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Case Report

Clinical results of shoulder arthroscopy combined with an open modified Latarjet procedure for chronic anterior shoulder instability with glenoid bony loss

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ABSTRACT

The purpose of this study was to follow up the clinical results of the modified Latarjet procedure combined with shoulder arthroscopy for chronic anterior shoulder dislocation with glenoid bony defect. From 1999 to 2004, we evaluated 28 patients with 28 shoulders receiving shoulder arthroscopy combined with an open modified Latarjet procedure. The average age of the patients was 28.5 years. The average length of follow-up in this series was 108.2 months (range 86–126 months). At the final follow-up, the Rowe score was excellent in 21 patients (75%), and good in seven patients (25%). No patient reported subluxation or recurrent instability. The average American Shoulder and Elbow Surgeons score was 93.4, and the average total Western Ontario Shoulder Instability score was 72.74%. Shoulder arthroscopy before the Latarjet procedure is recommended because of the higher incidence of intra-articular lesions affecting satisfactory functional outcomes.

1. Introduction

The major reason for the failure of surgery for anterior shoulder instability is the inability to reconstruct glenoid bony defects during surgery.[1–4] Burkhart et al[2] reported a recurrent instability rate of 4% in patients without significant bone deficiency. However, the high failure rate (67%) was found after only arthroscopic Bankart repair if significant bone defects were not treated during surgery.[2] A significant bone defect (inverted pear glenoid) is defined as 25% bony loss of the glenoid cavity. Procedures to restore glenoid bony insufficiency can be categorized as bone block procedures (iliac crest bone[4] and allograft[4]) and coracoid transfers (Latarjet[3] and Bristow procedures[4]). Bone block procedures may encounter the problem of bone resorption and nonunion. The Bristow procedure using the tip of the coracoid process only affects a small area and lacks the capsule effect compared with the Latarjet procedure. Shoulder arthroscopy can be used to identify and treat the intra-articular pathology. However, there is debate over whether arthroscopic surgery is necessary before open procedures. The purpose of the present study was to evaluate the functional outcome of the modified Latarjet procedure and assess the value of using shoulder arthroscopy before the procedure.

2. Materials and methods

Between February 1999 and March 2004, a total of 30 patients underwent shoulder arthroscopy combined with an open modified Latarjet procedure. The inclusion criteria for this study were young, active patients with chronic recurrent traumatic anterior shoulder instability and an inverted-pear glenoid (>25% loss of the diameter of the inferior glenoid) with or without an engaged Hill-Sachs lesion. The exclusion criteria were multiple-direction shoulder instability, impingement syndrome, and a history of shoulder surgery. All patients were treated in a single academic teaching hospital, and surgical procedures were performed by one senior author (S.T.H.). Preoperative assessment relied on radiographs, including anterior–posterior, axillary, and outlet views (Fig. 1). Computed tomography (CT; Fig. 1) and magnetic resonance imaging were not routinely performed for patients. A shoulder apprehension test was positive in all patients preoperatively. Data on the patient age, sex, mechanism of injury, and the duration from injury to surgery are shown in Table 1.

2.1. Operative techniques

Under general anesthesia, patients were placed in a beach chair position. Diagnostic shoulder arthroscopy was done through

