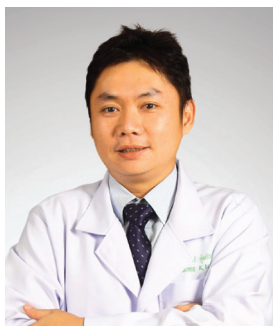


Long Head Biceps Superior Capsular Reconstruction: Available Option for Irreparable Rotator Cuff Tear (Case Report)

Sukree Khumrak, MD¹ ; Thongchai Laohathaimongkol, MD²



Sukree Khumrak, MD

Abstract

Large and massive rotator cuff tears often pose challenges when trying to repair the injury, and can sometimes be irreparable. Superior capsular reconstruction was recently introduced as an effective procedure for maintaining the static stability of the shoulder joint in order to prevent the progression to cuff tear arthropathy. We described the technique of superior capsular reconstruction using local long head of biceps tendon as an alternative to tensor fascia lata or dermal allograft.

Keywords: superior capsular reconstruction, long head of biceps tendon, irreparable rotator cuff tear

Large retracted rotator cuff tears may not be amenable to complete primary repair. The less retracted edges of the tear near the anterior and posterior margins are usually reparable, but the central portion of the tear with the greatest retraction may be irreparable.¹ There are many treatment options, such as conservative treatment, arthroscopic debridement and biceps tenotomy, rotator cuff partial repair, patch augmentation, reverse total shoulder arthroplasty, and superior capsular reconstruction.² Superior capsular reconstruction is a good treatment option for relatively young patients with irreparable massive cuff tear because the superior capsule acts as a better restraint to proximal migration of the humeral head,³ and is considered to be a key static stabilizer. This concept explains why the SCR can relieve severe pain and improve disability from irreparable massive rotator cuff tears.⁴

Mihata et al.⁵ reported the use of a superior capsular reconstruction technique with tensor fascia lata autograft for restoration of the normal restraint to superior translation that leads to deficient rotator cuff. This technique is especially good for relatively young, irreparable massive cuff tear patients due to its few complications, and it is possible to switch to a salvage procedure such as reverse total shoulder arthroplasty when retear or reoperation is needed. However, this technique has the disadvantage of requiring tensor fascia lata autograft harvesting and donor site morbidity such as lateral thigh pain.⁶⁻⁸ Yang-Soo Kim et al.⁴ used the arthroscopic SCR technique with the Long Head Biceps Tendon (LHBT) instead of the autologous tensor fascia lata, and reported that it can be used very easily during arthroscopic shoulder surgery because of the proximity of this tendon, and that donor-site morbidity can be avoided.

Case Report

A 56-year-Old Thai male suffered from right shoulder pain for 1 year with night pain, sleep disturbance, and weakness due to pain when elevating his right shoulder.

¹ Orthopedic Center, Bangkok Hospital Pattaya, Chonburi, Thailand.

² Orthopedic Center, Queen Sawang Vadhana Memorial Hospital, Chonburi, Thailand.

* Address Correspondence to author:
Sukree Khumrak, MD
Bangkok Hospital Pattaya
301 Moo 6 Sukhumvit Rd.,
Chonburi 20150, Thailand.
email: skbiggumz@gmail.com

Physical examination

Right Shoulder:

- Active forward flexion 150 degree with pain
- Abduction external rotation 70 degree
- Internal rotation at L4
- Hawkin Kenedy test positive
- Jobe test positive
- Whipple test positive
- Bear Hug test positive
- Belly Press test positive
- External Rotation Lag sign negative

Magnetic Resonance Image (MRI) Right Shoulder:

(Techniques and Sequences: 3T MRI, Axial: T1, PDFS, T2*FFE Coronal: T1, T2FS Sagittal: PD, T2FS) show

- Complete tear of supraspinatus tendon retracting medially to glenohumeral joint level.
- Low-grade partial thickness tear at the articular surface of superior fiber of infraspinatus tendon.
- Subscapularis tendon shows a focal high-grade partial thickness interstitial tear at superior fiber and low-grade partial thickness tear at the articular surface and intrasubstance of the rest of tendon fiber, mainly at superior fiber.
- Subacromial enthesophytes (spurs), mild lateral acromial down-sloping and mild acromial low lying
- Long head biceps tendon shows tendinosis +/- minimal interstitial tear at the intraarticular part.

