

## Clinical Characteristics and Surgical Outcomes for Collision Athletes with Traumatic Posterior Instability

Atsushi Tasaki

Department of Orthopedics Surgery, St. Luke's International Hospital, Tokyo, Japan

**Background:** Diagnosis and treatment of traumatic posterior instability of the shoulder have not been described in detail. The author investigated surgical outcomes for traumatic posterior shoulder joint instability in collision athletes.

**Methods:** The author surgically treated patients with a diagnosis of traumatic shoulder joint instability and investigated those that had been followed up for >2 years after surgery.

**Results:** Seven shoulders in six collision athletes with a history of traumatic injury were examined. All cases were negative for the general laxity sign and positive for the posterior jerk test; five shoulders showed positive anterior apprehension. Posterior glenoid osseous defects were found in three shoulders, and one shoulder injury involved anterior and posterior osseous lesions. As surgical treatment, one posterior capsulolabral lesion, two posterior osseous lesions, and three combined anterior and posterior capsulolabral lesions were repaired arthroscopically. In a patient with a combined anterior and posterior osseous lesion, the Bristow procedure was performed after arthroscopic osseous repair. Patients returned to competition at an average of 6.8 months after surgery. One patient developed anterior subluxation at 7 months, and another exhibited posterior re-dislocation at 8 months after returning to competition.

**Conclusion:** Traumatic posterior instability in collision athletes often involves glenoid osseous lesions and is frequently accompanied by anterior apprehension and lesions. Although collision athletes can return to play after arthroscopic repair, such activity is associated with a risk of re-dislocation.

(J Nippon Med Sch 2021; 88: 133–137)

**Key words:** posterior shoulder instability, labrum lesion, arthroscopic treatment

### Introduction

Traumatic posterior instability accounts for about 5% of cases of traumatic instability of the shoulder<sup>1,2</sup>. The mechanism of injury differs between posterior and anterior shoulder instability, and diagnosis and evaluation methods vary<sup>3</sup>. Posterior instability is associated with general laxity and involuntary inferior subluxation<sup>4</sup>. However, few patients exhibit these physical characteristics<sup>3</sup>.

The features and treatment outcomes for anterior instability of the shoulder joint in collision athletes have been reported<sup>5</sup>. Anterior glenoid osseous lesions, which are characteristic of traumatic anterior dislocation of the

shoulder, are common in collision athletes<sup>6,7</sup>. Successful surgical outcomes have been reported for anterior instability of the shoulder. However, previous studies of clinical outcomes for patients with posterior instability of the shoulder included patients who participated in a variety of sports and at a wide range of activity levels<sup>8,9</sup>. How traumatic posterior instability affects the ability of athletes to compete in collision sports such as rugby and American football is unclear.

This study reviewed cases of surgical treatment for traumatic posterior instability of the shoulder in collision athletes. Because of the significant traumatic impact, posterior instability of the shoulder in collision athletes may

---

Correspondence to Atsushi Tasaki, MD, PhD, Department of Orthopedics Surgery, St. Luke's International Hospital, 9-1 Akashi Cho, Chuo-ku, Tokyo 104-8560, Japan

E-mail: tatsu@luke.ac.jp

[https://doi.org/10.1272/jnms.JNMS.2020\\_88-207](https://doi.org/10.1272/jnms.JNMS.2020_88-207)

Journal Website (<https://www.nms.ac.jp/sh/jnms/>)

Table 1 Patient characteristics and clinical results

No. 1	Age	Side	Onset to Surg. (M)	Injury manner	Physical finding		Image		Operation	Clinical score		Follow up (M)
					Jerk test	Anterior appre- hension	CT Glenoid defect (%)	osseous		Ant. Labral lesion	Oxford Pre. Op.	
1	21	Lt	24	1)	+	+	12% (fragment -)	0	Post. capsulolabral repair	26	42	41
2	21	Rt	5	1)	+	+	0	1	Post. Ant. capsulolabral repair	26	43	30
3	19	Rt	6	2)	+	+	11% (fragment +)	1	Post. osseous repair	27	44	29
4	20	Lt	4	1)	+	-	16% (fragment +)	NA	Post. osseous repair	25	43	28*
5	21	Rt	12	3)	+	+	0	1	Post. Ant. capsulolabral repair	24	46	25**
6	22	Lt	10	3)	+	+	0	1	Post. Ant. capsulolabral repair	22	46	24
7	20	Rt	14	2)	+	+	Ant. 4% (fragment+) Post.14% (fragment+)	1	Post. Ant. Labrum repair, Bristow proce- dure	24	45	24

1) Fall to the side, 2) arm forced backward, 3) elbow stuck upward, Rt: right, Lt left, fragment: glenoid osseous fragment.