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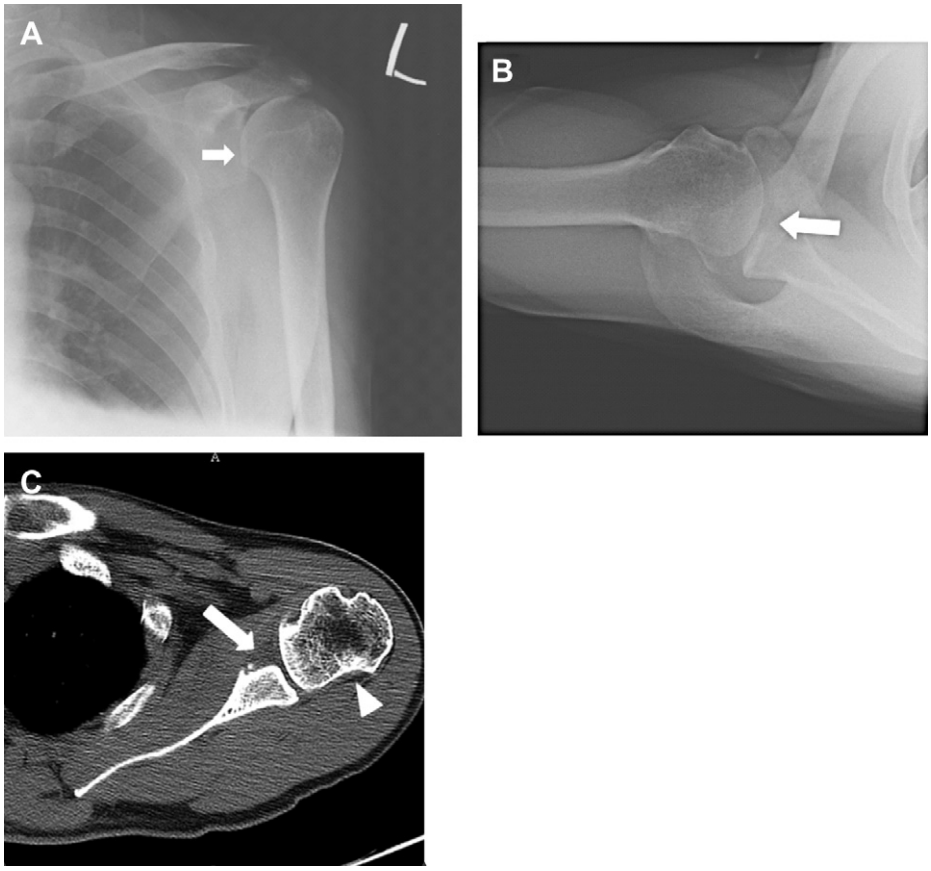

Fig. 1. (A) Radiograph AP view showing subtle loss of contour of the anteroinferior glenoid rim (arrow). (B) Axillary radiograph showing a bony Bankart lesion (arrow). (C) CT image showing Hill-Sach lesion (arrowhead) and bony Bankart lesion (arrow).

the standard posterior portal and anterolateral portal. A calibrated (3-mm marks) probe was then inserted through the posterior portal and used to measure the posterior radii of the inferior glenoid to compare the bony loss of anterior inferior glenoid. The degree of bone loss can be quantified as a percentage of the normal diameter of the inferior glenoid (Fig. 2). Associated intraarticular pathology [e.g., superior labrum anterior and posterior (SLAP) lesion, rotator cuff injury, and Hill-Sachs lesion] was evaluated and addressed. SLAP lesions were debrided or repaired using one or two 2.8-mm FASTak suture anchors (Arthrex, Naples, FL, USA; Fig. 3). The arthroscopic surgery was converted to an open modified Latarjet procedure if an inverted-pear glenoid was found during surgery.

A 5–6 cm vertical surgical excision was performed from the anterior portal after arthroscopic surgery (Fig. 3). Surgical dissection was performed after the cephalic vein was identified in the deltoid and pectoral major muscle groove. The coracoid process was exposed from its base to its tip, the *pectoaris* minor tendon was released from the coracoid neck region and the coracoacrominal ligament was transected about 1 cm lateral to the coracoid insertion. A 90° angled oscillating saw was used to harvest the coracoid graft and the level of the osteotomy was at the junction of the horizontal and vertical parts of coracoid. The deep surface of the coracoid was decorticated with a saw for healing of the bony contact. Two holes were drilled using a 3.2-mm drill perpendicularly in the long axis of the coracoid process. The *subscapularis* muscle was split in line with its fibers and a vertical capsulectomy was done at the level of the joint line. A Fukuda retractor was placed into the glenohumeral joint and the anteroinferior region of the glenoid was completely exposed. The recipient bone was prepared for grafting using curets and a high-speed bur. The coracoid bone graft was fixed with two 4.5 cancellous screws to the inferior glenoid rim (Fig. 3). With the arm in a neutral position, the capsule was sutured to the stump of the coracoacromial ligament using absorbable sutures. The surgical wound was closed in layers.