Surgical Technique

Positioning and Examination of Glenohumeral Joint and Subacromial Space

The patient was set up in the beach chair position with general endotracheal anesthesia. Diagnostic arthroscopy was performed with 30° arthroscope viewing through a standard arthroscopic portal to examine the glenohumeral joint of the right shoulder. The posterior portal is used as the viewing portal and anterior portal is used as the working portal. The joint was routinely examined to detect any articular lesions and subscapularis tendon. The integrity of the LHBT was also checked. If the LHBT were completely torn, we would not perform this technique. In our patient, we found Lafosse type I of the subscapularis tear. We repaired it with Masen Allen suture technique (Figure 2)

The arthroscope was moved into the subacromial space through the posterior portal, which was similarly used for the examination of the glenohumeral joint, and a bursectomy was performed by a shaver through the anterolateral portal. An acromioplasty was performed only for large sharp spurs. We found large reverse L shape retracted irreparable of supraspinatus tendon. Good integrity and good mobility of proximal insertion of the long head biceps tendon was shown (Figure 3).

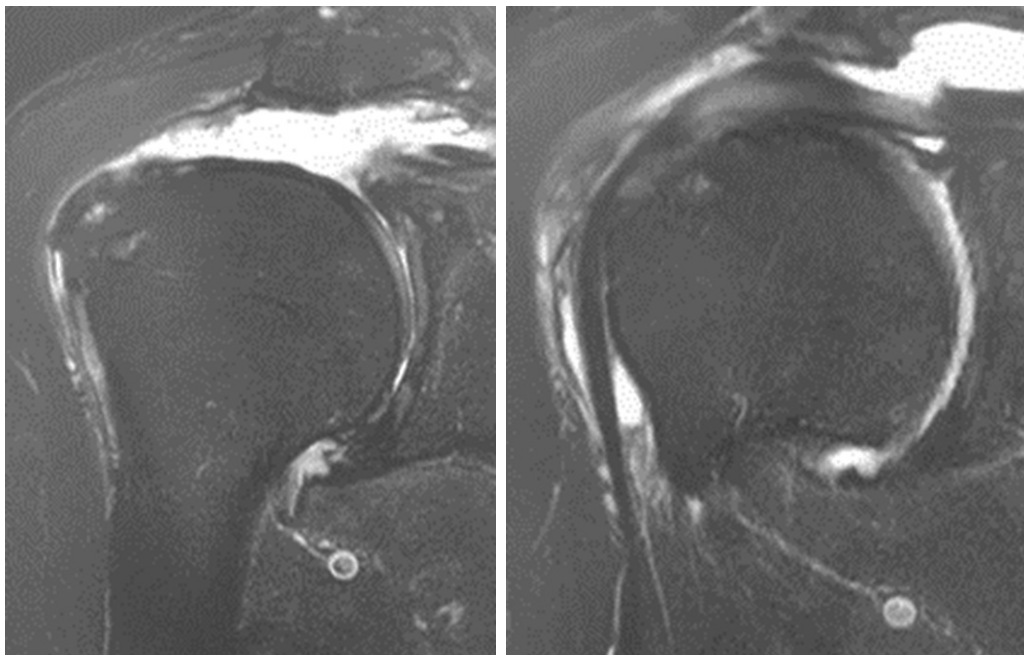


Figure 1: MRI of right shoulder (PD FS) show complete tear of supraspinatus tendon retracting medially to glenohumeral and intact of long head biceps tendon with tendinosis +/- minimal interstitial tear at the intraarticular part.

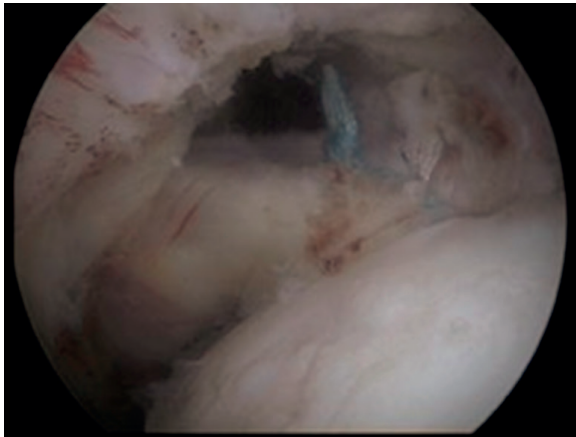


Figure 2: After repairing the subscapularis torn with Masen Allen suture technique.

