulder among those with pain in Stage 2 and not Stage 3 and that pain remained in the same

shoulder for those with pain in both Stage 2 and 3. If respondents had had shoulder surgery they were excluded from the study.

The potential participants were asked "MRI exclusion questions" which ensured that there were no pacemakers, claustrophobia, or metal implants which would prevent an MRI being undertaken. Participants were then asked if they had neck pain and/or regular headaches, to ensure that the shoulder pain was not referred from the neck. Finally, they were asked if they had been diagnosed with rheumatoid arthritis. Respondents were unable to participate if the response was in the affirmative to any of these questions.

If respondents were happy to participate, they were sent an information sheet and consent form and recontacted in a few days to confirm their involvement and the clinic visit.

Clinic visit

The clinic assessment was undertaken by a trained physical therapist. Hand dominance and shoulder of interest were determined. The questionnaire comprised the numeric scale Shoulder Pain and Disability Index (SPADI), a thirteen item questionnaire which examines shoulder pain and disability across a variety of activities. The scores can be examined in terms of the pain and disability subscales and also as a total score. The higher the score, the greater the level of pain or disability[19]. There were also questions relating to the duration of pain, whether pain woke them at night, whether they could get back to sleep and the intensity of pain at night. The location and type of the shoulder pain was marked on a diagram. Cervical range of motion was

examined to exclude participants with referred pain from the neck as a cause of shoulder pain. Range of movement of both shoulders was assessed for all participants. Active flexion and abduction of both the left and right shoulders was measured using a goniometer. External rotation was examined visually with the upper arms by the side and rotating the arms out. Visual assessment has previously been shown to be a suitable means of assessing shoulder range of movement[20, 21]. For horizontal flexion the arm was raised to 90° of flexion and then the participant was asked to touch the opposite shoulder while maintaining the arm in 90° of flexion and the combined movement of extension and internal rotation was also assessed by reaching up behind the back and measuring the highest anatomical that was reached by the thumb[22]. Range of movement and pain associated with movement were recorded.

Each participant underwent a plain X-ray and MRI of the affected or previously affected shoulder, or matched side (in those with no current or previous shoulder pain). Standard X-ray views (anteroposterior in internal and external rotation, lateral scapula, superoinferior) were undertaken on all participants.

Each MRI scan was performed on the same machine; Siemens Espree 1.5T, 18 channel, DZ gradient system (33mT/m, 170mT/m/s slew rate), with 4 channel shoulder coil. The following MRI sequences were used: 1) Axial: proton density (PD), 2) Coronal: PD, PD fat saturated, T2 and 3) Sagittal: PD fat saturated, to allow identification of pathology (PD and T1 sequences to identify the anatomy and muscle atrophy, PD fat saturated and T2 to differentiate tendinosis versus tear of rotator cuff).

Both the X-ray and MRI films were independently read by two experienced musculoskeletal radiologists blinded to each participant's symptoms. The presence of

GHJ OA was determine using the Samilson-Prieto classification[23, 24] This scale has been shown to have substantial intraobserver reliability and moderate to excellent interobserver reliability[24, 25]. The MRIs were read using structured reporting system. Although there are a number of surgical classifications of rotator cuff, labral and glenohumeral lesions, there are no validated MRI scoring systems as in knee OA[25].

Ethics approval

Ethics approval for the study was obtained from the Human Research Ethics committees of The Queen Elizabeth Hospital, Adelaide, South Australia and the University of Adelaide and all participants provided written informed consent. Participants were provided with the results of their scans at the completion of the study.

Statistical analyses

Statistical analyses were conducted using SPSS Version 19 (IBM SPSS Statistics, New York, NY, USA). Frequencies (counts) of each of the features seen on X-rays and MRI scans were determined for each of the three groups and analyses of variance (ANOVA), with a post-hoc Bonferroni correction were used to demonstrate differences between the three groups of interest in terms of shoulder flexion, abduction and external rotation range of movement. ANOVA with a post-hoc Bonferroni correction was also used to examine differences between the three groups in terms of the length and width of supraspinatus tears – the most common rotator cuff tear identified in the study.

Results

Overall, 30 participants (12 males and 18 females, mean age 64.8, SD 4.77, range 56-74) took part in the study. In each of the three groups (no pain, previous pain and current pain), five participants were aged between 55 and 64 years and five were between 65 and 74 years. Five participants were left hand dominant. Pain had been experienced previously and currently in six right shoulders, thus within all three groups six right shoulders and four left shoulder were examined by X-ray and MRI.

