International Journal of Research in Medical Sciences
Shah YK et al. Int J Res Med Sci. 2015 Apr;3(4):863-870
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: 10.5455/2320-6012.ijrms20150408

Research Article

Is rotator cuff repair worthwhile in patients with co-morbidities?

Yash Kishore Shah[1]*, Rohan Kiran Khavte[1], Parag Kishore Munshi[2]

[1]Department of Orthopaedics, Government Medical College, Miraj, Maharashtra, India
[2]Consultant Orthopaedic Surgeon, Bombay Hospital, Mumbai, Maharashtra, India

Received: 22 January 2015
Revised: 12 February 2015
Accepted: 3 March 2015

***Correspondence:**
Dr. Yash Kishore Shah,
E-mail: dr.yashshah@gmail.com

ABSTRACT

Background: Rotator cuff tears are a common source of shoulder pain. The incidence increases with age and is most frequently due to degeneration of the tendon, rather than injury. This study is done to see whether in patients having established rotator cuff tears with co-morbidities like hypertension diabetes, epilepsy, etc. a surgical repair is worthwhile or whether it is better to leave such patients alone in order to give them a better quality of life.
Methods: A total of 35 patients with co-morbidities, treated by a single surgeon of which 8 by open method, 19 with arthroscopic assisted mini open rotator cuff repair and 8 entire arthroscopically were evaluated retrospectively. Small tears (<1 cm), medium tears (1-3 cm); large tears (3-5 cm) were addressed by the same surgical procedure using bone tunnels, suture anchors, or a combination of both. The patients were evaluated by history, examination, pain scores and constant scores.
Results: As compared to patients with no co-morbidities, these patients took longer time for healing especially diabetics. Despite that 27 patients had excellent pain relief, 5 good and 3 poor pain relief. Constant scores improved in all patients.
Conclusion: Patients with co-morbidities take longer time to heal, yet the final outcome which is attained and relief of pain and relief in the form of activities of daily living that we could offer the patients makes the surgery worthwhile. It is well worth operating on patients with co-morbidities and a rotator cuff tear, giving them a better pain free life and better activities of daily living.

Keywords: Rotator cuff, Cuff tear, Shoulder arthroscopy

INTRODUCTION

Rotator cuff tears are a common source of shoulder pain. The incidence of rotator cuff damage increases with age and is most frequently due to degeneration of the tendon, rather than injury from sports or trauma. The decision on how to treat rotator cuff tears is based on the patient's severity of symptoms and functional requirements, and presence of other illnesses that may complicate treatment.

There is a divided opinion when it comes to patients having established rotator cuff tears with co-morbidities like hypertension, diabetes, epilepsy, etc. as regards to the treatment. Some doctors advocate to leave such patients alone due to the risk involved, longer healing time and poor patient compliance. Some are aggressive and advocate a surgical tactic.

We are of the opinion that such patients must be operated. This task is not without challenges. The patient needs good intensivists, and motivation for good post op rehabilitation. This study is done to see whether in such patients with co-morbidities a surgical repair is worthwhile or whether it is better to leave such patients alone in order to give them a better quality of life.

Aims and objectives

1. To show that arthroscopy is a good and durable method in the treatment of rotator cuff injuries.

2. To show that patients with co-morbidities can be considered for surgical treatment.

METHODS

A total of 35 patients with co-morbidities, treated by a single surgeon of which 8 by open method, 19 with arthroscopic assisted mini open rotator cuff repair and 8 entire arthroscopically were evaluated retrospectively.

Among 35 patients, 29 were females and 6 were males.18 patients were diabetics, out of which 9 were on oral hypoglycaemic agents and 9 were on insulin. 9 patients were hypertensive with 2 having history of transient ischemic attacks. 3 patients had a history of CKD (chronic kidney disease) with stents, 1 patient was on dialysis and 1 had undergone renal transplant. 1 case was an epileptic. For the sake of comparison with regards to healing time and improvement in the constant scores we compared all these patients to the results of similar rotator cuff repairs in 15 similar set of patients (not part of this study) with no co-morbidities.