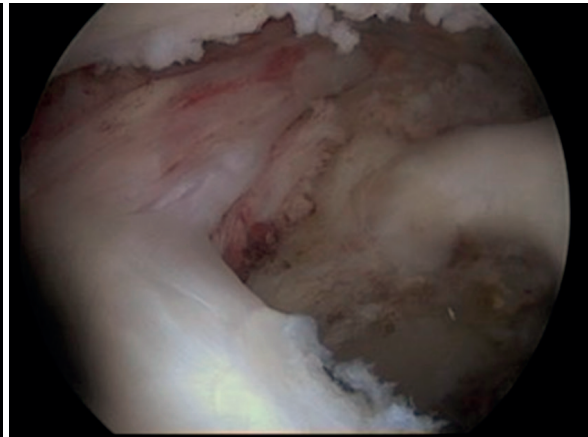


Figure 3: Arthroscopic subacromial view showed large reverse L shape retracted irreparable of supraspinatus tendon. Good integrity and good mobility of proximal insertion of the long head biceps tendon was shown.

Preparation of LHBT for Rerouting and Bone Bed of the Greater Tuberosity of the Humeral Head

To ensure muscle mobility and re-route the LHBT posterolaterally, we removed the soft tissue around the LHBT, including the transverse humeral ligament, using an electrocautery. The decortication of bone bed of the anterolateral portal with careful use of a bone-cutter blade, until the cancellous bone of the greater tuberosity (GT) of the humeral head was exposed enough. This bone bed of the GT of the humeral head was used for the biologic fixation of LHBT and rotator cuff to the bone. The mobility and integrity of the LHBT were checked with a tendon grasper. We used a retriever to posteriorly reposition the LHBT to the GT of the humeral head.

Fixation of LHBT

After anchor insertion (BioComposite Corkscrew FT Suture Anchor, 5.5 mm) at the midlateral aspect of footprint, the SutureLasso came preloaded with a monofilament loop of

suture used to shuttle the suture through the soft tissue with a No. 1 PDS (Ethicon, Somerville, NJ), and introduced the SutureLasso through the anterior portal to make a double lasso-loop tie. The tip of the hook was passed through the body of the LHBT to make a lasso-loop around the LHBT to capture the tendon at the anchor site. The shuttle of the suture that was used to make the lasso-loop did not pass the tendon completely to make a loop at the body of the LHBT (Figure 4). After making the loop at the body of the LHBT, the end of the suture that formed the loop was passed through the loop to complete the double lasso-loop (Figure 4). With the opposite part of the suture, ties were made 4 to 5 times to fix the LHBT (Figure 4). A tenotomy of the LHBT was performed at the distal part. The different aspects of our technique compared to Kim was that we only used 1 double load anchor to secure LHBT with a double loop lasso technique to greater tuberosity after decortication of bone bed at fixation site. Afterwards, we did a side to side repair of infraspinatus and subscapularis to LHBT with a free suture and suture from medial row anchor, whereas the original technique from Kim used two anchor sutures to fix the LHBT to greater tuberosity.

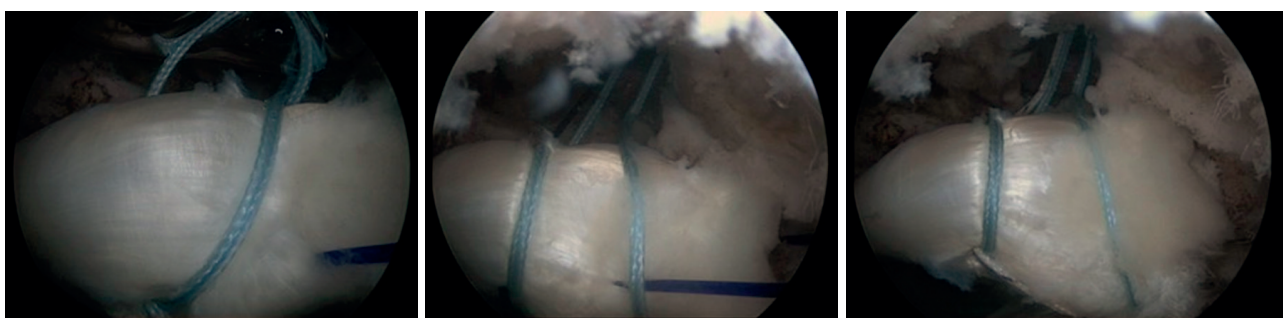


Figure 4: Double lasso loop suture was done at the intraarticular part of long head biceps tendon with double load suture anchor (4.5 mm Healix Anchor suture, Mitek) after resected distal part at bicipital groove above transverse ligament.