2.2. Postoperative course

All shoulders were placed in a simple sling for 1 week. Immediate shoulder range of motion was encouraged but overhead motion was avoided for 2 weeks. Gentle external rotation stretching was begun at 6 weeks, strength exercises at 3 months and progressive return to sport activity at 4–5 months (Figs. 4 and 5).

2.3. Follow-up

Patients were contacted by telephone, letter, or e-mail every half year postoperatively. Outcomes were assessed with physical examination of range of motion, the shoulder apprehension sign, Rowe score,[5] American Shoulder and Elbow Surgeons (ASES) score[6] and Western Ontario Shoulder Instability (WOSI) index.[7] A ROWE score of 90–100 points indicated an excellent result, 75–89 points a good result, 51–74 points a fair result, and 50 points or less a poor result. For evaluation of dislocation arthroplasty of the shoulder according to the Samilson and Prieto radiological classification,[8] no arthrosis of glenohumeral joint was Stage 0; glenoid exostosis <3 mm (mild arthrosis) was Stage 1; 3–7 mm glenoid exostosis

Table 1
Details of 28 patients with traumatic anterio shoulder dislocation with glenoid bony deficiency.

Case	Sex	Age (y)	Mechanism	Injury side	Hand dominance	ASES	WOSI	Duration (mo)
1	M	23	Badminton	L	R	79	126	66
2	F	32	MVA	R	R	82	319	46
3	M	19	Baseball	L	R	77	143	53
4	M	24	Grenade throw	R	L	75	232	45
5	F	21	Grenade throw	R	R	78	134	42
6	M	28	Baseball	L	R	82	340	55
7	M	22	Karate	R	L	86	186	62
8	M	25	Volleyball	R	R	86	137	44
9	M	19	Soccer	R	R	90	207	57
10	F	18	Grenade throw	L	R	84	334	52
11	F	29	MVA	R	L	88	273	52
12	M	26	Judo	L	L	82	247	49
13	M	23	Basketball	L	R	78	135	51
14	M	33	Grenade throw	R	L	89	480	45
15	F	19	Boxing	L	L	83	454	41
16	F	30	Taekwondo	R	L	85	233	57
17	M	26	Judo	R	R	77	161	40
18	F	31	Grenade throw	R	L	89	480	45
19	M	23	MVA	L	L	92	446	77
20	M	21	Baseball	R	L	80	107	64
21	M	31	Wrestling	L	R	76	315	42
22	M	29	Badminton	L	R	80	181	58
23	M	22	Grenade throw	L	L	81	296	49
24	M	33	Soccer	L	R	85	131	67
25	F	21	Volleyball	R	R	80	224	42
26	M	27	Grenade throw	R	L	79	269	40
27	M	24	Volleyball	R	L	90	169	60
28	F	22	Baseball	R	R	88	333	53

ASES = American Shoulder and Elbow Surgeons score; Duration = time from injury to surgery; MVA = motor vehicle accident; WOSI = Western Ontario Shoulder Instability score.

(moderate arthrosis) was Stage 2; and glenoid exostosis >7 mm (severe arthrosis) was Stage 3.

3. Results

Two patients were lost to follow-up. There were 21 men and seven women with a mean age of 23.3 years (range 18–32 years) at the time of surgery. The largest number of injuries occurred after throwing a grenade (7 patients).The mean time between the injury and surgery was 32 months (range 9–78 months).

