RESULTS

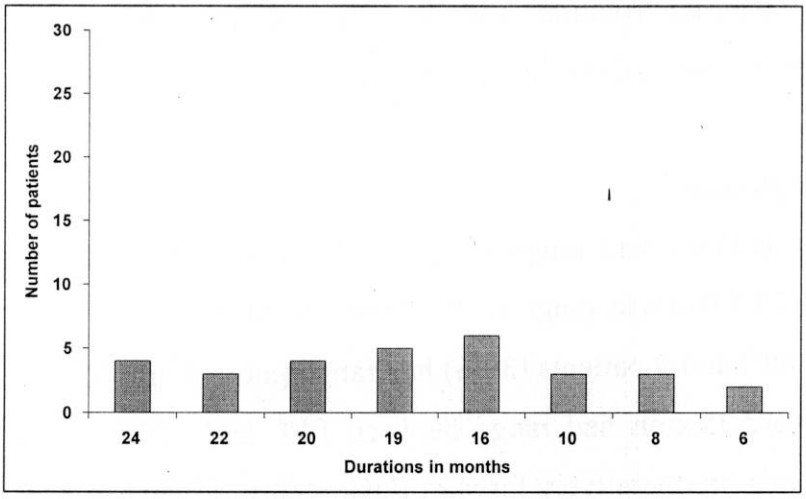
I. ASSESSMENT OF THE RESULTS

Duration of follow up:

In this study, the follow up of the patients ranged between 6 and 24 months. Four patients (13.33%) were followed up for 24 months, 3 patients (10%) for 22 months, 4 patients (13.33%) for 20 months, 5 patients (16.67%) for 19 months, 6 patients (20%) for 16 months, 3 patients (10%) for 10 months, 3 patients (10%) for 8 months, 2 patients (6.67%) for 6 months and 2 patients could not reached during follow up.

Table (8-1): Durations of follow up and the percentage of each.

Number of patients	Durations in months	Percentage
4	24	13.33 %
3	22	10 %
4	20	13.33 %
5	19	16.67 %
6	16	20 %
3	10	10 %
3	8	10 %
2	6	6.67 %



Recurrence of instability :

With follow up of the patients, we assessed the stability of the shoulders of the patients by anterior drawer and apprehension tests where all patients had negative anterior drawer test and only 2 patients had positive anterior apprehension test. Three patients (10%) developed recurrence of instability. Two patients of them had redislocation due to fall on outstretched hand in spite of proper fixation of inferior glenohumeral ligament by anchors. In the opposite side another patients had frayed and lacerated inferior glenohumeral ligament but not developed redislocation. This means that the operation gave proper results but the redislocation is due to new trauma unrelated to the procedure. The other one patient had redislocation due to removal of the shoulder immobilizer 2 weeks after the operation and resumed his normal activities. In this case, the procedure was good and detached labrum was fixated by 2 anchors properly but the time was not enough for healing and early movements especially external rotation resulted in detachment again.

Range of motion:

The range of motion was assessed postoperatively including forward flexion, external rotation and internal rotation and compared with preoperative range of motion to conclude the effect of procedure on range of motion.

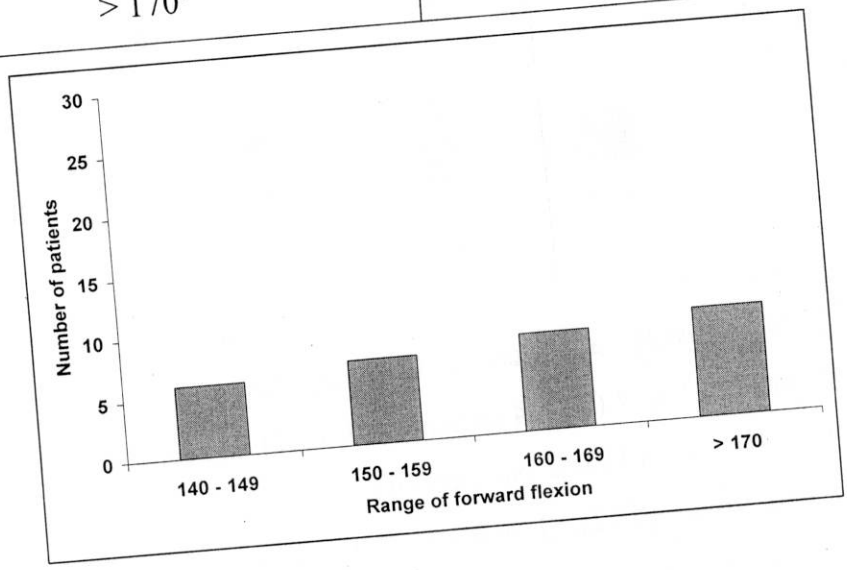
Forward flexion

Six patients had range of forward flexion (140° - 149°) (20%), 7 patients (23.33%) had range (150° - 159°), 8 patients (26.67%) had range (160° - 169°) and 9 patients (30%) had range (more than 170°). This means that forward flexion had range between 140° and 175° with an average 169.5° while preoperatively forward flexion ranged between 140° and 185°

with an average 170.5°. We concluded that the arthroscopic procedure did not affect the range of motion of forward flexion because it did not involve any dissection of muscles and cutting of capsule and this is one advantage of arthroscopic procedure.