The mean range of flexion, abduction and external rotation for the shoulders within each group that were examined by X-ray and MRI are presented in Table 1. These ranges were all lower for the pain group compared to the other two groups. Overall, both shoulder flexion ($F=8.37$ $p=0.001$) and abduction ($F=3.86$ $p=0.03$) were significantly different between the groups. Post hoc comparisons indicated that there was a significant difference in shoulder flexion between each of the no pain and previous pain groups and the current pain group.

The no and previous pain groups did not report pain when asked to complete the SPADI, however the mean percentage score for the pain group was 41.80 (SD 20.10, range 18-74). There was no functional limitation among the no pain group, some minor functional limitations among the previous pain group (mean percent function score 1.2, SD 2.70, range 0-7.5) and the mean score for the current pain group was 31.88 (SD 20.41, range 8.75-60).

In the current pain group, 50% reported that shoulder pain stopped them going to sleep at night, 70% reported that their shoulder pain woke them up at night, and 50% reported that it was difficult to go back to sleep. When rating, on a scale of 0 (no

pain) to 10 (the worst pain imaginable) how painful their shoulder was at night, the mean score was 3.90 (SD 2.89, range 0-8). For both the previous and current pain groups, the length of time that pain had been experienced over was generally over a period over several years.

The X-ray findings are summarised in Table 2. These findings and subsequent categorizations were the subjective judgement of the reporting radiologists and based on their normal clinical practice and experience. Any discrepancy between the two radiologists was discussed and decided upon by consensus. No bone lesions or injury were evident on X-ray. There were some variations between the groups in terms of the subacromial space and GHJ arthritis, however generally there were few differences between each group.

The MRI findings are presented in Table 3. As stated above, there are no validated scoring systems for MRI scans of the shoulder, thus subjective judgement and clinical experience were again used to determine the following:

1. ACJ arthritis severity which was determined according to the degree of osteophytes, joint effusion, synovial thickening, bone oedema and articular cartilage thinning;
2. Subacromial bursitis. Mild bursitis had a sliver of fluid present or a small increase in T2 signal. Moderate bursitis, clear fluid or thickening present and severe bursitis, marked fluid distension and synovial thickening and/or the presence of rice bodies.
3. Tendon damage, which was based on standard radiological terms. Tendonosis was present if the proton density fat saturated sequence signal was increased but the T2 signal was less than that obtained if fluid was present. A partial tear – T2 signal

of defect was a fluid signal. Full thickness tear, there was a tear evident from one side to other side of tendon but not necessarily whole tendon, for a complete tear all fibres of the tendon were torn.

4. GHJ cartilage damage was classified as mild if there were small areas of cartilage thinning (<50mm thickness), moderate if areas of cartilage thinning were >50mm or more extensive involvement of <50mm areas of thinning and severe if there were larger areas of full cartilage loss.
5. Glenoid labrum tears were deemed to be small if they were less than full thickness of the labrum and not displaced. Large tears were full thickness.

Examples of a full thickness tear of the supraspinatus and severe arthrosis of the ACJ, both of which were common problems, whether or not pain was present, are shown in Figure 1 and Figure 2 respectively. Again there are few differences between groups with abnormalities such as subacromial bursitis being very common (90%) amongst each group, irrespective of presence of symptoms and 27 of the 30 participants demonstrating a degree of ACJ degeneration. No loose bodies were evident on MRI and a possible subcoracoid impingement was evident for one participant. However there may be a slightly higher number of supraspinatus tendinosis/tears and involvement of the LHB in the current pain group.

The numbers of supraspinatus, infraspinatus and subscapularis tears are also shown in Table 3. The average size of these tears was examined. In the supraspinatus there were six tears with a width and length of less than 5mm. These were removed from the analysis as a precise numeric value was unable to be obtained due to the size of the tear and the mean width and length of the remaining tears were compared

between groups using ANOVA (Table 4). There was no significant difference between groups in terms of measurable tear width or length.

For the infraspinatus two tears had a width and length of less than 5 mm while one tear in the current pain group had a width of 8mm and a length of 6mm. All ten tears of the subscapularis measured less than 5mm in width and nine tears measured less than 5 mm in length. One tear in the no pain group had a length of 6mm.

Discussion

This study, in older adults, compared those with a history of no shoulder pain, previous and current shoulder pain to determine if clinical symptoms related to MRI and X-ray findings. It has been shown that pathology exists in both symptomatic and asymptomatic shoulders when examined by either MRI or US[5, 8, 9, 10] and that the association between symptoms and pathology is poorly understood[12], particularly in older people.