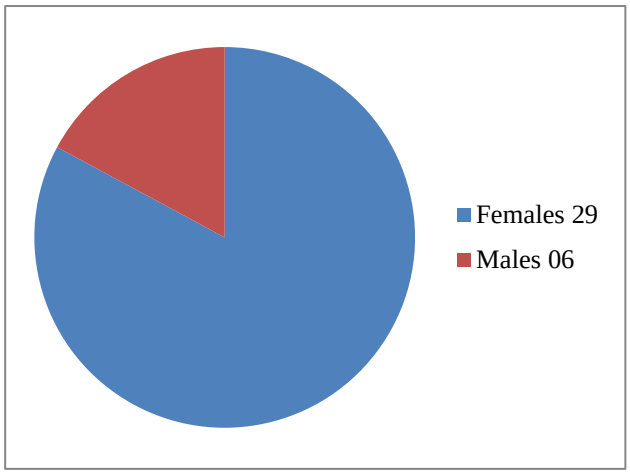

Figure 1: A sex wise distribution of the patients included in our study.

Method of surgery

The choice of surgical technique depends upon several factors including the surgeon's experience and familiarity with a particular procedure, the size of the tear, patient anatomy, quality of the tendon tissue and bone, and the patient's needs. Regardless of the repair method used, studies show similar levels of pain relief, strength improvement, and patient satisfaction.

In our study small tears (<1 cm), medium tears (1-3 cm); large tears (3-5 cm) were addressed by the same surgical procedure using bone tunnels, suture anchors, or a combination of both. Glenohumeral arthroscopy with subacromial decompression was performed in all cases. Distal clavicle excision was performed in selected cases

The three surgical techniques employed for rotator cuff repair were:

1. Open repair

2. Mini-open repair

3. All-arthroscopic repair

Inclusion criteria

1) Symptomatic documented rotator cuff tears

2) Failure of conservative treatment

3) Suffering from pain for at least 8 months

4) Having significant night pains

5) A.D.L. dysfunction

6) Pain score >7/10

7) Having co-morbidities like diabetes, hypertension, etc.

Exclusion criteria

1) Concomitant plexus injuries along with cuff tears (pre-ganglionic)

2) Previous steroid injection with sepsis

Duration of follow up

1-6 years

Evaluation

Evaluation included:

1. History

2. Physical examination

3. Preoperative and post-operative strength

4. Range of motion

5. Pain scores

6. Constant score.

All shoulders had either a pre-operative MRI or a USG done.

Demographic data included:

A. Number of patients

B. Age

C. Gender

D. Dominant extremity of the patient

E. Duration of symptoms

F. Duration of follow up

Clinical evaluation[1-5]

Table 1: How clinical evaluation is done.

Muscle	Test
Supraspinatus	The patient's arm is straightened and then abducted 20°. The patient is then asked to abduct the arm against an applied force
Supraspinatus	Alternatively, empty can" (Jobe test) or "full can" position
Infraspinatus and teres minor muscles	The patient is positioned with the elbow flexed 90° and the shoulder internally rotated 20°. The patient is then asked to resist an inward force
Subscapularis	The lift-off test can be performed to evaluate it.[6,15] This test is performed by passively positioning the patient's arm behind the back with the palm facing outward. Failure to hold the forearm and hand off the back or inability to push off against the examiner's hand constitutes a positive test

Constant score technique

Given below is the constant score that we used to evaluate the patients of rotator cuff tear. The European Society for Shoulder and Elbow Surgery (ESSES) adopted the scoring system of C. Constant and A. Murley.[7-11]

This scoring system consists of four variables that are used to assess the function of the shoulder.

The right and left shoulders are assessed separately. The subjective variables are pain and ADL (sleep, work, recreation/sport) which give a total of 35 points.

The objective variables are range of motion and strength which give a total of 65 points. Total is 100 points.

Table 2: A quick review of the constant score system used in our study.

Constant score technique	
Subjective	
Pain	15
ADL {Activities of daily life} (sleep, work, recreation/sport)	20
Objective	
Range of motion	40
Strength	25

In the constant score system there is precise information about how the points are calculated. Bear in mind that 150 degrees of flexion give 8 points, while 151 degrees give 10 points.

Range of motion

Active range of motion should always be measured as part of the Constant Score.

