

Video Journal of Sports Medicine

Partial rotator cuff repair with biceps rerouting and double tenodesis: An efficient and cost-effective biological superior capsular reconstruction

Journal:	<i>Video Journal of Sports Medicine</i>
Manuscript ID	VJSM-21-0009
Manuscript Type:	Demonstration of new or established surgical techniques
Date Submitted by the Author:	22-Jan-2021
Complete List of Authors:	Lannes, Xavier; Hospital of the Morges Area Traverso, Aurélien; Hospital of the Morges Area Coron, Charline; Hospital of the Morges Area Blakeney, William; Royal Perth Hospital Bauer, Stefan; Hospital of the Morges Area
Keywords:	Irreparable rotator cuff tears, superior capsular reconstruction, long head of the biceps, augmented repair, young patients
Categories:	Shoulder, rotator cuff < Clinical Medicine by Anatomic Region
Abstract:	<p>Background Chronic rotator cuff tears (RCTs) are common and can be partially repairable or irreparable. Surgical treatment of these cases remains challenging, especially in younger patients. Surgical options include arthroscopic debridement, partial rotator cuff repair, tendon transfer, subacromial spacer, superior capsular reconstruction (SCR) and reverse total shoulder arthroplasty. The use of SCR has recently been expanded with various techniques. Commercialized SCR uses free avascular grafts with 6-7 anchors. This technique creates an economic burden due to graft/implant cost and theatre time.</p> <p>Indications Younger patient with partially repairable postero-superior RCTs (Goutallier stage ≥ 3, Patte 3) without arthritis. Intact long head of biceps or minimal tendonitis without mechanical deficiency.</p> <p>Technique Description Key steps: Arthroscopic release/opening of the bicipital groove (15-20mm), placement of a first foot-print anchor 8-10mm posterior to the anatomic bicipital groove. Use of a 5mm burr to create a new rerouting groove obliquely from the first anchor to the original groove, 15-20mm caudal to the summit of the tubercle. Lasso-loop translation and tenodesis of the LHB to the first anchor. Use of a second caudal biceps tenodesis anchor with lasso-loops at the caudal end of the new groove. These two anchors create a rerouting bipedicle tenodesis performing the function of both an SCR and biceps tenodesis. Single-</p>

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

	<p>row, tension-free over-the-top repair of infraspinatus and the bursal layer of supraspinatus is completed with a third anchor on the rerouted biceps which remains in continuity.</p> <p>Results The senior authors series (n=10) with a mean follow-up of 12 months (9-18 months) shows satisfactory outcomes. One case developed a postoperative frozen shoulder. Functional scores and patient satisfaction improved in all cases. The subjective shoulder value (SSV) improved from a mean of 30% (10-40%) preoperatively to 75% (60%-80%) postoperatively and the Constant score from 30 points (20%-40%) to 68 points (60-71).</p> <p>Conclusion This technique leads to functional improvements and patient satisfaction at short term follow-up for partially repairable RCTs. Advantages of this procedure over free allograft SCR are lower risks of humeral/glenoid sided failure, lower risk of infection (no skin-graft contact) and low cost.</p>
<p>Note: The following files were submitted by the author for peer review, but cannot be converted to PDF. You must view these files (e.g. movies) online.</p>	
<p>Biceps.mp4</p>	



Partial rotator cuff repair with biceps rerouting and double tenodesis: An efficient and cost-effective biological superior capsular reconstruction

Background

Chronic rotator cuff tears (RCTs) are common and can be partially repairable or irreparable. Surgical treatment of these cases remains challenging, especially in younger patients. Surgical options include arthroscopic debridement, partial rotator cuff repair, tendon transfer, subacromial spacer, superior capsular reconstruction (SCR) and reverse total shoulder arthroplasty. The use of SCR has recently been expanded with various techniques. Commercialized SCR uses free avascular grafts with 6-7 anchors. This technique creates an economic burden due to graft/implant cost and theatre time.

Indications

Younger patient with partially repairable postero-superior RCTs (Goutallier stage ≥ 3 , Patte 3) without arthritis. Intact long head of biceps or minimal tendonitis without mechanical deficiency.

Technique

Description Key steps: Arthroscopic release/opening of the bicipital groove (15-20mm), placement of a first foot-print anchor 8-10mm posterior to the anatomic bicipital groove. Use of a 5mm burr to create a new rerouting groove obliquely from the first anchor to the original groove, 15-20mm caudal to the summit of the tubercle. Lasso-loop translation and tenodesis of the LHB to the first anchor. Use of a second caudal biceps tenodesis anchor with lasso-loops at the caudal end of the new groove. These two anchors create a rerouting bipedicle tenodesis performing the function of both an SCR and biceps tenodesis. Single-row, tension-free over-the-top repair of infraspinatus and the bursal layer of supraspinatus is completed with a third anchor on the rerouted biceps which remains in continuity.