Little association between clinical symptoms (shoulder pain and dysfunction) and the presence of pathology was shown in this study. While range of movement for the affected shoulder was generally lower for the current pain group, there were few differences in shoulder pathology on MRI. However, the movements that were significantly different, abduction and flexion are performed by the supraspinatus and LHB. Both of these tendons had slightly higher evidence of pathology in the current pain group, as shown by MRI.

Night pain of some kind was also present in over half of those with current pain. Night pain is often said to be an indicator of capsulitis[26], however this was only

evident in one participant, although night pain can also be associated with rotator cuff damage[27], which was common.

MRI studies of those with knee pain have allowed identification of lesions such as subchondral bone oedema which have been associated with knee pain and structural deterioration and progression of knee OA[13, 14]. Bone oedema of the GHJ and ACJ were specifically examined in this study to determine if there was a relationship with shoulder pain. GHJ bone oedema was present in a small number of participants in the previous and current pain groups however ACJ oedema was present in relatively equal numbers across all groups, indicating that bone oedema may not be specifically associated with shoulder pain. It may be bone oedema plays a more important role in knee pain due to the weight bearing nature of the knee joint.

The size of tear has also been identified as a potential cause of symptoms[5, 6]. RC tears were evident in all groups but in particular, the mean width size of supraspinatus tears in this study was higher for the current pain group compared to the other two groups however the length of tear was not. Both tear width and length may be important in the development of shoulder symptoms, however, the sample size of this study was too small to investigate this further.

Unlike many previous imaging studies of shoulders, which have relied on convenience samples from clinics or volunteers, this study utilised participants from a randomly selected population-based cohort study. A further strength of the study was the novel methodology in that a group of people with previous shoulder pain was compared to those with current or no pain, whereas previously comparisons had only been made with symptomatic or asymptomatic shoulders.

The limitations of this study were the small number of participants examined due to the constraints of the MRI costs which limited the power of the study to detect statistically significant differences between the three groups of interest. While significant differences were able to be identified between groups in the range of flexion and abduction, power calculations based on determining statistical differences in the width of the supraspinatus tear determined that, in this case, the study had only a relatively low power (34%) to detect differences of the size observed.

As we have previously alluded to, shoulder pain is common in the community. However, as a recent study of French workers demonstrated, although the overall prevalence of "shoulder pain" for men and women was 28.0% and 31.1%, respectively, the prevalence rates of rotator cuff syndrome was much lower at 6.6% and 8.5%, respectively[28]. This also consistent with the findings described above of Cadogan[12] using nerve blocks to locate the cause of shoulder pain. In comparison, MRI imaging of the knee in cohorts of symptomatic and asymptomatic older people has been fruitful in identifying causes of knee pain, such as bone marrow lesions, and potential treatment targets. However, equally, knee MRI studies have also demonstrated high prevalence of meniscal abnormalities amongst older adults, irrespective of knee symptoms[15]. This current shoulder study and others have demonstrated high prevalence of RC and ACJ abnormalities in asymptomatic individuals, but low prevalence of GHJ and cartilage/labral defects. This suggests that MRI in this research setting does not add much beyond what can be learnt from current US studies.

In conclusion, shoulder pathology is present on imaging in approximately equal proportions in people with shoulder pain, in people who have a history of shoulder

pain, and in people who have never had shoulder pain and their clinical symptoms do not necessarily match the radiological findings. The findings suggest that the value of MRI as a clinically useful diagnostic investigation for shoulder pain is questionable, particularly in older people with a high chance of incidental findings. Structural changes found on shoulder MRI scanning, particularly of the ACJ, are common, and unless shoulder surgery is being seriously contemplated, this form of expensive investigation should probably be deferred.

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Table 1: Mean range of movement of shoulder examined by MRI and X-ray for each group

	No shoulder pain	Previous shoulder pain	Current shoulder pain
Flexion*			
Mean (SD)	172.00 (6.32)	171.50 (8.83)	144.50 (27.73)
Range (Minimum-Maximum)	160-180	160-180	80-180
Abduction*			
Mean (SD)	175.00 (5.27)	178.00 (4.22)	152.00 (39.10)
Range (Minimum-Maximum	170-180	170-180	50-180
External rotation			
Mean (SD)	70.50 (12.57)	70.00 (15.63)	58.00 (22.51)
Range (Minimum-Maximum)	40-80	40-90	10-90