\*Re-posterior dislocation at 15 months, \*\*Re-posterior dislocation at 14 months

have clinical features that are distinctive from those in non-collision athletes.

### Materials and Methods

Cases of traumatic posterior shoulder instability in collision athletes who underwent surgical treatment for traumatic shoulder instability in the author's hospital between April 2015 and August 2017 were retrospectively reviewed. Patients with an obvious mechanism of injury, posterior instability on physical examination, and pathological findings in the posterior capsulolabral complex on magnetic resonance imaging (MRI) were included in the study<sup>9</sup>. The outcome measures were mechanism of traumatic injury, physical examination findings, findings on computed tomography (CT) and MRI, operative methods, and clinical results before and after the operation. Physical findings were examined by the author, and imaging findings were interpreted by a musculoskeletal radiologist. The minimum follow-up period was 2 years. Clinical outcomes were assessed preoperatively and at more than 2 years postoperatively<sup>10</sup>. Ethical approval was obtained from the Research Ethics Committee of the hospital (Ref: 17-R036).

Surgery was performed by the author in all cases. Patients were placed in the lateral decubitus position with lateral traction of 40° in abduction and 10° in forward flexion. Anterior, anterosuperior, and posterior portals were created. The injured capsulolabral complex and glenoid osseous glenoid lesion were repaired with a suture anchor (GRYPHON BR; Mitek, Raynham, MA, USA). A

Bone Stitcher (Smith Nephew, Andover, MA, USA) was used to sew the suture through the osseous lesion<sup>8</sup>.

A shoulder brace with the shoulder in a neutral position was used for 3 weeks postoperatively; this was followed by range-of-motion exercises. Patients were allowed to start running at 10 weeks, to practice passing a ball and begin weight training at 12 weeks, to participate in non-contact practices at 3 months, and to start contact practice at 5 months postoperatively.

### Results

Posterior glenohumeral instability was observed in seven shoulders of six patients (one patient had bilateral injuries) among a total of 101 patients who underwent surgery for traumatic shoulder instability caused by collision sports during the study period, which accounted for 7% of all cases (Table 1). Six patients played for Division 1 Japanese college rugby teams and one played for a Japanese division 1 American football team. The mechanism of injury was falling to the side in five cases, including two cases with a direct impact to the elbow. Two injuries were due to backward force on the arm by a tackle, including one patient who had undergone the open Bristow procedure at a different hospital. Five patients had no apparent joint laxity, and one patient (bilateral shoulder injuries) had a Beighton score of 2, which excluded hypermobility. MRI showed posterior capsulolabral complex and/or osseous lesions in all cases; similar lesions were seen anteriorly in five cases<sup>11</sup>. All patients had a positive result on a posterior jerk test, and five patients

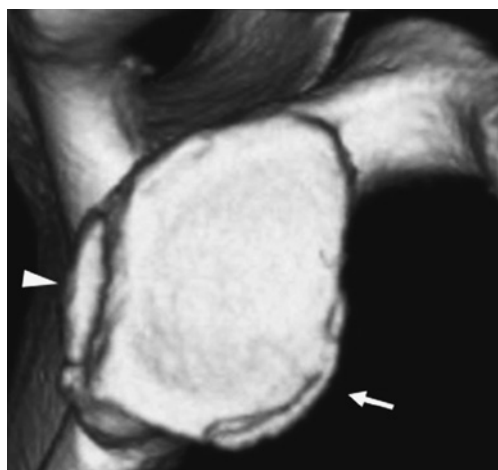


Fig. 1 Bilateral osseous lesions  
Rt. Shoulder, 3DCT (patient 7)  
Anterior (arrow) and posterior (arrowhead) osseous lesions.