Table (8-2): Postoperative range of forward flexion and its percentage.

Range of forward flexion	Number of patients	Percentage
140° - 149°	6	20%
150° - 159°	7	23.33%
160° - 169°	8	26.67%
> 170°	9	30%

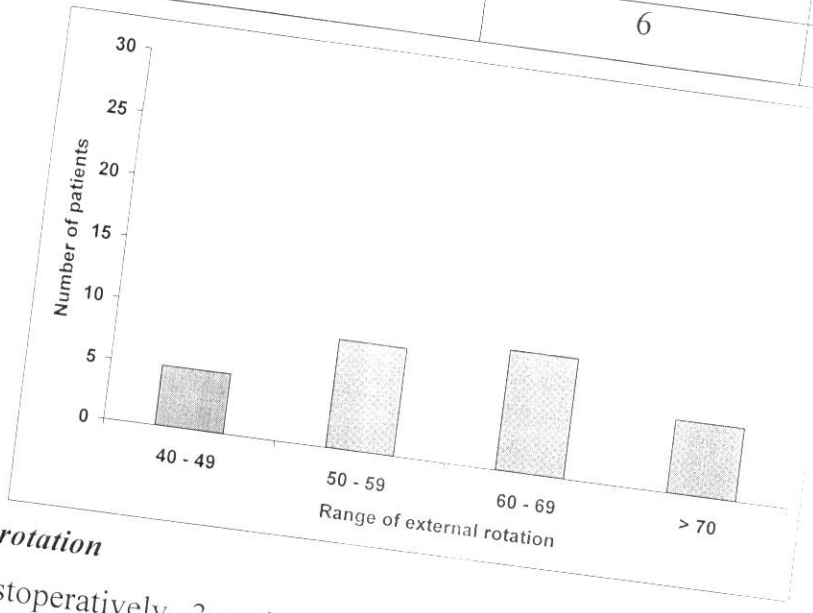


External rotation

Five patients (16.67%) had range (40° - 49°), 9 patients (30%) had range (50° - 59°), 10 patients (33.33%) had range (60° - 69°) and 6 patients (20%) had range (more than 70°). External rotation ranged between 40° and 75° with an average of 59.5°. Preoperatively it ranged between 50° and 85° with an average of 64.3°. This means that there is no difference between preoperative and postoperative range of external rotation.

Table (8-3): Postoperative range of external rotation and its percentage.

Range of external rotation	Number of patients	Percentage
40° - 49°	5	16.67 %
50° - 59°	9	30 %
60° - 69°	10	33.33 %
> 70°	6	20 %

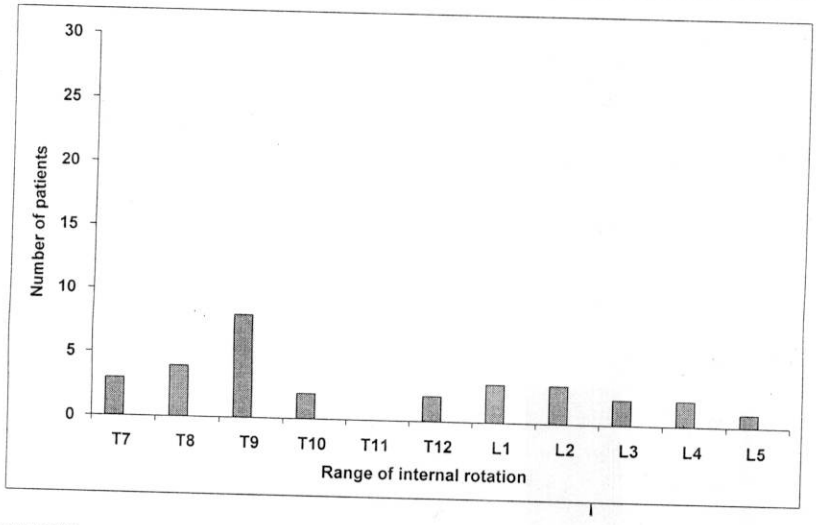


Internal rotation

Postoperatively, 3 patients (10%) had range of internal rotation at thoracic vertebra No. 7 (T7), 4 patients (13.33%) had range (T8), 8 patients (26.66%) had range (T9), 2 patients (6.67%) had range (T10), 2 patients (6.67%) had range (T12), 3 patients (10%) had range (L1), 3 patients (10%) had range (L2), 2 patients (6.67%) had range (L3), 2 patients (6.67%) had range (L4) and only one patient (3.33%) had range (L5). Internal rotation postoperatively, ranged between T7 and L5 with an average T9 and 19 patients had range above T12. Preoperatively, it ranged between T5 and L5 with an average T7 and 25 patients had range above T12. This means that there is minimal decrease in range of internal rotation.