*Significant difference between groups ANOVA $p < 0.05$

Table 2: Summary of X-ray findings for each group

	No shoulder pain		Previous shoulder pain		Current shoulder pain	
	n	**%**	**n**	**%**	**n**	**%**
ACJ						
No arthritis	1	10.0	-	-	-	-
Mild arthritis	5	50.0	6	60.0	6	60.0
Moderate arthritis	4	40.0	4	40.0	4	40.0
ACJ osteophytes	3	30.0	3	30.0	2	20.0
Acromial spur	2	20.0	3	30.0	4	40.0
Subacromial space						
Normal/ Equivocal	9	90.0	7	70.0	7	70.0
Narrow	1	10.0	3	30.0	3	30.0
Calcific tendinosis	1	10.0	-	-	2	20.0
GHJ						
Normal	3	30.0	4	40.0	5	50.0

Mild arthritis	7	70.0	6	60.0	5	50.0

Table 2: Summary of X-ray findings for each group (cont)

	No shoulder pain		Previous shoulder pain		Current shoulder pain	
	n	**%**	**n**	**%**	**n**	**%**
Samilson Prieto classfication						
Normal	5	50.0	4	40.0	6	60.0
Mild - osteophyte < 3 mm on humeral head	5	50.0	6	60.0	4	40.0

Table 3: Summary of MRI findings for each group

	No shoulder pain		Previous shoulder pain		Current shoulder pain	
	n	**%**	**n**	**%**	**n**	**%**
ACJ						
No arthritis	2	20.0	1	10.0	-	-
Mild arthritis	2	20.0	4	40.0	3	30.0
Moderate arthritis	4	40.0	4	40.0	6	60.0
Severe arthritis	2	20.0	1	10.0	1	10.0
ACJ osteophytes	1	10.0	2	20.0	1	10.0
ACJ effusion and/or synovitis	2	20.0	1	10.0	1	10.0
ACJ bone oedema	6	60.0	4	40.0	5	50.0
Os acromiale	-	-	-	-	1	10.0
Subacromial bursitis						
None	1	10.0	1	10.0	-	-

Mild	6	60.0	6	60.0	7	70.0
Moderate	3	30.0	3	30.0	3	30.0

Table 3: Summary of MRI findings for each group (cont)

	No shoulder pain		Previous shoulder pain		Current shoulder pain	
	n	**%**	**n**	**%**	**n**	**%**
Supraspinatus						
Normal/ Equivocal	3	30.0	3	30.0	-	-
Tendinosis	1	10.0	2	20.0	2	20.0
Partial thickness tear with or without tendinosis	4	40.0	3	30.0	6	60.0
Full thickness tear with or without tendinosis	2	20.0	2	20.0	2	20.0
Infraspinatus						
Normal/ Equivocal	7	70.0	4	40.0	7	70.0
Tendinosis	3	30.0	5	50.0	1	10.0
Partial thickness tear	-	-	1	10.0	2	20.0

with or without

tendinosis

Table 3: Summary of MRI findings for each group (cont)

	No shoulder pain		Previous shoulder pain		Current shoulder pain	
	n	**%**	**n**	**%**	**n**	**%**
Subscapularis						
Normal/ Equivocal	4	40.0	3	30.0	5	50.0
Tendinosis	2	20.0	5	50.0	1	10.0
Partial thickness tear with or without tendinosis	4	40.0	2	20.0	4	40.0
Teres Minor						
Normal/ Equivocal	10	100.0	10	100.0	10	100.0
Long head of biceps						
Normal/ Equivocal	8	80.0	6	60.0	2	20.0
Tendinosis	1	10.0	3	30.0	3	30.0
Partial thickness tear with or without tendinosis	1	10.0	1	10.0	4	40.0
Full thickness Tear	-	-	-	-	1	10.0

Table 3: Summary of MRI findings for each group (cont)

	No shoulder pain		Previous shoulder pain		Current shoulder pain	
	n	**%**	**n**	**%**	**n**	**%**
GHJ cartilage						
Normal/ Equivocal	2	20.0	3	30.0	4	40.0
Mild	8	80.0	7	70.0	5	50.0
Moderate	-	-	-	-	1	10.0
GHJ subchondral bone cyst	1	10.0	-	-	1	10.0
Glenoid labrum						
Normal/ Equivocal	8	80.0	8	80.0	9	90.0
Small tear	2	20.0	2	20.0	-	-
Large tear	-	-	-	-	1	10.0
Capsulitis	-	-	-	-	1	10.0
GHJ bone oedema	-	-	1	10.0	2	20.0

