Outcome of arthroscopic rotator cuff repair in different age groups

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Background

There are numerous reports on the outcome of rotator cuff repair, but few have considered age as a factor affecting functional outcome.

Hypothesis

Age does not affect the anatomical and functional outcomes of rotator cuff repair.

Patients and methods

Twenty-eight patients with arthroscopic rotator cuff repair belonging to three different age groups were prospectively enrolled in the study and were followed up for at least 18 months after surgery. Various clinical features according to age were evaluated. The correlation was assessed between age and outcome, with adjustment for the preoperative score.

Results

The patient mean age was 61.6 years. There was marked improvement in postoperative pain (from 8.2 to 2.3) ($P<0.0001$). The mean Oxford Score showed significant improvement from 22.8 ± 4 preoperatively to 38.3 ± 4 postoperatively ($P<0.001$). The Constant Score also showed a significant improvement from 43.9 ± 10 to 81 ± 4 ($P<0.001$).

Conclusion

There was marked improvement after arthroscopic rotator cuff repair in all age groups. Multivariate regression revealed that age was not correlated with postoperative pain, satisfaction, or functional outcome.

Keywords:

arthroscopic repair, rotator cuff different ages, rotator cuff repair

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Introduction

In the last two decades, rotator cuff pathology has become an increasingly common diagnosis for patients with a painful shoulder. It is one of the most common causes of shoulder pain and dysfunction. However, the exact prevalence is not well known; reports suggest a wide range between 5 and 31% of the population, with incidence increasing with age [1].

Rotator cuff disorders substantially affect the quality of life, including disorders in activities of daily living, altered sleep patterns, and adverse impact on work and recreation. This impact ranges from chronic low-level nuisance to unremitting and severe pain and disability. Some patients become physically dependent as they are unable to utilize the operated extremity for activities of daily living. This is a particular burden in the elderly, especially for patients who are living alone and independently [2,3].

Multiple factors including sex [4], smoking [5], larger tear size [6], poor tendon quality, and fatty degeneration of the cuff [7] were shown to affect the healing and clinical outcome after rotator cuff repair.

The literature does not have enough data on age as a factor affecting the clinical outcome after arthroscopic rotator cuff repair. Few studies have focused on results in younger age groups [8,9].

Patients and methods

Between January 2008 and January 2010, 28 patients, comprising 28 shoulders, who underwent arthroscopic rotator cuff repair at Benha university hospital were prospectively included in the study. Originally, 32 patients were recruited, but four of them were later excluded: two because of an associated slap tear that was discovered during arthroscopy, which was repaired, and the other two because they passed away during the course of follow-up.

The patients' ages ranged between 50 and 75 years, with an average age of 61.6 years. They were divided into three age groups, as shown in Chart 1.

To be included in the study, patients had to have symptomatic full-thickness rotator cuff tear that had

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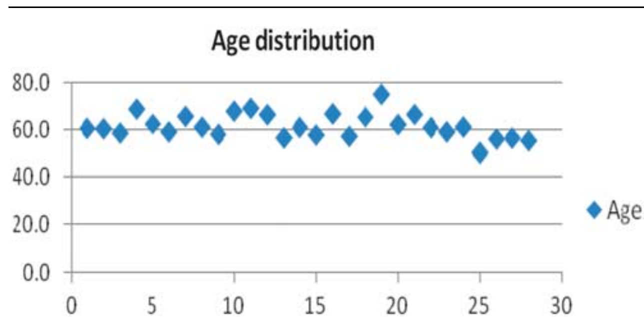
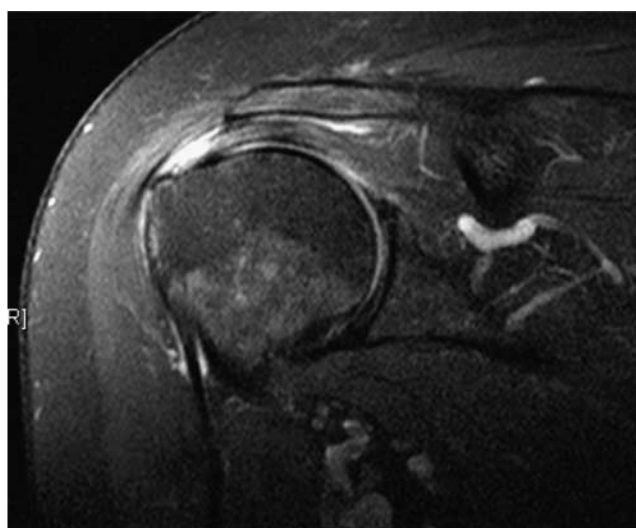
Chart 1



Age distribution, the three age groups.