Table (8-4): Postoperative range of internal rotation and its percentage.

Range of internal rotation	Number of patients	Percentage
T_7	3	10 %
T_8	4	13.33 %
T_9	8	26.66 %
T_{10}	2	6.67 %
T_{11}	0	0 %
T_{12}	2	6.67 %
L_1	3	10 %
L_2	3	10 %
L_3	2	6.67 %
L_4	2	6.67 %
L_5	1	3.33 %



Muscle power:

After the arthroscopic procedure the shoulder was maintained in shoulder immobilizer resulted in mild muscle atrophy so gentle pendulum exercises were started during second 3 weeks while the patient moved the affected arm forward and backward and in a circular manner. During third

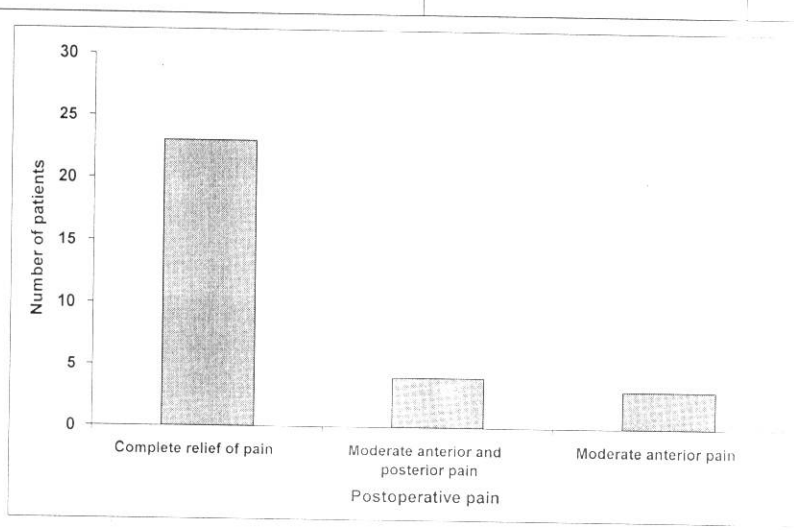
3 weeks, gradual active exercises were started with gradual increase of range of motion but external rotation beyond neutral was avoided. During fourth 3 weeks, strengthening exercises were begun to resume muscle power completely. In this study, muscle power returned to normal in 28 patients (93.33%) while only 2 patients (6.67%) had mild muscle atrophy. This means that arthroscopic procedure does not affect the muscle power because no dissection of muscles and this is one of advantages of the procedure.

Pain:

Twenty three patients (76.66%) had complete relief of pain, 4 patients (13.34%) had moderate anterior and posterior pain and 3 patients (10%) had moderate anterior pain.

Table (8-5): Postoperative pain and its percentage.

Postoperative pain	Number of patients	Percentage
Complete relief of pain	23	76.66 %
Moderate anterior and posterior pain	4	13.34 %
Moderate anterior pain	3	10 %



Complications :

1. Recurrence

Three patients (10%) had redislocation of the shoulder. Two patients had poor quality of the inferior glenohumeral ligament and had redislocation due to fall on outstretched hand. The other one had redislocation due to early removal of the shoulder immobilizer 2 weeks after the operation.

2. Infection

Two patients (6.66%) had infection of the posterior skin incision. The first one had superficial skin infection and responded to repeated dressing and antibiotics and the infection disappeared within 10 days. The second one was treated by surgical debridement of the wound and the infection disappeared after longer time.

3- Neuropraxia

We used the traction apparatus and weights to distract the articular surface of the humeral head away from the glenoid. In 2 cases, we used excessive weights and the procedure was prolonged due to narrow joint space resulted in overstretch the brachial plexus and neuropraxia. The patients had parathesia and tingling of the hand involving the dermatome of median, redial and ulnar nerves. The patients were treated by neurotonics and recovered within few weeks without any residual effects.

Also through the posterior approach, the suprascapular and axillary nerves may be injured but in this study this was avoided by strict adherence to the landmarks of the posterior portal.

4- Articular cartilage damage

Abrasion of the articular cartilage of the glenoid cavity was happened in one case due to narrow joint space. But with follow up, the patient had no pain and no limitation of movement.