Results

The senior authors series (n=10) with a mean follow-up of 12 months (9-18 months) shows satisfactory outcomes. One case developed a postoperative frozen shoulder. Functional scores and patient satisfaction improved in all cases. The subjective shoulder value (SSV) improved from a mean of 30% (10-40%) preoperatively to 75% (60%-80%) postoperatively and the Constant score from 30 points (20%-40%) to 68 points (60-71).

Conclusion

This technique leads to functional improvements and patient satisfaction at short term follow-up for partially repairable RCTs. Advantages of this procedure over free allograft SCR are lower risks of humeral/glenoid sided failure, lower risk of infection (no skin-graft contact) and low cost.

Keywords

Irreparable rotator cuff tears, young patients, superior capsular reconstruction, long head of the biceps, augmented repair

Slide deck transcript

S1: Partial rotator cuff repair with biceps rerouting and double tenodesis.
An efficient and cost-effective biological superior capsular reconstruction.

S2: No disclosures.

S3: SCR is one of the treatment options for chronic irreparable rotator cuff tears in younger patients. Various techniques have been described for SCR such as partial repair without or with free autograft and reconstruction techniques with the biceps. We report a new technique of biological SCR with a double tenodesis of the long head of biceps with good functional outcomes and patient satisfaction.

S4: We present a 63yo heavy machinery salesman with chronic right shoulder pain for 8 years and failure of non-operative treatment with an SSV of 30% and Constant score of 37.

S5: Radiographs show no arthritis and a Hamada stage II cuff-tear arthropathy

S6-7: Arthro-MRI shows a supraspinatus tear, Patte 3, Goutalier II-III, and a partial infraspinatus tear. Integrity of the biceps tendon is also shown.

S8: Important equipment is listed on this slide.

S9: We prefer a standard beach chair positioning with the use of an arm holder.

S10: Step by step video

The scope is inserted through a standard posterior portal. After a diagnostic arthroscopy and quick assessment of the biceps tendon the subacromial space and supraspinatus foot print are debrided from the lateral portal with a standard radiofrequency ablator.

The lateral portal is then used for viewing and an anterolateral portal is created.

The long head of the biceps is mobilized and assessed. The bursal layer of the supraspinatus is reducible to the medial foot print with adequate tension. The capsular layer is further retracted underneath the bursal layer and is not visible.

This sketch shows the initial superior capsular and cuff deficiency and the location of the biceps before rerouting.

First the biceps pulley is released from proximal to distal over 15mm with the RF ablator. A 5mm burr is used to create a cancellous groove for posterior rerouting of the biceps. Cortical bone islands for anchor placement must be planned and maintained to prevent failure of anchor fixation.

We aim for 5-10mm of posterior translation of the biceps.

A first 2.8mm suture anchor is inserted 5-10mm posterior to the biceps tendon at the medial boarder of the foot print.

With a retrograde suture passer double lasso-loops are set up and classic half-hitches, so called Lafosse easy knots, are tied inverting post tension to fix the biceps as a superior capsular reconstruction. It's important to not over tension the biceps limiting the posterior translation to max 5-10mm in 30° abduction.

All suture ends are placed under the bursal layer into the joint to be picked up with a retrograde suture passer until all suture ends are passed through the anterior part of the bursal layer of the supraspinatus.

1
2
3 A second 2.8 suture anchor is placed posterior to the first anchor between biceps and infraspinatus at
4 the medial boarder of the footprint.
5

6 The footprint is further freshened up with a 5mm burr.
7

8 As for the anterior part of the bursal layer of the supraspinatus, sutures are passed through the posterior
9 part of the supraspinatus and anterior part of the infraspinatus with a retrograde suture passer.
10

11 Whilst maintaining lateral viewing sutures are organized through anterolateral and posterolateral portals.
12

13 The anterior bursal layer of the supraspinatus is tied to the biceps reconstruction on the first anchor as a
14 single row over the top repair without tension. The posterior part of the suprapinatus as well as the
15 anterior part of the infraspinatus are repaired in the same way as a single row technique.
16

17 The quality of the suture fixation is tested with an arthroscopic probe.
18

19 Next the second biceps tenodesis anchor is inserted about 15mm distal to the first anchor just posterior
20 to the anatomic bicipital groove.
21

22 Like for the proximal t enodesis a double lasso-loop technique is used for the distal tenodesis.
23

24 The two sketches show the initial and final position of the biceps after rerouting with a posterior
25 translation and double tenodesis.
26

27 The final repair and reconstruction is probed and tested.
28
29

30 **S12:** Do not over tension the retracted supraspinatus. The repair should just reach the medial foot print.
31 The biceps tendon should also not be over tensioned and posterior translation should be limited to 5-
32 10mm.
33

34 **S13:** We recommend an abduction orthosis with passive exercises to 90° for 6 weeks with progressive
35 active-assisted mobilization from week 7.
36

37 **S14:** Return to appropriate sports is allowed after 6 months.
38

39 **S15:** In our series of 10 patients, results are encouraging with improved functional score and patient
40 satisfaction at a mean follow-up of one year.
41

42 S16: ref
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60