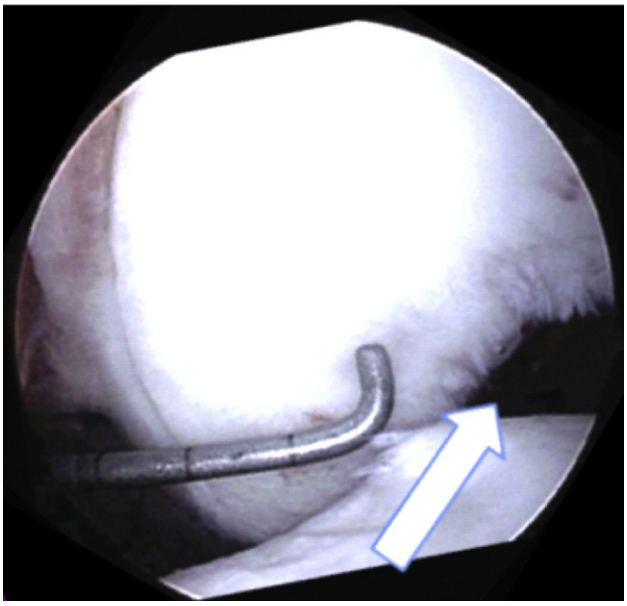

Fig. 2. Arthroscopic quantification of glenoid bone loss in a right shoulder. The arthroscope is placed in the anterosuperior portal, and demonstrating an inverted-pear glenoid (arrow).

3.1. Arthroscopic findings

All 28 shoulders demonstrated an inverted pear glenoid (>25% loss of the inferior glenoid diameter) and all shoulders had Hill-Sach lesions (19 osteochondral and 9 chondral). There were also 15 SLAP lesions, which was the most common associated lesion (54%). Two Type I SLAP lesions were treated with debridement and 13 Type II were stabilized with FASTak anchors. Four had partial rotator cuff tears (14%), which were treated with debridement. Six had loose bodies identified in the axillary recess (21%). The arthroscopic findings are reported in Table 2.

The 28 shoulders were classified into two groups, Group A (13 shoulders) without a SLAP lesion, and Group B (15 shoulders) with a SLAP lesion. There were no significant differences in the preoperative ($p = 0.348$ and $p = 0.677$) and postoperative ASES and WOSI scores ($p = 0.562$ and $p = 0.493$) between groups (Table 3).

According to the most recent follow-up data, the average external rotation was 85.7° (range 81–90°), internal rotation 83.2° (range 78–90°), forward flexion 177.7° (range 172–180°), and abduction 162° (range 158–168°).

Radiographic evidence of glenohumeral arthrosis was assessed and compared with preoperative plain radiographs according to criteria set by Samilson and Prieto.[8] There were 19 patients (68%) at Stage 0, 7 (25%) Stage 1, and 2 (7%) Stage 2. Only three patients (11%) had progressed one stage.

3.2. Scoring

The mean ROWE score was 88.3 points (range 75–100), with excellent results in 21 patients (75%), and good results in seven (25%). The mean ASES score was 92 (range 75–100). The average WOSI score was 159 (range 4–334). One patient with a bony crack noted intraoperatively had no further dislocation or subluxation at the final follow-up. One loose screw without a need to remove the screw and one fibrous union were also noted radiographically. All 28 shoulders remained completely stable and returned to preinjury levels of daily activity.

4. Discussion

Excellent and good clinical results have been reported with the open Latarjet procedure with a low rate of recurrence of shoulder dislocation (0–3.9%).[3,7,9–11] Patte et al described the following triple effects: (1) the conjointed tendon acts as a sling effect; (2) the coracoid bone transfer increases the glenoid surface (bone effect); (3) the coracoacrominal ligament repair reconstructs the anterior capsule effect.[12]

A biomechanical study showed significant increases in anterior and inferior translation after an open Latarjet procedure with dissection of the coracoacrominal ligament and conjointed tendon.[13] In another cadaver study, stability was compared under four different conditions (capsulotomy, bone defect, bone block procedure, and Latarjet procedure). The Latarjet procedure significantly increased stability reduced by a glenoid defect up to 350% and exhibited its maximum effectiveness in the abduction and externally rotated positions.[14] Those results confirm Patte's opinions of the triple effects.

