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## Ha-Eri Chari procedure for recurrent antero-inferior dislocation of shoulder joint

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### Abstract

**Background:** The functional outcome of Ha-Eri Chari procedure as operative management for recurrent antero- inferior dislocation of shoulder joint

**Materials and Methods:** This study is a prospective study. 15 patients aged 20 to 44, who underwent Ha-Eri chari procedure from 2023 to 2024 for recurrent anterior dislocation of the right (n=10) and left (n=4) shoulders were included in this study. The mean number of dislocations was 12. The patients were evaluated every 12 weeks during the first year and every 6 months thereafter. The mean follow-up period was 12 months. Outcome was evaluated using the Burkhart and Rockwood criteria.

**Results:** Outcome was excellent in 12 patients, good in 3. None had poor outcome. The mean external rotation deficit at 0° and 90° of abduction improved. No patient had evidence of loosening, infection, re dislocation, migration of coracoid screw or glenohumeral arthritis.

**Conclusion:** Ha-Eri Chari procedure is a feasible, simple and cost-effective management for recurrent antero- inferior shoulder dislocation. This procedure is relatively simple and can be performed by all orthopaedic surgeons without the need of specialised arthroscopic instruments.

**Keywords:** Recurrent antero-inferior dislocation of shoulder; Ha-Eri Chari procedure

### Introduction

Surgical treatments for recurrent antero-inferior dislocation of the shoulder include passive interventions using capsuloligamentous or bone block to create barriers and active interventions using muscle action. Major disadvantages of these treatments are long immobilisation and loss of external rotation of shoulder. The Ha-Eri Chari procedure can overcome these disadvantages by re-routing the coracoid process with its attached conjoint tendon of the short head of the biceps and coracobrachialis deep to the subscapularis muscle and re-attachment to its anatomic location<sup>[1-5]</sup>. In this prospective study, we evaluated the functional outcome of the Ha-Eri chari procedure in 15 patients.

### Materials and Methods

This study is a prospective study. 15 patients aged 20 to 44, who underwent Ha-Eri chari procedure from 2023-2024 for recurrent anterior dislocation of the right (n=10) and left (n=5) shoulders were included in this study. The mean number of dislocations was 12.

Patients with epilepsy, multidirectional instability, neuromuscular disorders, and abnormal mental status were excluded.

Preoperatively, apprehension test for anterior dislocation was positive in all patients. Shift and load test and sulcus test indicating instability were negative in all patients. Radiographs with internal rotation of the shoulder were taken. In patients with bony defect, the defect was less than 20%. All these patients had evidence of Bankart's lesion on MRI.

### Surgical procedure and follow up

Patients were placed in a beach - chair position under general anaesthesia, and a sand bag was placed under the medial border of the scapula (Figure 1 and 2)



**Fig 1 & 2:** Chair position under general anaesthesia

The standard deltopectoral approach was used (Figure 3 and 4).



**Fig 3 & 4:** Standard deltopectoral approach was used

The deltoid was retracted laterally and the pectoralis major was retracted medially to expose the coracoid with tendinous origin of the short head of the biceps and coracobrachialis (Figure 5).



**Fig 5:** Short head of the biceps and coracobrachialis

A drill hole was made in the coracoid process along its axis with 2.5 mm drill bit. The coracoid process along with the origin of short head of biceps and coracobrachialis was osteotomised and moved distally (Figure 6). With the shoulder in internal rotation, a plane was developed between the joint capsule of shoulder and the subscapularis starting from the lower border of the subscapularis. Care was taken not to damage the anterior circumflex humeral vessels. The detached tip of the coracoid process along with the attached muscles was passed through the plane and fixed to the predrilled proximal counterpart of the coracoid process using a 4-mm AO cancellous screw (about 30 mm in length) (Figure 7).

The arm was immobilised by the side of chest with the shoulder in internal rotation. The position of the screw was assessed using radiographs (Figure 9).



**Fig 6:** Shoulder in internal rotation



**Fig 7:** 4-mm AO cancellous screw (about 30 mm in length)



**Fig 8:** After haemostasis, the wound was closed in layers



**Fig 9:** Position of the screw was assessed using radiographs

After 2 days, pendulum shoulder exercises were started after removal of drain.