Rotator Cuff Repair

After finishing the arthroscopic in situ SCR with the LHBT (Figure 5), the rotator cuff repair was performed. The L-shaped rotator cuff tear was repaired to biceps SCR with side-to-side repaired technique to convert the L-shape tear into U-shape tear (Figure 6). We performed side-to-side repair at subscapularis tendon with biceps SCR (Figure 7). Another anchor was inserted at the medial side close to the articular cartilage to repair the rotator cuff tear. A double-row repair or separate bridge repair can be performed. For the massive rotator cuff tears, which cannot be covered by remnant cuff tissue, partial repair is acceptable through arthroscopic in situ SCR with the LHBT (Figure 8).

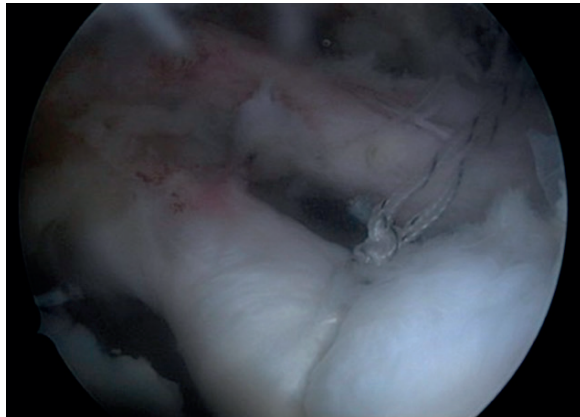


Figure 5: After long head of biceps rerouting was finished for SCR at near anterior cable foot print of supraspinatus.

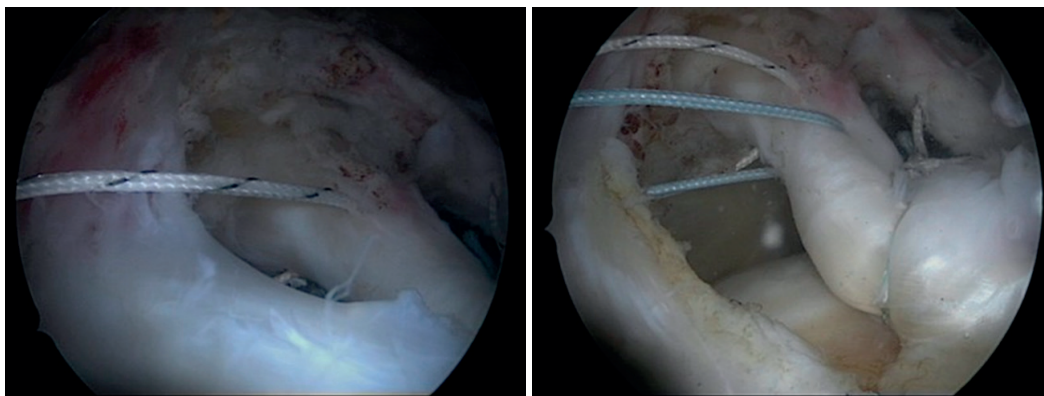


Figure 6: Side to side repair of remaining posterior part of supraspinatus tendon to long head of biceps.

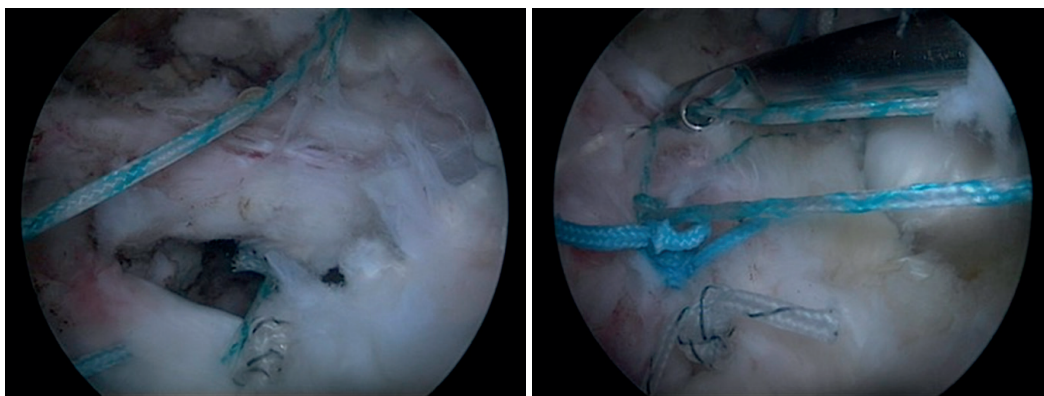


Figure 7: Side to side repair of upper part of subscapularis to long head of biceps.