5- Fluid extravasation

In two cases, the time spent on the procedure was prolonged and significant amount of fluid was extravasated through interstitial tissues. This increased the distance between skin and capsule entrance resulted in shortening the instrument's working space and the instruments were slit out of the capsule. The procedure was not proper. With postoperative follow up, the extravasation was subsided and the patients resumed full range of movement.

6- Deep venous thrombosis

As general, the incidence of postoperative venous thrombosis after shoulder arthroscopy is very low and in this study, no patient had deep venous thrombosis. It may be happened in arthroscopic procedure of the lower extremity and is usually due to the suspicion of a hypercoagulable state or a pathological extrinsic mass causing venous occlusion.

7- Synovial fistula

In this study, none of patients had developed synovial fistula where diagnosis of synovial fistula required that the patient fulfill the following four criteria

a) have persistent serous drainge from an arthroscopic portal for more than 7 days postoperatively.

b) have markedly increased drainge on movement due to increased intraarticular pressure.

c) have no evidence of septic arthritis.

II. SCORING OF THE RESULTS

The postoperative results are evaluated by shoulder scoring systems which are designed to measure the effectiveness of management in different shoulder conditions. There are various scoring systems as the University of California at Los Anglos scoring system (UCLA) (1969) which is based on three items (pain, motion and function).

Table (8-6): University of California at Los Anglos scoring system (UCLA)

Pain	
No pain	10
Occasional and slight	8
With heavy activity	5
None or little at rest	4
Constant, bearable ± strong medication	2
Constant, unbearable ± strong medication	1
Motion	
Normal muscle power / near normal motion	10
Good or normal, FF 140° , ER 20°	8
Fair or good, FF 90° , IR 90°	5
Poor or fair, FF 60° , IR 45°	4
Ankylosis with good position	2
Ankylosis with deformity	1
Function	
Normal activities	10
Slight restriction, able to work above shoulder	8
Most housework, wash hair, driving	5
Light house work	4
Very light activities only	2
Unable to use arm	1

FF Forward flexion

ER External rotation

IR Internal rotation

Another scoring system is applied and modified by American Shoulder and Elbow Surgeons (ASES) (1974). It is based on pain, function and stability instead of motion.

Table (8-7): American Shoulder and Elbow Surgeons (ASES) scoring system

Pain	
None	5
Slight	4
After unusual activity	3
Moderate	2
Marked	1
Complete disability	0
Stability	
Normal	5
Apprehension	4
Rare subluxation	3
Recurrent subluxation	2
Recurrent dislocation	1
Fixed dislocation	0
Function	
Normal	4
Mild compromise	3
With difficulty	2
With aid	1
Unable	0

Rowe et al., (1978) applied another scoring system called Rowe's scoring system which is based on stability, motion and function but no pain.

Table (8-8): Rowe's scoring system

Stability	
No recurrence	50
Apprehension in certain positions	30
Subluxation	10
Recurrent dislocation	0
Motion	
100% ER, IR and FF	20
75% ER, IR and FF	15
50% ER, 75% IR and FF	5
50% FF and IR, no ER	0
Function	
No limitation of work / sport, no pain	30
Minimal limitation and discomfort	25
Moderate limitation and discomfort	10
Marked limitation / pain	0

FF Forward flexion

ER External rotation

IR Internal rotation

This scoring system was modified by ***Jobe et al., (1991)*** by adding pain as an item and is called Modified Rowe's scoring system.

Table (8-9): Modified Rowe's scoring system

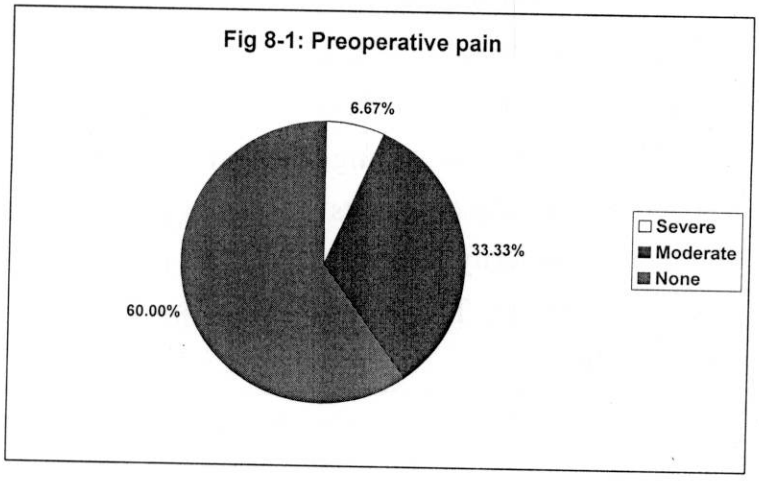
Pain	
None	10
Moderate	5
Severe	0
Stability	
Negative apprehension test, no subluxation	30
Negative apprehension test, but discomfort with arm in abducted and externally rotated position	15
Positive apprehension test and / or sense of subluxation	0
Motion	
Full range of motion	10
As much as 25% loss of motion in any plane	5
More than 25% loss of motion in any plane	0
Function	
No limitation in sports or work, able to throw baseball and football, can swim crawl stroke	50
No limitation in work, not the same in throwing baseball, serving forcefully in tennis, swimming crawl stroke	40
No limitation in work, not able to return to sports	35
Moderate limitation in work, throwing baseball and football, swimming crawl work, serving in tennis	20
Marked limitation in throwing and in all sports, unable to work overhead	0
Maximum score	100 points
Excellent	90 to 100 points
Good	70 to 89 points
Fair	40 to 69 points
Poor	39 points or fewer