ESSES recommends measuring range of motion with the patient sitting on a chair or bed, with weight even distributed between the ischial tuberosities. No rotation of the upper body may take place during the examination. In the case of active motion, the patient can lift his arm to a pain free level. Note that the number of degrees at which the pain starts determines the range of motion. If one measures the active range of motion with pain, this should be stated. The Constant score cannot then be applied beyond the initiation of pain.

The most important thing is that range of motion is performed and measured in a standardised way.

Table 3: How to score ranges of motions in Constant score system - Forward flexion 10 points.

Forward flexion 10 points	
0-30	0
31-60	2
61-90	4
91-120	6
121-150	8
151-180	10

Table 4: How to score ranges of motions in Constant score system - Abduction 10 points.

Abduction 10 points	
0-30	0
31-60	2
61-90	4
91-120	6
121-150	8
151-180	10

Table 5: How to score ranges of motions in Constant score system - External rotation 10 points (hand is not allowed to touch the head).

External rotation 10 points (hand is not allowed to touch the head)	
Not reaching the head	0
Hand behind head with elbow forward	2
Hand behind head with elbow back	2
Hand on top of head with elbow forward	2
Hand on top of head with elbow back	2
Full elevation from on top of head	2

Table 6: How to score ranges of motions in Constant score system - Internal rotation 10 points.

Internal rotation 10 points	
End of the thumb to lateral thigh	0
End of the thumb to buttock	2
End of the thumb to lumbosacral junction	4
End of the thumb to L3 (waist)	6
End of the thumb to T 12	8
End of the thumb to T 7 (interscapular)	10

Strength

Strength is given a maximum of 25 points in the Constant Score.

The significance and technique of strength measurement has been, and continues to be, the subject of much discussion.

The European Society for Shoulder and Elbow Surgery measures strength according to the following method:

- A spring balance is attached distal on the forearm.
- Strength is measured with the arm in 90 degrees of elevation in the plane of the scapula (30 degrees in front of the coronal plane) and elbow straight.
- Palm of the hand facing the floor (pronation).
- The patient is asked to maintain this resisted elevation for 5 seconds.
- It is repeated 3 times immediately after another.
- The average in pound (lb) is noted.
- The measurement should be pain free. If pain is involved the patient gets 0 points.
- If patient is unable to achieve 90 degrees of elevation in the scapula plane the patient gets 0 points.

Devices for measuring strength

Strength can be measured with a standard Spring Balance (available from General hardware stores) or specific commercial devices. Easy and small spring balances are available online and good value online. You will need one that has 25 lb/12 kg capacity. A good digital one is the Salter Electro model.

Prof. Len Funk prefers to use the IDO Isometer from IDO, which has been designed specifically for Constant score strength testing of the shoulder. It is small, light and uses disposable batteries. It is provided in an excellent portable bag, with options for fixed attachment to furniture or underfoot.

The Nottingham Mecmesin Myometer, is also designed for strength measurement of the Constant score. The Myometer comprises a digital force reader that can either be used independently or linked to a PC in order to accurately measure and graph the function of muscle groups around the shoulder. The Windows Dataplot Software allows the Myometer to become a virtual chart reader where up to four tests can be plotted on one graph. Data can be exported in either tabular or graphical format into spreadsheets for later use. However, it is a bit bulky and requires recharging.

Figure 2: Pre-operative clinical photographs of one such elderly patient showing the pre op ranges of shoulder flexion, abduction, internal and external rotation respectively. She was a 58 year old fisherwoman.

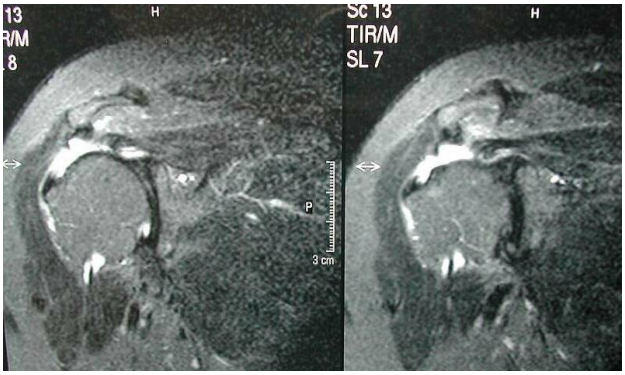

Figure 3: Pre-operative pictures of the MRI of the same patient showing a large rotator cuff tear in the supraspinatus muscle.