Figure 1



Preoperative MRI showing the rotator cuff tear.

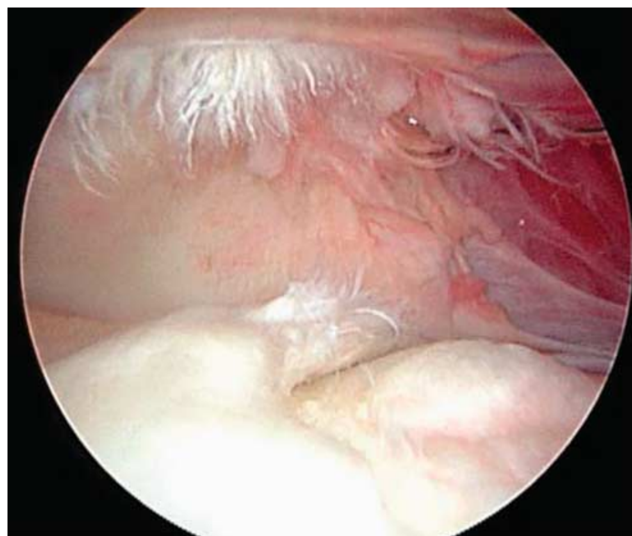
failed conservative treatment for at least 6 months. Those who had undergone surgery previously on the affected shoulder or had advanced arthritic changes or associated glenohumeral pathology, or severe fatty infiltration (Goutelier grade IV), or massive irrepairable rotator cuff tear were excluded.

Patient assessment

At the preoperative visit, all patients underwent standard history taking and a physical examination, as well as imaging studies including bilateral anteroposterior radiographs of the shoulder and supraspinatus outlet radiographs. All patients underwent an MRI scan on the affected side, which confirmed a defect at the tendinous portion of the rotator cuff (Fig. 1). However, the tear size and pattern were determined during diagnostic arthroscopy (Fig. 2).

All patients were assessed with a visual analog scale (VAS) for pain, as well as with the Constant–Murley Score [10], the Oxford Shoulder Score [11], and a satisfaction score

Figure 2



Diagnostic arthroscopy showing the tear size and pattern.

preoperatively and at the time of final follow-up at an average of 24 months (range from 18 to 30 months).

The Constant–Murley Score combines physical examination results with subjective evaluations by the patients. The subjective assessment consists of 35 points, and the remaining 65 points are assigned for the physical examination assessment. The subjective assessment includes a single item for pain (15 points) and four items for activities of daily living (work, 4; sport, 4; sleep, 2; and positioning the hand in space, 10 points). The objective assessment includes range of motion (forward elevation, 10 points; lateral elevation, 10 points; internal rotation, 10 points; and external rotation, 10 points) and power (scoring based on the number of pounds of pull the patient can resist in abduction to a maximum of 25 points). The total possible score is therefore 100 points [10].

The Oxford Shoulder Score is a shoulder-specific scoring system that was developed by Dawson and colleagues in 1996 for use in painful shoulder conditions secondary to inflammatory or degenerative processes that depend only on the patient's subjective assessment. This questionnaire consists of 12 items and has been shown to be internally consistent, reproducible, valid, and sensitive to clinical changes [12]. Each item is scored from 0 to 4, with 4 representing the best score achievable. When all 12 items are summarized the total score ranges from 0 (worst score) to 48 (best score) [11].