A recent study showed that almost 60% of operative bony lesions are missed by plain radiographs alone.[15] We did not routinely perform CT for all patients. Only three patients with a bony defect were diagnosed by CT, and the other 25 by radiography (AP view or

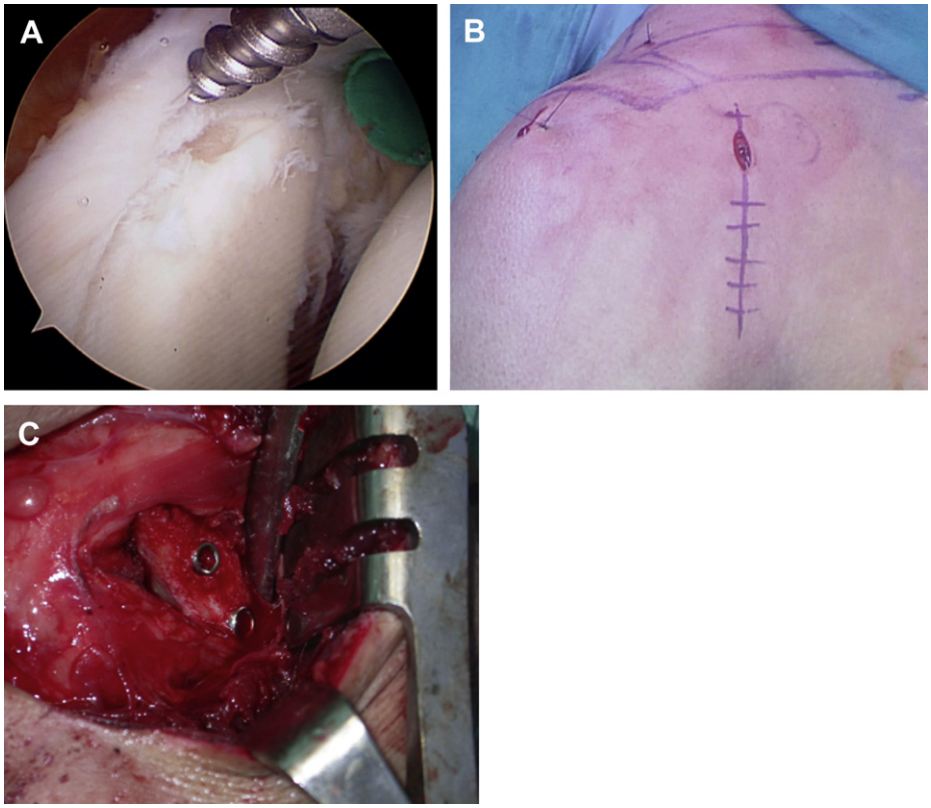

Fig. 3. (A) Type II SLAP lesion is debrided using a 2.8 mm metal suture anchor for SLAP repair. (B) The skin incision from the anterior portal. (C) The coracoid graft is secured to the anterior glenoid.

axillary view) and arthroscopic measurements. Presently, there is no strong evidence to support or refute the use of routine shoulder arthroscopy before an open procedure. A limited number of articles have assessed the importance and benefits of shoulder arthroscopy before a Latarjet procedure.[3,16] In our view, shoulder arthroscopy presents several advantages: (1) it actually evaluates the amount of glenoid bony loss and can be shifted to an open procedure; (2) it can fully identify and deal with intra-articular lesions (SLAP, Hill-Sachs lesion, rotator cuff, loose bodies); and (3) it provides adequate visualization of contact between the coracoid bone graft and the glenoid surface for accurate bone graft positioning when performing screw fixation.

The study by Paolo et al[16] found a high incidence of SLAP lesions (63.6%) in anterior shoulder instability with glenoid bony loss. This result was similar to our study (54%; 2 Type I and 13 Type II). One question to be considered is whether early arthritis and chronic pain occur easily if a SLAP repair is not done. Allain et al assessed the results of an open procedure without dealing with intra-articular pathology by shoulder arthroscopy and showed that only 38 of 58 shoulders (66%) had no pain and 36 shoulders (62%) had arthritis.[17] Lehmann et al[18] evaluated a coherency between glenohumeral osteoarthritis and SLAP lesions by using magnetic resonance arthrography and showed that a chondral lesion of the anterosuperior rim of the glenoid is also significantly associated with SLAP lesions. In a recent human cadaver study,[19,20] the results demonstrate that SLAP lesions lead to increased glenohumeral translational shoulder instability with subsequent increased LHB load. Patzer et al[21] recently studied whether SLAP lesions affect chondral lesions, and found that a SLAP lesion is highly associated with early onset of osteoarthritis of the glenohumeral joint (63%). We agree with their conclusions and consider a SLAP lesion to be a factor in early arthritis and refractory chronic pain. We routinely repair SLAP II lesions found during arthroscopy before an open procedure. In our study, our rehabilitation program did not differ between the SLAP group and no SLAP group, because we found that the modified Latarjet procedure provides good stability and allows early range of motion.