At week 3, active assisted shoulder mobilisation was started aiming to achieve full shoulder movements at week 8 (Figure 10).

The patients were evaluated every 12 weeks during the first year and every 6 months thereafter (Figure 11).



**Fig 10:** Shoulder mobilisation was started aiming to achieve full shoulder movements at week 8



**Fig 11:** 12 weeks during the first year and every 6 months

Outcome was evaluated using the Burkhead and Rockwood criteria (Figure 12); a score of 90 to 100 was considered excellent, 70 to 89 as good, 40 to 69 as fair, and  $\leq 39$  as poor.

#### Burkhead and Rockwood criteria for evaluation of shoulder function

	Points
<b>Function</b>	
No limitation in sports or work; able to throw baseball and football; can swim crawl-stroke	50
No limitation in work; slight limitation in throwing baseball, serving forcefully in tennis, or swimming crawl-stroke; can throw football normally	35
Moderate limitation in overhead work, throwing baseball and football, swimming crawl-stroke, or serving in tennis	20
Marked limitation in throwing in all sports; unable to work with arm overhead	0
<b>Pain</b>	
None	10
Moderate	5
Severe	0
<b>Stability</b>	
Negative apprehension test, no subluxation	30
Negative apprehension test, but discomfort with arm in position of abduction and external rotation	15
Positive apprehension test and sense of subluxation	0
<b>Motion</b>	
Full range of motion	10
As much as 25 per cent loss of motion in any plane	5
More than 25 per cent loss of motion in any plane	0

\*Excellent = 90 to 100 points, good = 70 to 89 points, fair = 40 to 69 points, and poor = 30 or fewer points.

**Fig 12:** Score of 90 to 100 was considered excellent, 70 to 89 as good, 40 to 69 as fair, and  $\leq 39$  as poor



**Fig 13:** Post-operative assessment of ROM (external rotation, neutral and internal rotation)



**Fig 14:** Post-operative Assessment of ROM (abduction and extension with arm behind the back)

## Results

The mean follow-up period was 12 months. Outcome was excellent in 12 patients, good in 3 patients. None had poor outcome. The mean external rotation deficit at 0° and 90° of abduction improved. No patient had evidence of loosening, infection, re dislocation, migration of coracoid screw or glenohumeral arthritis.

## Discussion

Treatment for recurrent antero-inferior dislocation of shoulder should provide an active corrective force that pushes the humeral head into the glenoid fossa. The Ha-Eri chari procedure achieves this objective in 2 ways.

- First, the increased muscle bulk of the subscapularis, coracobrachialis, and the short head of biceps augments the bracing effect over the antero-inferior aspect of the glenohumeral joint, and thus prevents anterior dislocation.
- Second, the muscle bellies of 2 strong muscles are rerouted to lie more directly in contact with the joint capsule and humeral head so that their active contraction exerts a strong control on the anterior exertion of the humeral head, thereby balancing the deforming forces of dislocation.

Lengthening of the subscapularis is the main cause of shoulder instability, whereas the capsular and bony defects are the subsidiary causes [6]. This is contrary to the current trend of addressing mainly the intra-articular pathology of the

unstable shoulder [5]. Therefore, the recurrence rate is higher after arthroscopic repair than open procedure [7]. However, limited range of motion was the main drawback of open procedures [8].

The recurrence rates after the Bankart procedure, Putti-Platt procedure, Magnuson-Stack procedure, and Bristow procedure for recurrent anterior dislocation of shoulder were 6%, 20%, 7%, and 13%, respectively, with restriction of external rotation and glenohumeral arthritis in long-term follow-up [8-10]. The Ha-Eri chari procedure achieves comparable results, with lower recurrence rate, minimal restriction of external rotation, and no glenohumeral arthritis. However, this procedure may be contraindicated in epileptic patients and those with weak subscapularis or large glenoid defect [11-13].

## Conclusion

Ha-Eri chari procedure is a viable and simple treatment for recurrent anterior shoulder dislocation. This procedure is relatively simple and can be performed by all orthopaedic surgeons without the need of specialised arthroscopic instruments. This is important particularly in developing countries.

## Conflict of Interest

Not available

## Financial Support

Not available

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