Figure 4: An intra-operative view of a rotator cuff tear.

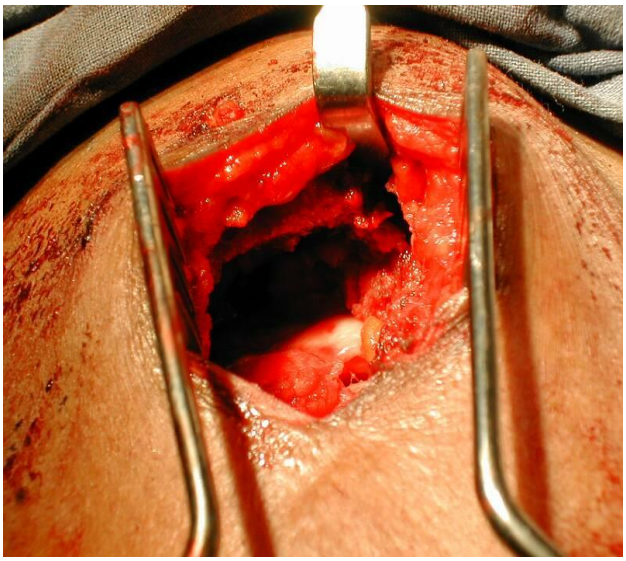

Figure 5: Sub acromial decompression done relieves the pressure over the cuff.

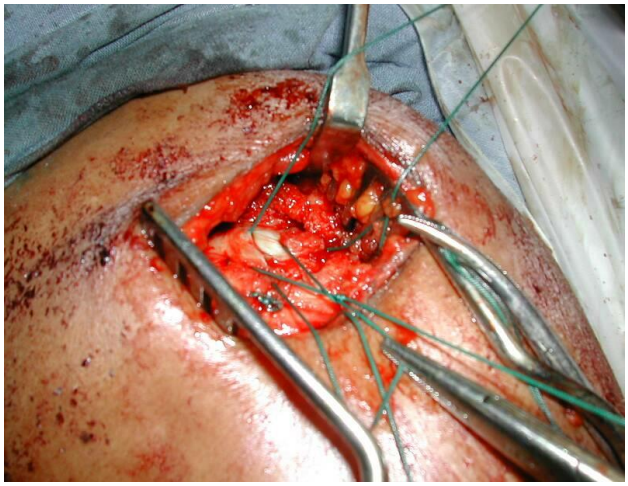

Figure 6: Suture anchors used to tie the rotator cuff.

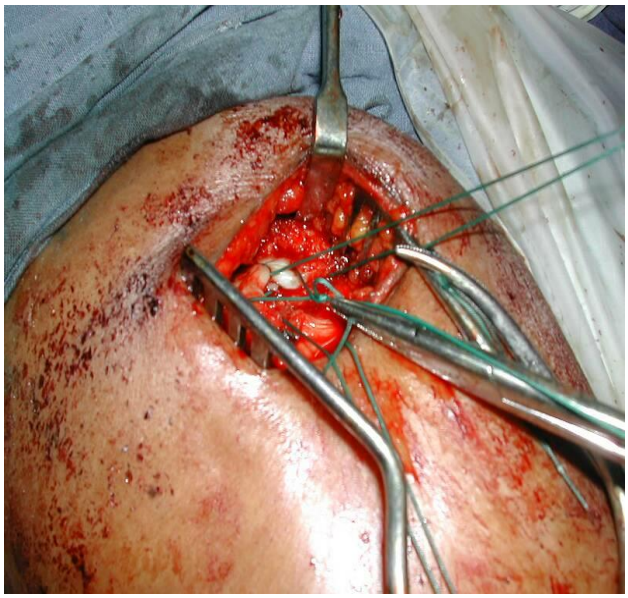

Figure 7: Suture anchors used to approximate the supraspinatus tear.

Figure 8: This is the suture anchor that was used to tie the torn cuff.