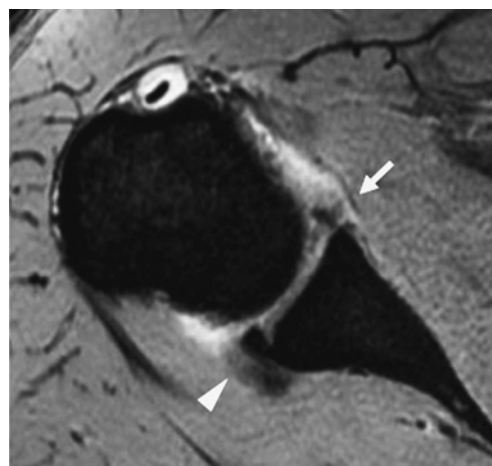


Fig. 2 Bilateral labrum lesions  
Rt. Shoulder MRI, axial, T2\* image (patient 5)  
Anterior (arrow) and posterior (arrowhead) labrum injury.

had a positive result on an anterior apprehension test<sup>3</sup>. Osseous lesions at the posterior glenoid were revealed by CT in four cases, and three cases had osseous fragments. One patient (patient 7) had osseous lesions on both the anterior and posterior glenoid, despite the absence of an obvious history of anterior dislocation (Fig. 1)<sup>6</sup>. MRI showed posterior capsulolabral complex and/or osseous lesions in all patients; similar lesions were seen anteriorly in five patients (Fig. 2).

Posterior lesions were repaired arthroscopically in all cases, and an anterior labrum lesion was additionally identified and repaired in three cases, (Fig. 3A-D). In one patient with anterior and posterior osseous glenoid lesions (Fig. 4A-D), combined arthroscopic osseous repair of the anterior and posterior lesions and the open Bristow procedure were performed<sup>7</sup>.

The patients returned to competition at an average of 6.8 months after surgery (range 6 - 8 months). The average Oxford shoulder score improved from 25 points before surgery to 44 points at 1 year after surgery, when all had returned to their previous level of athletic competition. Analysis of range of motion showed that the average preoperative and postoperative anterior elevation was 174° (170° to 175°) to 172° (170° to 175°), external rotation at the side was 74° (65° to 80°) to 68° (65° to 70°), external rotation at 90° abduction was 93° (90° to 95°) to 90° (85° to 95°), and internal rotation at 90° abduction was 68° (60° to 70°) to 61° (60° to 70°).

The average follow-up period was 29 months (range, 24-40 months). One patient (case 4) showed posterior re-dislocation after hitting an opponent with the affected

shoulder at 8 months after returning to play. This patient had a previous history of anterior traumatic instability, which was treated by the open Bristow procedure at a different hospital, and at the time of the operation in our hospital, part of the anterior joint capsule was damaged and thinned, and the subscapular muscle fibers behind it could be seen. The patient decided not to undergo another surgery and retired from competition. Another patient (case 5) developed anterior subluxation 7 months after returning to play and was treated with the arthroscopic Bankart and open Bristow procedures<sup>7</sup>. He returned to play at his previous level of competition.

### Discussion

In collision athletes, incidents such as tackles and falls are the main mechanisms of injury in cases of traumatic posterior shoulder instability. Four of the present patients had posterior glenoid osseous lesions, which are characteristic findings of collision injuries<sup>7</sup>. Five patients had physical signs of both posterior and anterior instability, and one had osseous lesions in both anterior and posterior directions.

Neer et al. described multidirectional instability (MDI) as anteroposterior instability with inferior voluntary subluxation<sup>12</sup>. However, none of the present patients had detectable general joint laxity on physical examination, and the posterior lesions that had induced posterior instability in all the present patients were likely caused by traumatic force to the capsulolabral complex during participation in collision sports. An external force that dislocates the humeral head posteriorly may also damage the anterior labrum by traction force, and posterior instabil-