Surgical procedure

All procedures were performed with the patient under general anesthesia in the beach-chair position. A posterior portal was established for the initial assessment of the glenohumeral joint. The tear size and presence of delamination were carefully determined. The arthroscope was then removed from the glenohumeral joint and redirected into the subacromial space. A lateral portal and

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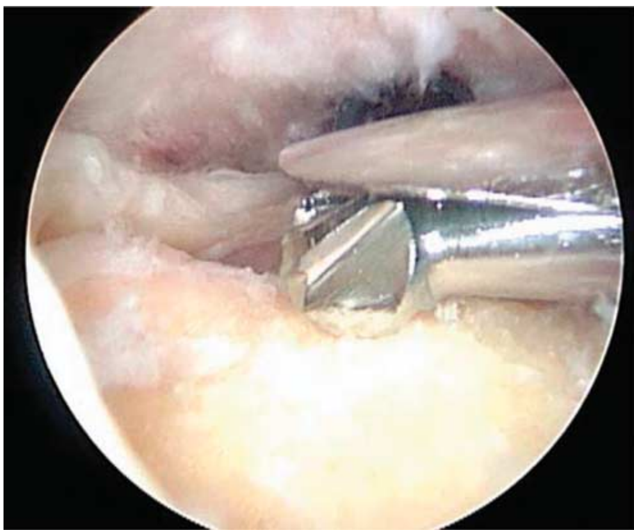
a posterolateral portal were also established. Any pathological bursal tissue that impeded clearance of the space was removed, and arthroscopic subacromial decompression was performed to create a flat acromial undersurface in all patients.

Mainly, the posterolateral portal was used as the viewing portal in these procedures. The tear size and pattern were again evaluated, and the mobility and reparability of the torn cuff were estimated. If the mobility of the tendon was insufficient in larger tears, a tendon mobilization procedure, including a partial or entire capsulotomy and coracohumeral ligament release, was performed before the repair. The footprint of the greater tuberosity was debrided to expose the cortical bone (Fig. 3). The tendon-to-bone fixation technique varied according to the tear size and quality of the cuff tissue (Fig. 4a and b). In 10 patients the tear size was small (<1 cm) and in seven the tear size was medium (1–3 cm) with good tissue quality; hence, repair was carried out using one or two metal suture anchors (Fastin RC 5.0; DePuy Mitek) in a single-row configuration.

In the remaining 11 patients, seven had medium-sized tears with fair cuff quality and four had large tears (3–5 cm), which were repaired by a double-row suture bridge technique with two 5.5 mm Healix anchors (DePuy Mitek) used in the medial row and one Versalok (DePuy Mitek) anchor in the lateral row. A postoperative plain radiograph was taken for all patients to assess anchor position (Fig. 5).

Figure 3



The footprint of the greater tuberosity was debrided to expose the cortical bone.

Postoperative rehabilitation

A three-phase protocol is recommended by the AAOS [13].

Phase 1: passive range of motion phase (postoperative weeks 1–6).

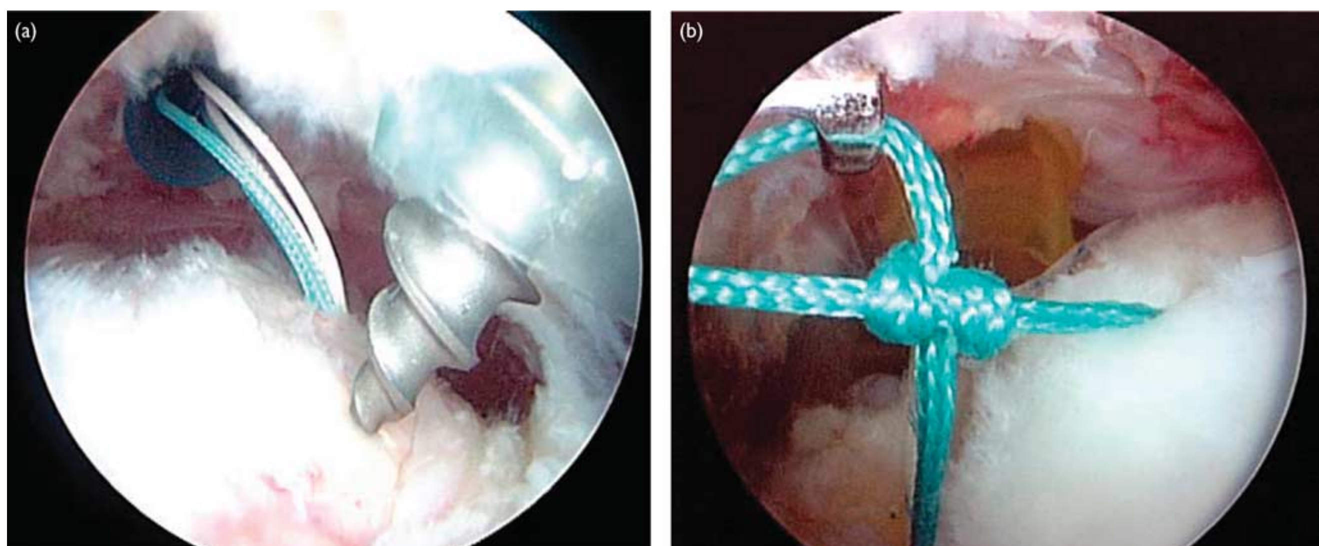
Phase II: active range of motion phase (postoperative weeks 6–12).