The Modified Rowe's scoring system is the most popularity used scoring system for anterior shoulder instability because it covers the items required for proper assessment of the treatment of anterior shoulder instability. It was chosen to score the results of this study.

1) Pain

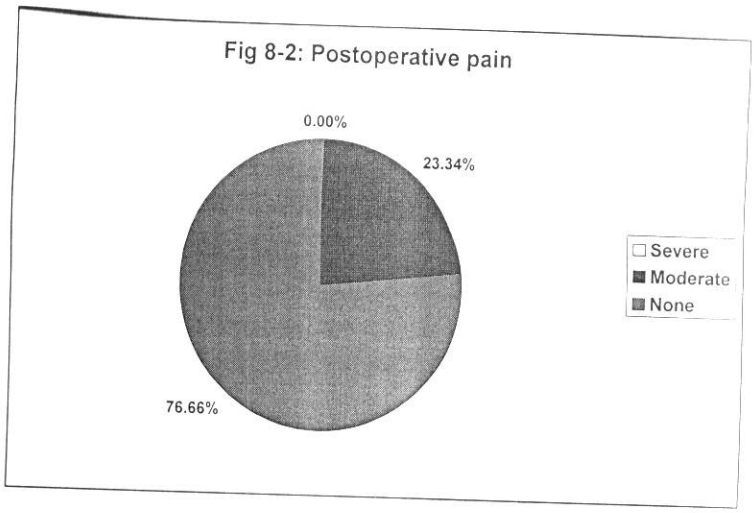
Preoperative pain:

As general, pain is not the main complaint of patients with anterior shoulder instability but the feeling of insecurity is considered the main complaint. In this study, 18 patients (60%) had no pain and each of which was given 10 points. Ten patients (33.33%) had moderate pain especially with extreme external rotation and forward flexion and 5 points were given for each. Only 2 patients (6.67%) had severe pain in the resting position increased with movements and each of which was given no points. The average points for preoperative pain was 7.66 points out of 10.



Postoperative pain:

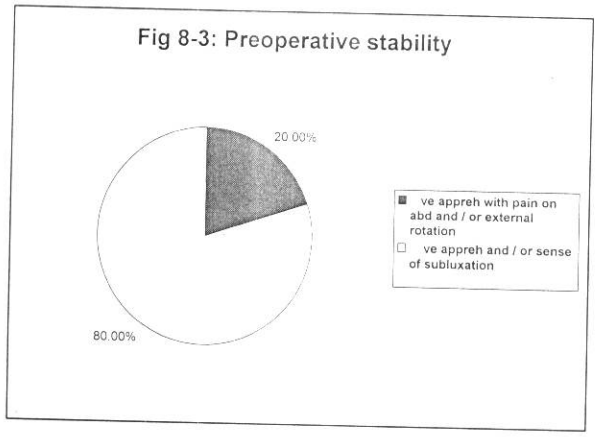
After the arthroscopic procedure, 23 patients (76.66%) had no pain even with extreme range of movement and each of which was given 10 points. Seven patients (23.34%) had moderate pain and each of which was given 5 points. While no patients had severe pain. The average points for postoperative pain was 8.83 points out of 10.