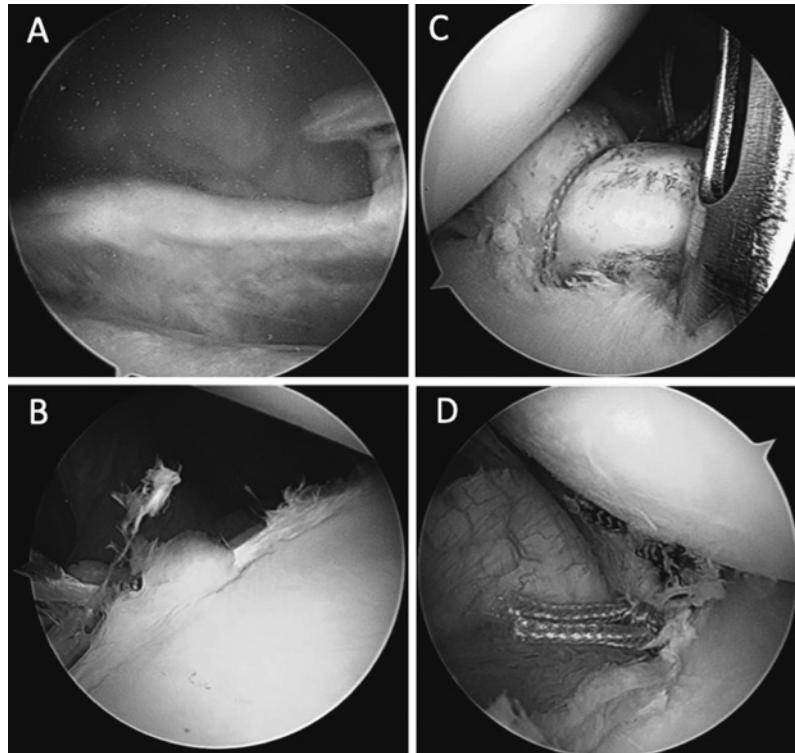


Fig. 3 Arthroscopic labrum repair

Lt. shoulder (patient 6). Arthroscopic view from posterior portal. Anterior labrum injury (A) and posterior labrum injury (B) were repaired with a suture anchor (C and D).

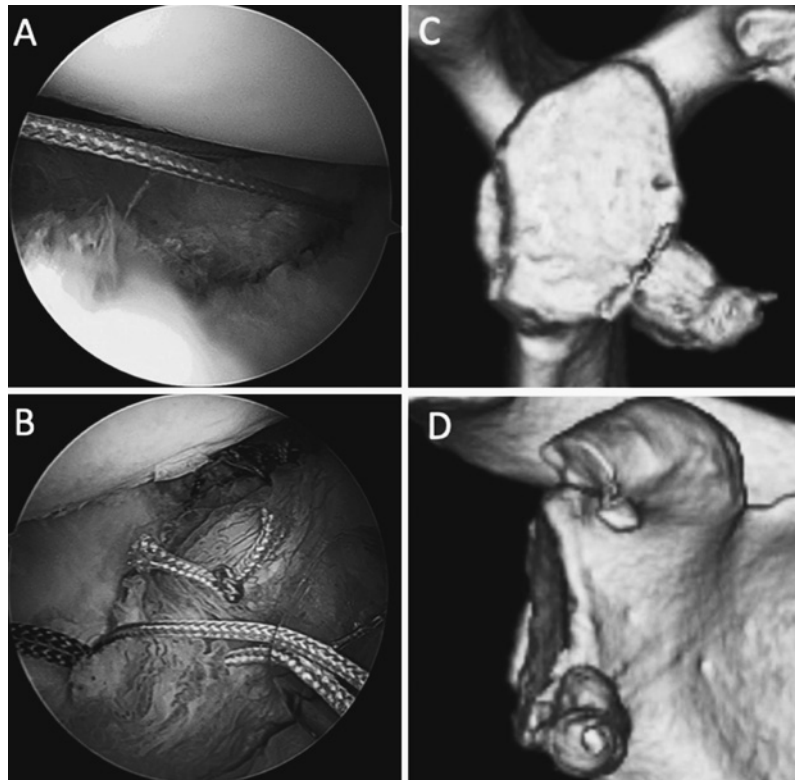


Fig. 4 Bilateral osseous repair and Bristow procedure

Rt. shoulder (patient 7). Arthroscopic repair of anterior osseous lesion (A) and posterior osseous lesion (B). C, D: 3DCT, post-Bristow procedure.



ity leads to failure of the entire capsule by additional repetitive stress on the affected shoulder in collision sports activity, thus resulting in anterior capsulolabral complex and osseous lesions.

The circle stability concept posits that instability in all directions can develop if failure of the joint capsule that supports the glenohumeral joint occurs in a single direction; treatment should be planned accordingly<sup>10</sup>. In one patient with postoperative recurrence, the anterior joint capsule had disappeared after a previous open Bristow procedure at a different hospital, and the whole circumferential continuity of the joint capsule had collapsed. In such cases, during the Bristow procedure the buttress effect of the transferred conjoint tendon is applied from the anterior toward the posterior direction so that posterior dislocation is likely.