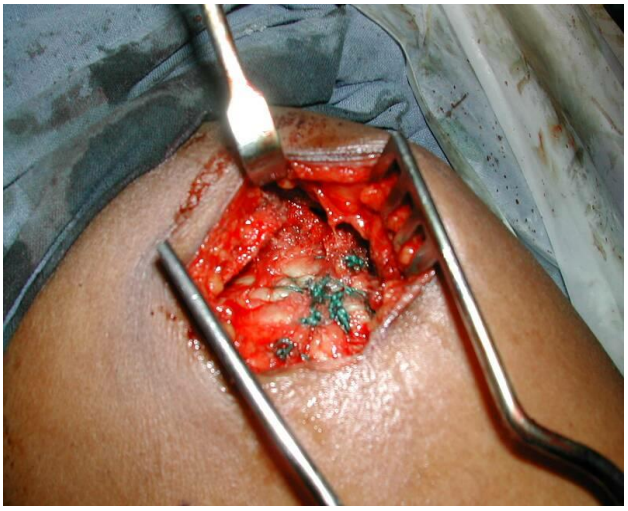

Figure 9: Showing after the rotator cuff tear has been sutured with suture anchors.

Figure 10: 2 monthly follow up of the same patient showing the clinical improvement in flexion, abduction, and internal and external rotation.

RESULTS

As compared to patients with no co-morbidities, these patients took longer time for healing especially diabetics. Despite that 27 patients had excellent pain relief, 5 good and 3 poor pain relief. Constant scores improved in all patients.

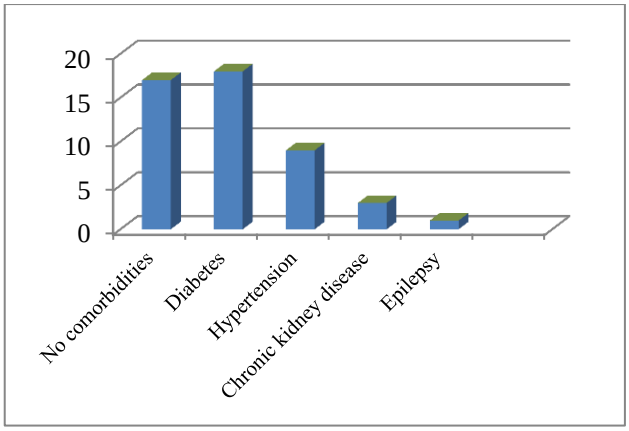

Figure 11: Showing the sample population and the diseases they suffered from.

Table 7: The average time taken for healing in various groups.

Mean time for complete pain relief of patients	
With no co morbidities	3 months
With Diabetes	7 months
With Hypertension	4 months
With Kidney disease	6 months
With epilepsy	3 months

Table 8: Table showing improvements in the mean Constant scores in various diseases.

Condition	Pre-op mean Constant score	Post-op mean Constant score
Patients without co morbidities	53	86
Patients with diabetes	45	78
Patients with hypertension	55	76
Patients with kidney disease	42	76
Patients with epilepsy	40	79

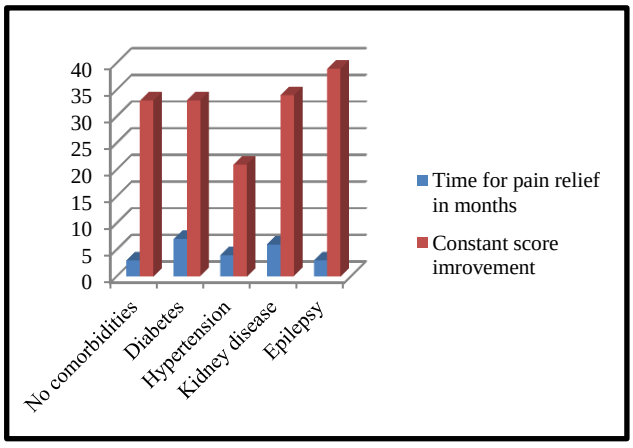

Figure 12: Comparing the time relief for pain as well improvement in Constant score in all patients.

Table 9: Pain relief showing the number of patients getting respective pain reliefs.

Pain relief on a scale of 1-10	No. of patients
Excellent 8-10	27 patients
Good 5-7	5 patients
Poor <5	3 patients

Table 10: This shows the outcome using various modes of surgery.