Table 4: Mean width and length (mm) of tear for the supraspinatus tendon*

	No shoulder pain	Previous shoulder pain	Current shoulder pain
Supraspinatus tear width			
Mean (SD)	7.13 (3.42)	12.75 (6.90)	16.70 (8.56)
Range (Minimum-Maximum)	3.00-11.00	7.00-22.00	6.50-28.00
Supraspinatus tear length			
Mean (SD)	12.50 (10.47)	17.25 (10.01)	15.40 (8.76)
Range (Minimum-Maximum)	5.00-28.00	5.00-29.00	6.00-27.00

*No significant difference between groups in terms of supraspinatus tear width or length (ANOVA $p > 0.05$)

Figure 1: Full thickness tear (FTT) of supraspinatus

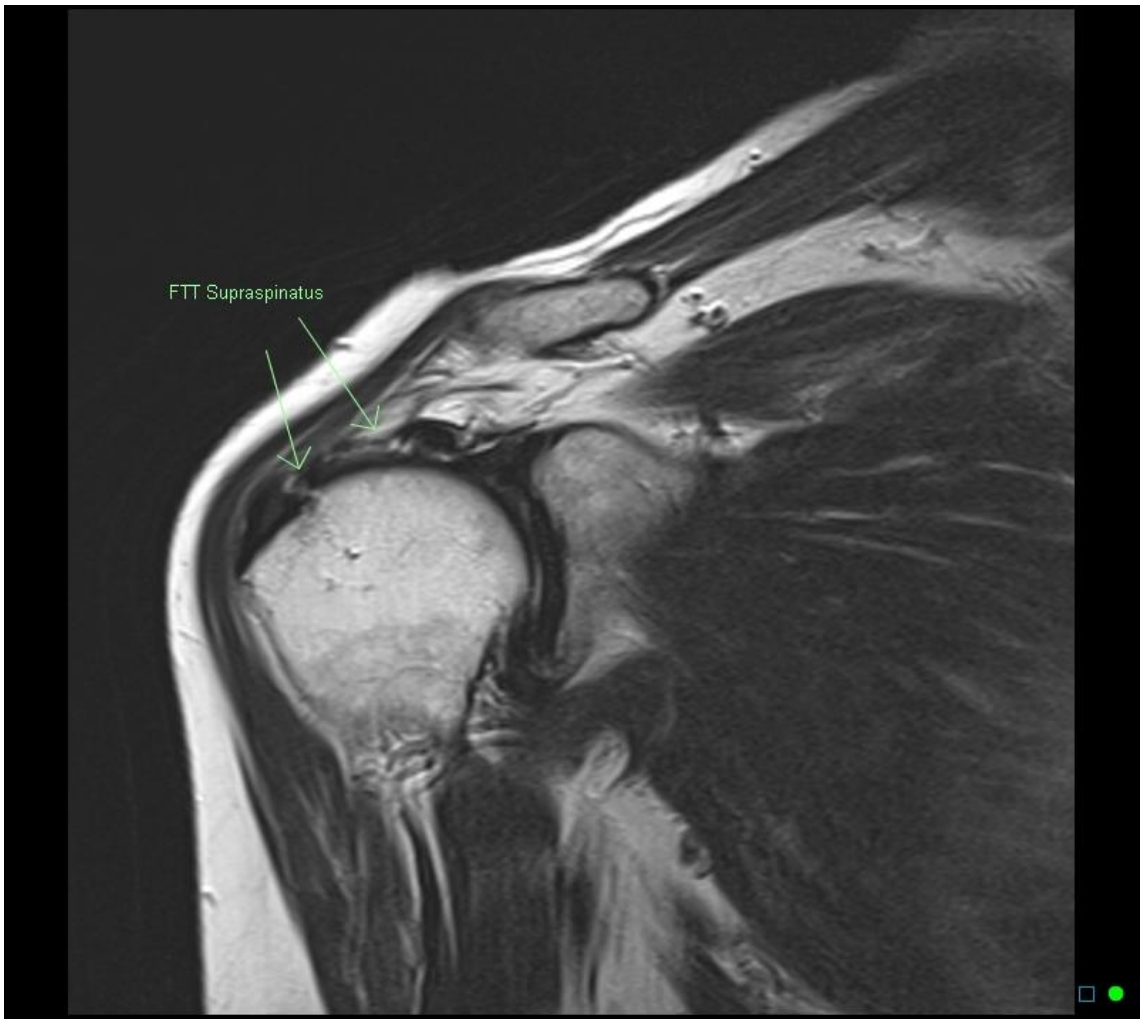

Figure 2: Severe arthrosis of the acromioclavicular joint