Stage III: active range and strengthening exercises (postoperative weeks 12–16).

Results

The mean follow-up period was 24 months (12–40 months). There was no mortality in the early postoperative period. Mortality 6 months after surgery involved seven patients (23.3%).

Figure 4



(a) Anchor placement; (b) knot tying.

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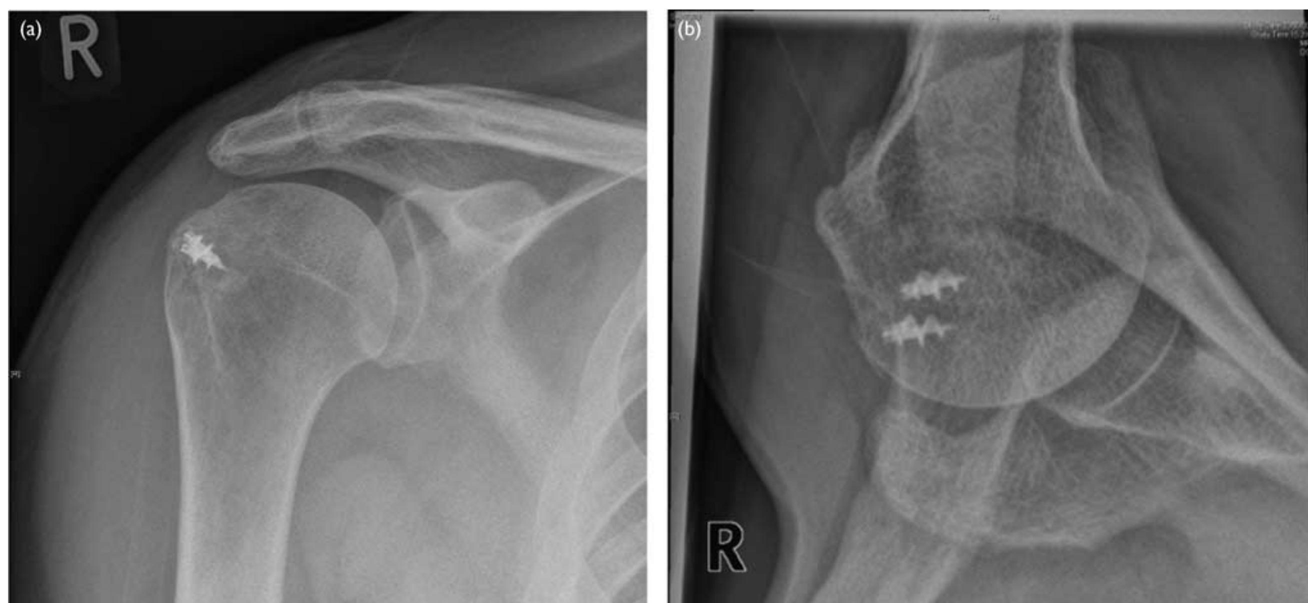
Figure 5



Postoperative radiograph; (a) anteroposterior and (b) axillary view.

Table 1 Showing distribution of the three patients group according to age

Age group	Frequency	(%)
50–60	11	39.3
60–65	8	28.6
65–75	9	32.1
Total	28	100

Twenty of the 30 surviving patients were evaluated clinically and radiographically as three patients missed follow-up.

We assessed the results according to Judet's point system for grading disability.

For the purpose of assessing the effect of patient age on clinical results, the patients were divided into three groups as shown in Table 1.