Method	Excellent	Good	Poor
Open	5	1	2
Mini-open	15	3	1
Arthroscopic	7	1	0

DISCUSSION

Anatomy of the rotator cuff

The rotator cuff is composed of four muscles, the subscapularis, the supraspinatus, the infraspinatus and the teres minor. From separate origins at the posterior (supraspinatus, infraspinatus and teres minor) and anterior (subscapularis) surfaces of the scapula they run laterally and fuse together with the articular capsule into a common insertion on the tuberosities of the humerus, which is known as the footprint of the rotator cuff.[12]

The muscles function to provide rotation and elevate the arm and give stability to the shoulder joint (glenohumeral joint). The supraspinatus is most frequently involved in degenerative tears of the rotator cuff. Pain, loss of motion and weakness may occur when one of the rotator cuff tendons tears. The tendons generally tear off at their insertion (attachment) onto the humeral head.

Incidence

Rotator cuff tears increase in frequency with age, are more common in the dominant arm, and can be present in the opposite shoulder even if there is no pain.[13] The true incidence of rotator cuff tears in the general population is hard to determine because 5 percent to 40 percent of people present without shoulder pain. This was determined by studies using MRI and ultrasound to image the shoulders of patients with no symptoms. One study revealed a 34 percent overall incidence of rotator cuff tears. Highest incidence occurred in patients who were more than 60 years old. This study supported the concept that rotator cuff damage has a degenerative component and, importantly, that a tear of rotator cuff is compatible with a painless, normal functioning shoulder.[14]

Aetiology

There are intrinsic and extrinsic causes of rotator cuff tears. An example of an intrinsic factor is tendon blood supply. The blood supply to the rotator cuff diminishes with age and transiently decreases with certain motions and activities. The diminished blood supply may contribute to tendon degeneration and complete tearing. The substance of the tendon itself degenerates over time. Due to an age related decrease in tendon blood supply, the body's ability to repair tendon damage is decreased with age; this can ultimately lead to a full-thickness tear of the rotator cuff. An extrinsic cause would be damage to the rotator cuff from bones spurs underneath the acromion. The spurs rub on the tendon when the arm is elevated; this is often referred to as impingement syndrome. Bone spurs are another result of the aging process. The rubbing of the tendon on the bone spur can lead to attrition (weakening) of the tendon. Combining this with a diminished blood supply, the tendons have a limited ability to heal themselves. These factors are at least partly responsible for the age-related increase in rotator cuff disease and the higher frequency in the dominant arm.

Importance of age

Prevalence of tears increases with age. Approximately 40% of asymptomatic patients over 50 years old have full-thickness rotator cuff tears,[14] and the prevalence of partial- and full-thickness tears in symptomatic patients over 60 years old is greater than 60%. Chronic causes such as repetitive micro-trauma, subacromial impingement, tendon degeneration, and hypo vascularity are thought to be responsible for most tears and account for this age-dependent prevalence. Acute macro trauma is less frequently responsible for tears.

We stumbled upon the question as to whether in spite of a high risk condition, and co morbidities is it well worth operating upon rotator cuff injuries with co-morbidities such as diabetes, hypertension, stroke, renal failure, epilepsy??

Because there is no evidence of better results in early versus delayed repairs, many surgeons consider a trial of non-operative management to be appropriate.

A study done by Asheesh Bedi et al. in 2001 showed that Diabetes mellitus impairs tendon-bone healing after rotator cuff repair.[16]

Also a paper by Robert Z. Tashjian, showed Medical co-morbidities have a negative impact on patient-reported preoperative baseline pain, function, and general health status associated with chronic rotator cuff tears.[17]

Indeed the patients do take longer time to heal, may be associated with pain for longer than their counterparts without any co-morbidities, yet the final outcome which is attained and relief of pain and relief in the form of activities of daily living that we could offer the patients makes the surgery worth its shot.

We may be playing with fire, but in the hands of trained anaesthetists and intensivists who can manage the patients well the task is simplified. We may be justified in saying that the patients were much more miserable without the surgery and by operating on them we can improve their quality of life, give them better pain scores and in many of the patients a full free painless range of motion. However caution needs to be taken with extremely old and debilitated patients who at a very high risk of surgery and non-compliant patients who may not do well with surgery.