In our overall series of 28 modified Latarjet procedures combined with shoulder arthroscopy, we had no recurrent dislocation or subluxation after 7–11 years of follow-up. Our report showed a mean loss of external rotation (2.9°, range 0–5.1°) with a gain in forward flexion (3.5° range 0–6°). Overall, 20 of 22 shoulders with high activity demands had returned to previous activity at follow up. Our results are similar to those in a previous report by Burkhart et al.[3]

Literature reviews show a rate of moderate to severe arthrosis of 14–20% in patients with recurrent anterior dislocation of the shoulder after open Latarjet procedure in long-term follow-up.[11,17] Our study showed that only 11% of arthroses progressed one stage and a total of 7% of patients had moderate arthrosis at the final follow-up. We thought that the low rate of severe arthrosis in our study may have occurred because we dealt with intra-articular lesions using shoulder arthroscopy and gave careful attention to the problem of overhanging of the bone graft during the operation to avoid arthrosis. However, the follow-up period was not long (7–10 years). The etiology of arthrosis is unknown, but the risk increases with age at the first dislocation and the number of recurrences.[22] However, an overhanging position of the bone block after a Latarjet procedure increases arthrosis of the glenohumeral joint and limits internal rotation by

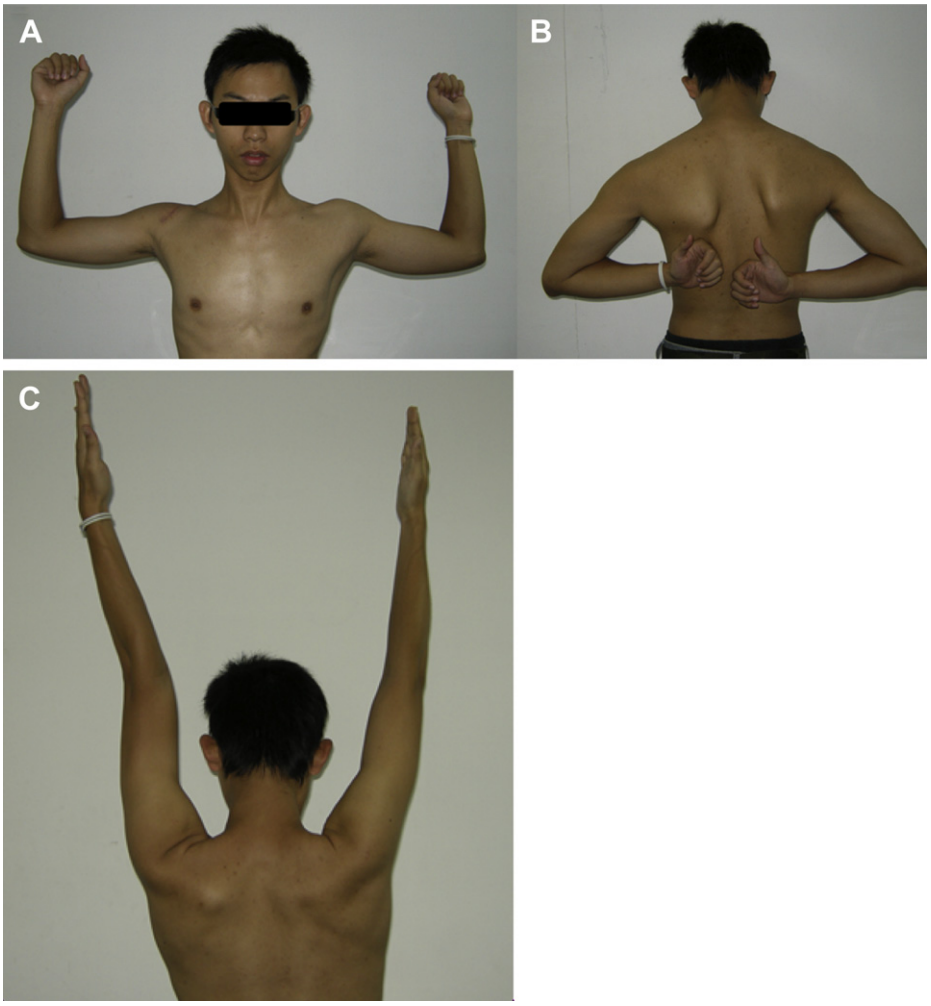

Fig. 4. The 23-year-old solider demonstrates good range of shoulder motion after modified latarjet procedure with shoulder arthroscopy.