Good treatment results were reported for arthroscopic posterior labrum repair of posterior instability<sup>2,13</sup>. Arthroscopic repair of osseous glenoid lesions leads to remodeling of the glenoid; therefore, posterior osseous lesions should be repaired<sup>11</sup>. However, two of the present patients developed re-dislocations. Arthroscopic repair of posterior capsulolabral lesions in collision athletes does not always provide sufficient stability against collision force, as was reported for anterior instability<sup>14</sup>. At present, extraarticular augmentation for posterior shoulder stability, such as in the Bristow-Lagarjet procedure for anterior shoulder stability, is not an established procedure for posterior instability. The incidence of posterior instability is as high as 15%, and approximately 30% of cases of posterior instability are associated with anterior instability<sup>15</sup>. In one of the present cases, re-dislocation was in the anterior direction, and more attention should be focused on preventing anterior re-dislocation when surgery is performed for patients with posterior instability.

**Conflict of Interest:** I declare that there are no conflicts of interest, either financial or personal.

### References

1. Robinson CM, Aderinto J. Recurrent posterior shoulder instability. *J Bone Joint Surg Am.* 2005;87(4):883–92.
2. Provencher MT, LeClere LE, King S, et al. Posterior instability of the shoulder: diagnosis and management. *Am J Sports Med.* 2011;39(4):874–86.
3. Buess E, Waibl B, Sieverding M, Halbgewachs J. Posteroinferior shoulder instability: clinical outcome of arthroscopic stabilization in 32 shoulders and categorization

- based on labral mapping. *Arch Orthop Trauma Surg.* 2015;135(5):673–81.
4. Altchek DW, Warren RF, Skyhar MJ, Ortiz G. T-plasty modification of the Bankart procedure for multidirectional instability of the anterior and inferior types. *J Bone Joint Surg Am.* 1991;73(1):105–12.
5. Hasegawa Y, Kawasaki T, Nojiri S, et al. The number of injury events associated with the critical size of bipolar bone defects in rugby players with traumatic anterior shoulder instability. *Am J Sports Med.* 2019;47(12):2803–8.
6. Kitayama S, Sugaya H, Takahashi N, et al. Clinical outcome and glenoid morphology after arthroscopic repair of chronic osseous bankart lesions: A five to eight-year follow-up study. *J Bone Joint Surg Am.* 2015;97(22):1833–43.
7. Tasaki A, Morita W, Yamakawa A, et al. Combined arthroscopic bankart repair and coracoid process transfer to anterior glenoid for shoulder dislocation in rugby players: Evaluation based on ability to perform sport-specific movements effectively. *Arthroscopy.* 2015;31(9):1693–701.
8. Katthagen JC, Tahal DS, Montgomery SR, Horan MP, Millett PJ. Association of traumatic and atraumatic posterior shoulder instability with glenoid retroversion and outcomes after arthroscopic capsulolabral repair. *Arthroscopy.* 2017;33(2):284–90.
9. Kim SH, Ha KI, Park JH, et al. Arthroscopic posterior labral repair and capsular shift for traumatic unidirectional recurrent posterior subluxation of the shoulder. *J Bone Joint Surg Am.* 2003;85(8):1479–87.
10. Dawson J, Fitzpatrick R, Carr A. The assessment of shoulder instability. The development and validation of a questionnaire. *J Bone Joint Surg Br.* 1999;81(3):420–6.
11. Beighton P, Horan F. Orthopaedic aspects of the Ehlers-Danlos syndrome. *J Bone Joint Surg Br.* 1969;51(3):444–53.
12. Neer CS 2nd, Foster CR. Inferior capsular shift for involuntary inferior and multidirectional instability of the shoulder. A preliminary report. *J Bone Joint Surg Am.* 1980;62(6):897–908.
13. McFarland EG, Kim TK, Park HB, Neira CA, Gutierrez MI. The effect of variation in definition on the diagnosis of multidirectional instability of the shoulder. *J Bone Joint Surg Am.* 2003;85(11):2138–44.
14. Mazzocca AD, Brown FM Jr, Carreira DS, Hayden J, Romeo AA. Arthroscopic anterior shoulder stabilization of collision and contact athletes. *Am J Sports Med.* 2005;33(1):52–60.
15. Javed S, Gheorghiu D, Torrance E, Monga P, Funk L, Walton M. The incidence of traumatic posterior and combined labral tears in patients undergoing arthroscopic shoulder stabilization. *Am J Sports Med.* 2019;47(11):2686–90.

(Received, May 12, 2020)

(Accepted, June 19, 2020)

Journal of Nippon Medical School has adopted the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<https://creativecommons.org/licenses/by-nc-nd/4.0/>) for this article. The Medical Association of Nippon Medical School remains the copyright holder of all articles. Anyone may download, reuse, copy, reprint, or distribute articles for non-profit purposes under this license, on condition that the authors of the articles are properly credited.