2) Stability

Preoperative stability:

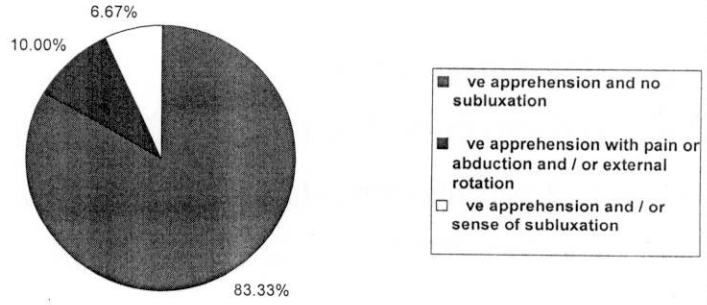
Six patients (20%) had negative apprehension test where the arm was held in 90 degrees abduction and external rotation with the forearm pulled or pushed dorsally and the examiner's other hand stabilized the back of the shoulder. The patients feel that the shoulders were stable not get ready to dislocate but feel only discomfort. Each of which was given 15 points. Twenty four patients (80%) had positive apprehension test where the patients feel the shoulders were getting ready to dislocate and / or positive sense of subluxation and these patients were given no points. This means that the feeling of insecurity not the pain was the main complaint of anterior shoulder instability. The average points for preoperative stability was 3 points out of 30.



Postoperative stability:

Twenty five patients (83.33%) had negative apprehension test where they did not feel that the shoulders were getting ready to dislocate with abduction and external rotation of the arm and no sense of subluxation. Each was given 30 points. Three patients (10%) had also negative apprehension test but feel pain on abduction and / or external rotation with 15 points were given to each. Only two patients (6.67%) had positive apprehension and / or sense of subluxation and no points were given. These patients had poor reattachment of anteroinferior glenoid labrum because it was frayed. The average points for postoperative stability was 26.6 points out of 30. This means that arthroscopic procedure improved the stability very well.

Fig 8-4: Postoperative stability

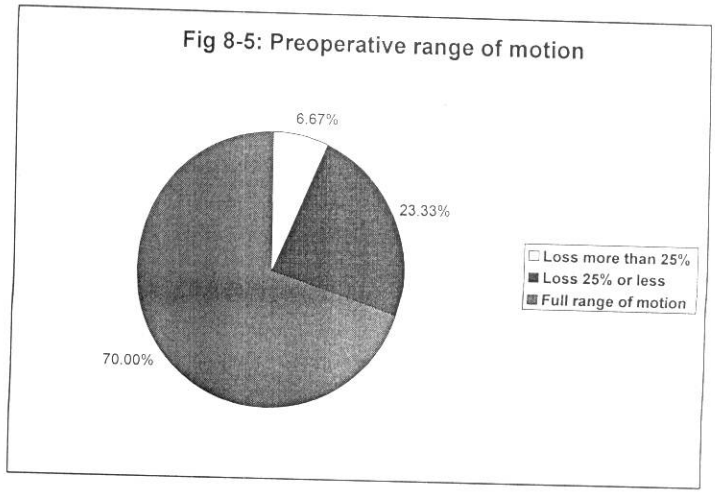


3) Range of motion

Preoperative range of motion:

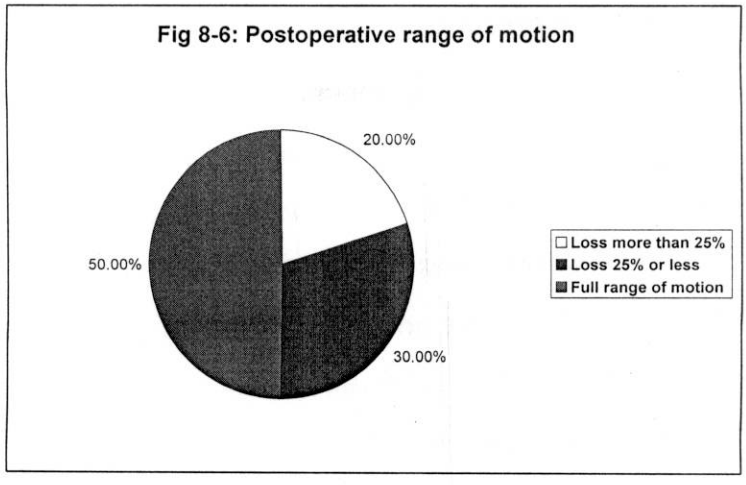
Twenty one patients (70%) had full range of motion involving forward flexion, external rotation and internal rotation. Each of which was given 10 points. Seven patients (23.33%) had a loss of 25% or less of range in any plane where 4 patients lost 25% or less of external rotation and 3

patients lost 25% or less of forward flexion. Each of which was given 5 points. Two patients (6.67%) had a loss of more than 25% of external rotation with no points were given. The average points for preoperative range of motion was 8.1 points out of 10. This means that the anterior shoulder instability did not affect the range of motion obviously.