head-coracoid impingment.[4,17,23] In addition, some authors recommend that the position of the coracoid bone graft be 2–4 mm medial to the joint with the screw and bone graft parallel to the glenoid joint line.[11,17]

Although our results showed a high degree of stratification after an open Latarjet procedure combined with shoulder arthroscopy, the study had some weaknesses. First, the number of patients was relatively small. Second, we did not have a control group of patients

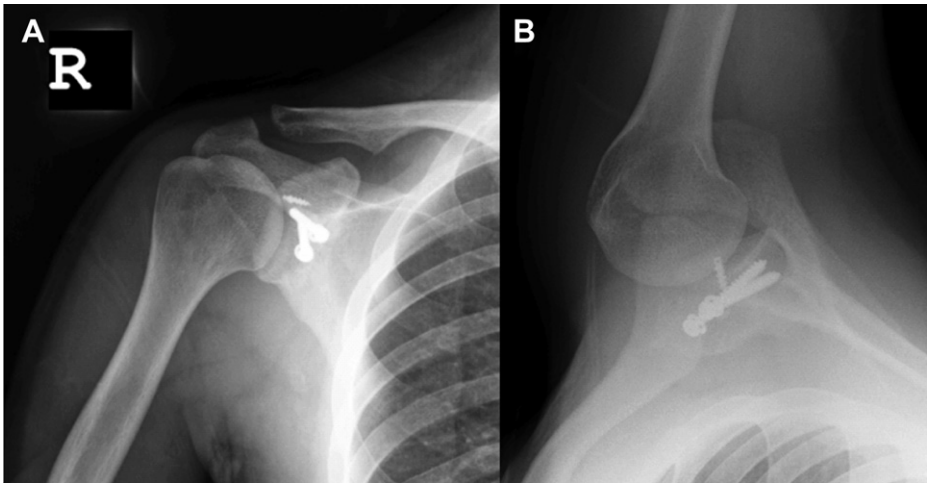

Fig. 5. Radiography showing the results at 6 months.

Table 2
Spectrum of accompanying arthroscopic finding in all 28 patients.

Intra-articular lesion	No. (%)
Loose body	6 (21)
SLAP lesion	15 (54)
Type I	2
Type II	13
Partial rotator cuff tear	6 (21)
Long head bicep tendinitis	23 (82)
Hill-Sachs lesion	28 (100)
Inverted pear glenoid	28 (100)

SLAP = superior labrum anterior and posterior.

Table 3
Comparison of ASES and WOSI scores between no SLAP and SLAP groups (independent sample *t* test).

	No SLAP ($n = 13$)	SLAP ($n = 15$)	p
Preoperative			
ASES	81.3 ± 9.1	82.1 ± 7.8	0.348
WOSI	236.3 ± 13.2	245.8 ± 11.2	0.677
Postoperative			
ASES	92.8 ± 13.2	93.7 ± 5.9	0.562
WOSI	48.7 ± 10,8	51.4 ± 9.6	0.493

who only received an open procedure without shoulder arthroscopy to compare results. The arthroscopic Latarjet procedure is gaining popularity and we will move in this direction in the future.

5. Conclusion

In our series, the modified Latarjet procedure combined with shoulder arthroscopy produced satisfactory surgical outcomes in patients with recurrent anterior shoulder instability with a glenoid bony defect. In addition, shoulder arthroscopy is useful in providing important information on intra-articular lesions and improves function. The high incidence of several pathologic lesions in chronic anterior shoulder instability with glenoid bony defects and shoulder arthroscopy should be considered in the surgical planning.

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