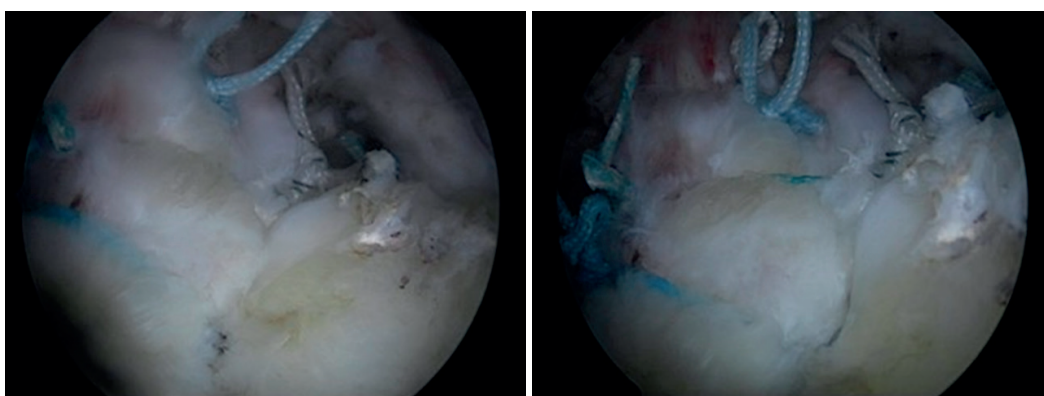


Figure 8: After completion.

Postoperative Care

After the operation, the shoulder was immobilized with an abduction brace for 4 weeks. The patient was only allowed to do active motion of the hand and wrist. The elbow range of motion exercise was prohibited due to LHBT rerouting and anchoring.

- At 4 weeks post operation, passive motion of the shoulder and elbow was allowed to prevent joint stiffness.
- At 3 months' post operation, active range of motion and strengthening exercise with rubber band on the shoulder was allowed.

- The main goal of rehabilitation program is to facilitate active shoulder range of motion and maintain the glenohumeral joint biomechanics.

Result

At 3 months after the operation, we made an appointment with the patient to check on the shoulder range of motion and to provide a strengthening program for the rotator cuff muscle. The patient can do full active forward flexion pain free (Figure 9), for active abduction external rotation (ABER) is nearly 90° (Figure 9). The internal rotation is about L2 level (Figure 10).



Figure 9: Full active forward flexion



Figure 10: External rotation and internal rotation

Discussion

Our case report demonstrated the result of an arthroscopic LHBT SCR with rotator cuff repair of right shoulder. Three months after the operation, the patient was able to do full active, forward flexion with pain-free range of motion. SCR is an important stability of the glenohumeral joint as it acts as a key static stabilizer to prevent glenohumeral translation and the progression to cuff tear arthropathy.⁹ The original SCR technique from Mihata et al.,⁵ uses the autologous tensor fascia lata as the graft for reconstruction, but the disadvantage of this technique is the thigh pain at graft harvesting area and the need for another skin incision.^{6,10}

Yang-Soo Kim et al.⁴ used the LHBT instead of the autologous tensor fascia, which has many advantages instead of using autologous tensor fascia lata or dermal allograft, such as less donor site morbidity, easier technique due to proximity of LHBT, less infection and less operation time.

However, the disadvantages of LHB SCR are the popeye-sign deformity or bicep cramping pains, which can be caused by the tenotomy of the LHBT. Furthermore, this technique is not available to patients with poor-quality LHBT and bicep anchoring, which can cause shoulder pain and tear the superior labrum and biceps stumps. When compared to the partial rotator cuff repair, we left some defects that we were unable to repair, this can cause progression of superior migration of humeral head and re-tear of rotator cuff.

The limitations of our case report are:

1. This is only a short term result for 3 months after operation, we need further assessment of clinical presentation after operation.
2. Larger patient population is required to fully assess the efficacy of this technique.

Conclusion

SCR should be considered as the first option for the young and irreparable rotator cuff tear cases in order to avoid and delay reverse shoulder arthroplasty. In our case report, we showed that SCR using LHBT instead of tensor fascia lata 3 months after operation can reduce pain and improve the shoulder range of motion. For more long term results, we need to follow the clinical presentation. SCR using LHBT is an easy surgical technique with less morbidity that provides more options to the shoulder surgeon to treat irreparable rotator cuff tears in order to prevent cuff tear arthropathy.

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Advantages of Biceps SCR:

1. SCR-LHBT can be an option before deciding to do SCR with tensor fascia lata and should be considered if MRI shows good LHBT quality.
2. Easy to do in one setting with rotator cuff repair, and gives room for the surgeon to make a decision after effort to repair the rotator cuff.
3. Less blood loss and donor site morbidity.
4. Less expensive.