Postoperative range of motion:

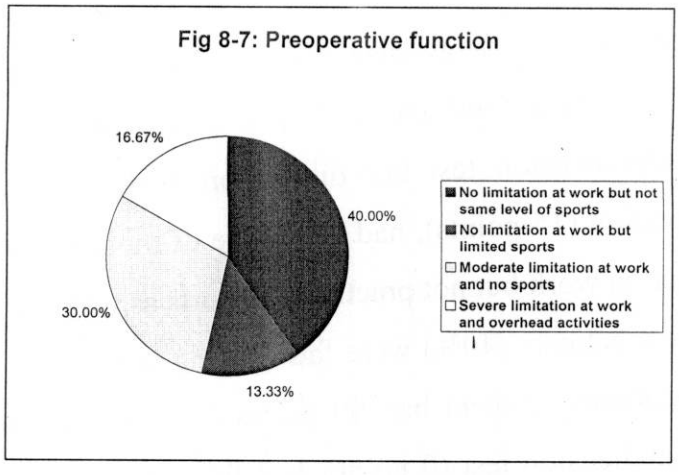
Fifteen patients (50%) had a full range of motion and 10 points were given to each. 9 patients (30%) had a loss of 25% or less in any plane where 5 patients lost 25% or less of external rotation and 4 patients lost 25% or less of forward flexion and each was given 5 points. 6 patients (20%) had a loss of more than 25% in any plane where 4 patients lost more than 25% of external rotation and 2 patients lost more than 25% of forward flexion. Each of which was given no points. The average points for postoperative range of motion was 6.5 points out of 10. This means that the arthroscopic procedure did not affect the range of motion because there were no dissection of muscles, no cutting of capsule and no skin incision.



4) Function

Preoperative function:

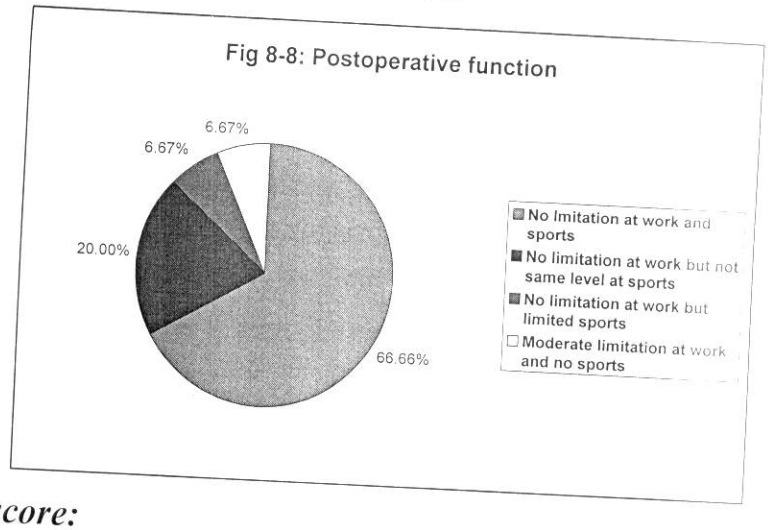
Twelve patients (40%) had no limitation at work but could not practise some sports as previously. Each was given 40 points. 4 patients (13.33%) had no limitation at work but could not practise sports and each was given 35 points. 9 patients (30%) had moderate limitation at work and could not practise sports and each was given 20 points. 5 patients (16.67%) had marked limitation at work and could not work overhead and these were given no points. The average points for preoperative function was 33.3 points out of 50.



Postoperative function:

Twenty patients (66.66%) had no limitation at work and were able to practise sports with no limitation. Each was given 50 points. 6 patients (20%) had no limitation at work and were able to practise sports but not to the same level and each was given 40 points. 2 patients (6.67%) had no limitation at work but were not able to practise sports and were given 35 points. 2 patients (6.67%) had moderate limitation at work and could not practise sports and each was given 20 points. The average points for postoperatvie function was 45 points out of 50.

Fig 8-8: Postoperative function



The average score:

In this study, the average preoperative score was 52.06 where 6 patients (20%) were good having 75 points (they had no pain (10 points), negative apprehension test but discomfort with arm in abduction and external rotation (15 points), had full range of motion (10 points) and had no limitation in work but not practise the sports as well (40 points)).

Twelve patients (40%) were fair (having score inbetween 40 and 69 points). 6 patients of them had 60 points (they had no pain (10 points), positive apprehension test (0 point), had full range of motion (10 points) and had no limitation in work but limited in sports (40 points)). 4 patients

of them had 55 points (they had no pain (10 points), had positive apprehension test (0 point), had full range of motion (10 points) and had no limitation in work but not able to return to sports (35 points)). 2 patients of them had 40 points (they had no pain (10 points), had positive apprehension test (0 point), had full range of motion (10 points) and had moderate limitation in work (20 points)).