CONCLUSIONS

And thus the answer is "YES". It is well worth operating on patients with co-morbidities and a rotator cuff tear, giving them a better pain free life and better activities of daily living. The only pre-requisite is however skilled anaesthetists, intensivists and good post-op physiotherapy combined with careful patient selection for surgery.

ACKNOWLEDGEMENTS

I would like to thank all the staff and junior doctors of Bombay hospital who made this study possible.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Calis M, Akgun K, Birtane M, Karacan I, Calis H, Tuzun F. Diagnostic values of clinical diagnostic tests in subacromial impingement syndrome. Ann Rheum Dis. 2000;59:44-7.
2. MacDonald PB, Clark P, Sutherland K. An analysis of the diagnostic accuracy of the Hawkins and Neer subacromial impingement signs. J Shoulder Elbow Surg. 2000;9:299-301.
3. Neer CS 2nd. Impingement lesions. Clin Orthop Relat Res. 1983;173:70-7.
4. Hawkins RJ, Kennedy JC. Impingement syndrome in athletes. Am J Sports Med. 1980;8:151-8.
5. Calis M, Akgun K, Birtane M, Karacan I, Calis H, Tuzun F. Diagnostic values of clinical diagnostic tests in subacromial impingement syndrome. Ann Rheum Dis. 2000;59:44-7.
6. Gerber C, Krushell RJ. Isolated rupture of the tendon of the subscapularis muscle: clinical features in 16 cases. J Bone Joint Surg Br. 1991;73:389-94.
7. Constant CR, Murley AHG. A clinical method of functional assessment of the shoulder. Clin Orthop Relat Res. 1987;214:160-4.
8. Constant CR. Assessment of the shoulder. In: Watson M, eds. Surgical disorders of the shoulder. 2nd ed. New York: Churchill Livingstone; 1991: 39-45.
9. Constant CR. Constant scoring technique for shoulder function. SECEC information. 1991. Nr 3. Available at: www.secec.org.
10. Gerber C. Integrated Scoring Systems for the Functional Assessment of the Shoulder. In: Matsen F, Fu F, Hawkins R, eds. The Shoulder: a Balance of Mobility and Stability. 3rd ed. Rosemont: American Academy of Orthopaedic Surgeons; 1992: 531-550.
11. Scoring Systems for the Shoulder. Circular to members of British shoulder and elbow society, 1997. Available at: http://www.axelina.com/ENG/kvalitet/kva_score.htm. Accessed 5 November 2007
12. Clark JM, Harryman DT. Tendons, ligaments, and capsule of the rotator cuff. Gross and microscopic anatomy. J Bone Joint Surg Am. 1992;74:713-25.
13. Ruotolo C, Nottage WM. Surgical and non-surgical management of rotator cuff tears. Arthroscopy. 2002;18(5):527-31.
14. Templehoff S, Rupp S, Seil R. Age-related prevalence of rotator cuff tears in asymptomatic shoulders. J Shoulder Elbow Surg. 1999;8:296-9.
15. Zaslav KR. Internal rotation resistance strength test: a new diagnostic test to differentiate intraarticular pathology from outlet (Neer) impingement syndrome in the shoulder. J Shoulder Elbow Surg. 2001;10:23-7.
16. Asheesh Bedi, Alice JS. Fox, Paul E. Harris, Xiang-Hua Deng, Liang Ying, Russell F. Warren, et al. Diabetes mellitus impairs tendon-bone healing after rotator cuff repair. J Shoulder Elbow Surg. 2010;19(7):978-88.
17. Robert Z. Tashjian, Ralph F. Henn, Lana Kang, Andrew Green. The effect of comorbidity on self-assessed function in patients with a chronic rotator cuff tear. J Bone Joint Surg Am. 2004 Feb;86(2):355-62.

DOI: 10.5455/2320-6012.ijrms20150408
Cite this article as: Shah YK, Khavte RK, Munshi PK. Is rotator cuff repair worthwhile in patients with co-morbidities? Int J Res Med Sci 2015;3:863-70.