Pain

Significant postoperative pain relief was seen in all cases ($P<0.0001$). Pain was measured on VAS and graded from 0 to 10, where 0 indicated no pain and 10 indicated unbearable pain. The mean preoperative pain score was 8.2 (ranging from 7 to 10), which reduced to 2.3 (from 0 to 5) postoperatively. Although the oldest group had a lower level of pain (2.33), this difference did not reach statistical significance ($P=0.1$). There was no correlation between postoperative pain and patient age.

Patient satisfaction

Satisfaction was measured on the VAS and ranged from 0 to 10, with 0 indicating not satisfied and 10 indicating completely satisfied. Seven patients (25%) were completely satisfied and gave the maximal satisfaction score of 10; 16 patients (57.1%) were very satisfied with the outcome of the operation and the rest (17.9%) were somewhat satisfied.

Functional results

Constant and Oxford Shoulder Scores

The mean Oxford Score showed significant improvement ($P<0.001$) from 22.8 ± 4 preoperatively to 38.3 ± 4 postoperatively. The Constant Score also showed a significant improvement ($P<0.001$), from 43.9 ± 10 to 81 ± 4. There was no correlation between postoperative Oxford Scores and age, tear size, quality of cuff tissue, and fixation technique. All these results (pain, patient satisfaction, and functional results) are presented in Table 2.

Discussion

Although there is growing awareness about the high prevalence of rotator cuff disease and the heavy burden of its disability, there is no agreement on clear guidelines of management based on high grades of evidence-based studies [14].

Given the difficulties associated with rotator cuff repair in elderly individuals, some researchers have advocated the use of decompression and debridement for full-thickness cuff tears unresponsive to conservative treatment [15]. Rotator cuff reconstruction, however, has been shown to provide consistently better results than debridement alone [16].

The quality and function of rotator cuff muscles are known to deteriorate as age increases [5,14,16]. In addition, the incidence of rotator cuff tear is known to

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Table 2 Results (pain, patient satisfaction, and functional results) in relation to age groups

Age groups	Postoperative pain Score	Satisfaction Score	Postoperative Oxford Score	Postoperative Constant Score
Age (50–60)				
Mean	2.27	8.82	39.45	82.09
N	11	11	11	11
SD	1.348	1.250	4.204	5.431
Age (60–65)				
Mean	2.50	8.50	37.38	80.50
N	8	8	8	8
SD	1.195	1.195	3.662	5.806
Age (65–75)				
Mean	2.33	8.44	37.78	80.33
N	9	9	9	9
SD	1.414	1.014	4.658	3.202
Total				
Mean	2.36	8.61	38.32	81.07
N	28	28	28	28
SD	1.283	1.133	4.164	4.838

increase with age, even in the asymptomatic population [9]. Therefore, clarifying outcomes based on age is indispensable for timing and prognosis of effective treatment.

There are numerous reports on age and outcome of repair, but many of them are case series that refer to outcomes for a certain age group, mostly younger age groups. There are very few case series on older age groups.

The correlation between patient age and outcome of rotator cuff repair was studied by Osti *et al.* [17] in 28 patients over 65 years of age and in 28 patients below 65 years. There was no statistical difference in functional outcome between the two groups. Verma *et al.* [18] studied arthroscopic rotator repair in 39 patients over 70 years of age. The pain score on the VAS improved from 4.6 ± 2.2 to 0.5 ± 0.9 ($P < 0.0001$), and forward elevation increased from 114.8 ± 42.0 to $146.2 \pm 33.2°$ ($P = 0.0012$). Mean age-matched and sex-matched normalized Constant–Murley Scores ranged from 88.3 to 97.2% of normal in men and from 81.7 to 88.8% of normal in women. The results of the above studies are consistent with those of the current study. Our patients were divided into three age groups (below 60 years, between 60 and 65, and above 65 years). At final follow-up, although the younger age group had better Constant Scores (82 vs. 80 and 80.2, respectively) and better Oxford Shoulder Scores (39.4 vs. 37 and 37.2, respectively), as well as more strength at elevation and less pain with a higher satisfaction score, the difference is too small to be of statistical significance. These results support the fact that there is no age limit for rotator cuff repair.

Conclusion

There was marked improvement after arthroscopic rotator cuff repair in all age groups. Multivariate regression revealed that age was not correlated with postoperative pain, satisfaction, or functional outcome. These results support the fact that there is no age limit for rotator cuff repair.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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