Twelve patients (40%) were poor (having score 39 points or fewer). 3 patients of them had 35 points (they had moderate pain (5 points), had positive apprehension test (0 point), had full range of motion (10 points) and had moderate limitation in work (20 points)). 2 patients of them had 30 points (they had moderate pain (5 points), had positive apprehension test (0 point), had limitation 25% of range of motion (5 points) and had moderate limitation in work (20 points)). 2 patients of them had 20 points (they had severe pain (0 point), had positive apprehension test (0 point), had loss more than 25% of range of motion (0 point) and had moderate limitation in work (20 points)). 5 patients of them had 10 points (they had moderate pain (5 points), had positive apprehension test (0 point), had loss 25% or less of range of motion (5 points) and had marked limitation in practice of sports (0 point)).

Postoperatively, the average score was 86.93 where 20 patients (66.6%) were excellent (having score above 90 points). 15 patients of them had 100 points (they had no pain (10 points), had negative apprehension test (30 points), had full range of motion (10 points) and had no limitation in work and sports (50 points)). 5 patients of them had 95 points (they had no pain (10 points), had negative apprehension test (30 points), lost 25% or less of range of motion (5 points) and had no limitation in work and sports (50 points)).

Five patients (16.6%) were good (having score inbetween 70 and 89 points). 3 patients of them had 85 points (they had no pain (10 points), had negative apprehension test (30 points), lost 25% or less of range of motion (5 points) and had no limitation in work but limitation in sports (40 points)). One patient of them had 80 points (they had moderate pain (5 points), had negative apprehension test (30 points), lost less than 25% of range of motion (5 points) and had no limitation in work but limitation in sports (40 points)). One patient of them had 75 points (they had moderate pain (5 points), had negative apprehension test (30 points), lost more than 25% of range of motion (0 point) and had limitation in work but limitation in sports (40 points)).

Four patients (13.4%) were fair (having score inbetween 40 and 69 points). One patient of them had 60 points (had moderate pain (5 points), had negative apprehension test but discomfort in abduction and external rotation of arm (15 points), lost more than 25% of range of motion(0 point) and had no limitation in work but limitation in sports (40 points)). One patient of them had 55 points (they had moderate pain (5 points), had negative apprehension test but discomfort with abduction and external rotation of the arm (15 points), lost more than 25% of range of motion (0 point) and had no limitation in work but not able to return to sports (35 points)). 2 patients of them had 40 points (they had moderate pain (5 points), had negative apprehension test but discomfort with abduction and external rotation of arm (15 points), lost more than 25% of range of motion (0 point) and had moderate limitation in work and sports (20 points)).

Only one patient (3.4%) was poor (25 points) (he had moderate pain (5 points), had positive apprehension test (0 point), lost more than 25% of range of motion (0 point) and had moderate limitation in work and sports (20 points)).

Table (8-10): Pre and postoperative scores according to Modified Rowe's scoring system

Patients	Preoperative					Postoperative				
No	Pain	Stability	ROM	Fun	Total	Pain	Stability	ROM	Fun	Total
1.	10	15	10	40	75	10	30	10	50	100
2.	10	0	10	35	55	10	30	10	50	100
3.	5	0	5	20	30	10	30	5	50	95
4.	10	0	10	35	55	10	30	10	50	100
5.	10	15	10	40	75	10	30	10	50	100
6.	10	0	10	20	40	10	30	5	50	95
7.	5	0	5	0	10	5	15	0	35	55
8.	10	0	10	40	60	10	30	10	50	100
9.	10	0	10	40	60	10	30	10	50	100
10.	10	0	10	40	60	10	30	10	50	100
11.	5	0	5	0	10	5	15	0	20	40
12.	10	0	10	20	40	10	30	5	50	95
13.	5	0	10	20	35	10	30	5	40	85
14.	10	15	10	40	75	10	30	10	50	100
15.	10	0	10	40	60	10	30	10	50	100
16.	0	0	0	20	20	5	0	0	20	25
17.	5	0	5	0	10	10	30	5	50	95
18.	10	15	10	40	75	10	30	10	50	100
19.	10	0	10	35	55	10	30	5	50	95
20.	10	0	10	35	55	10	30	10	50	100

Patients	Preoperative					Postoperative				
No	Pain	Stability	ROM	Fun	Total	Pain	Stability	ROM	Fun	Total
21.	0	0	0	20	20	5	15	0	20	40
22.	5	0	5	0	10	5	15	0	40	60
23.	10	15	10	40	75	10	30	10	50	100
24.	5	0	5	0	10	5	30	5	40	80
25.	10	0	10	40	60	10	30	10	50	100
26.	5	0	10	20	35	10	30	5	40	85
27.	5	0	5	20	30	5	30	0	40	75
28.	10	15	10	40	75	10	30	10	50	100
29.	10	0	10	40	60	10	30	10	50	100
30.	5	0	10	20	35	10	30	5	40	85
Average points	7.66	3	8.1	33.3	**52.06**	8.83	26.6	6.5	45	**86.93**