Osteolysis Following Reverse Shoulder Arthroplasty with Latissimus Dorsi and Teres Major Transfer

Gaku Matsuzawa[1], Toshitake Aizawa
[1]Tome Citizen Hospital

INTRODUCTION:
Reverse shoulder arthroplasty (RSA) is an effective treatment for improving active elevation (AE) in patients with severe rotator cuff tears. Active external rotation (AER) reportedly remains unchanged after RSA in patients with deficits in AE and AER with severe fatty infiltration of the external rotators (combined loss of active elevation and external rotation; CLEER). Adding latissimus dorsi and teres major tendon transfer (the modified L'Episcopo procedure) to RSA is expected to achieve good shoulder function, including active external rotation. Unprecedented stress is exerted on the posterolateral side of the humeral shaft on account of it being the site of the transferred tendon attachment. Several studies have reported the possibility of radiological changes at the tendon insertion point during the procedure. However, the clinical significance of this phenomenon remains unclear. The present study aimed to examine the impact of postoperative radiological changes in the area of tendon insertion for RSA and the modified L'Episcopo.
METHODS: We retrospectively followed up patients with CLEER who were treated with RSA and the modified L'Episcopo. Twenty-nine patients were enrolled and followed up for at least two years. The osteolysis grade in the humerus was evaluated using plain radiography and CT. The proportion of cases with osteolysis was determined, followed by patient subdivision into two groups, namely, OLA that comprised patients with none or minor osteolysis affecting less than half of the cortex, and OLB that comprised patients with severe osteolysis affecting more than half or the entire thickness of the cortex in the affected area (Figure 1). The humeral component fixation method with or without cement, shoulder range of motion (ROM), isometric muscular strength (IMS), and ASES scores were examined at the final follow-up. The range of internal rotation was evaluated using the Constant-Murlay score. These parameters were assessed in subjects who were treated with either cemented or cementless stems.
RESULTS: There were no significant differences in patient demographics between the groups. Osteolysis in the humerus was observed in 3 cases (89%). While all subjects in the OLA group (n=13) used the cemented humeral component, 11 and 5 patients in the OBL group (n=16) used the cemented and cementless component, respectively. No cases of periprosthetic fractures were observed. The ROM of forward elevation and external rotation in active and passive manners in the OLA group were significantly smaller than those in the OLB group ($p<0.05$). No significant differences in the ROM of active and passive internal rotation, as well as in the IMS and ASES scores between the groups were evident (Table 1). All the patients treated with cementless stems and 11 of the 24 patients (45.8%) treated with cemented components had severe osteolysis in the area of tendon insertion in the humerus ($p<0.05$). While the ROM of forward elevation and external rotation in the OLA group were significantly smaller than that in the OLB group, no significant differences in IMS and the ASES score were evident between subjects treated with the cementless component in the groups (Table2).
DISCUSSION AND CONCLUSION: Larger ROM is associated with more severe osteolysis, which may be due to physical stimulation of the posterolateral humeral side, leading to wearing out. The severity of osteolysis was not associated with poor clinical results. Since all subjects treated with cementless components experienced severe osteolysis, cement filling in the tendon insertion area might also be related to the severity of osteolysis apart from the large ROM post-surgery. Component selection for RSA with L'Episcopo should thus be carefully evaluated to avoid postoperative complications, such as, periprosthetic fractures.

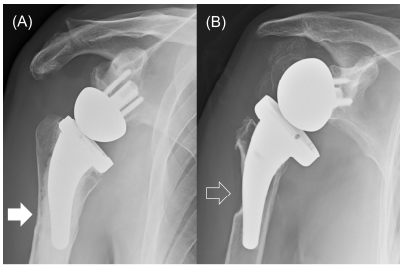

Figure 1. Subjects were divided into the (A) OLA group with minor osteolysis on the humeral lateral side (white arrow), and (B) OLB group with severe osteolysis on the humeral lateral side (white lined arrow).

Table 1 Clinical outcomes of all subjects.

mean (SD)		OLA (n=18)	OLB (n=11)	*p* value
ROM active	FE (°)	147.1 (12.1)	130.0 (12.9)	<0.01 †
	ER (°)	31.8 (8.1)	15.0 (13.3)	<0.01 †
	IR (points)	4.8 (1.6)	4.6 (0.9)	0.789†
passive	FE (°)	160.0 (10.7)	136.9 (40.9)	<0.01 †
	ER (°)	50.0 (6.3)	31.5 (8.5)	<0.01 †
	IR (points)	6.1 (1.3)	6.1 (1.7)	0.854†
power (N)	Abd	59.7 (15.9)	66.3 (17.7)	0.299‡
	AbdER	31.2 (10.6)	39.9 (16.3)	0.096‡
	AbdIR	30.2 (12.0)	39.1 (21.9)	0.312†
	ER	26.9 (10.7)	41.6 (25.1)	0.068‡
	IR	29.4 (11.3)	40.1 (21.3)	0.123†
ASES score (points)		86.0 (3.8)	83.0 (11.2)	0.242‡

SD standard deviation; FE forward elevation; ER external rotation; IR internal rotation; Abd Abduction AbdER External rotation in abduction; AbdIR Internal rotation in abduction; ER External rotation with the arm at the side; IR Internal rotation with the arm at the side
† Mann-Whitney U test
‡ two-sample t-test

Table 2 Clinical outcomes of subjects treated with cementless component.

mean (SD)		OLA (n=13)	OLB (n=11)	*p* value
ROM active	FE (°)	145.4 (13.5)	130.0 (12.9)	<0.01 †
	ER (°)	34.5 (6.5)	15.0 (13.3)	<0.01†
	IR (points)	4.5 (1.2)	4.6 (0.9)	0.649†
passive	FE (°)	158.1 (10.7)	136.9 (40.9)	<0.05†
	ER (°)	50.4 (6.5)	31.5 (8.5)	<0.01†
	IR (points)	6.0 (1.2)	6.1 (1.7)	0.826†
power (N)	Abd	60.5 (16.9)	66.3 (17.7)	0.421‡
	AbdER	34.1 (10.0)	39.9 (16.3)	0.321‡
	AbdIR	34.2 (10.2)	39.1 (21.9)	0.786‡
	ER	30.0 (10.8)	41.6 (25.1)	0.168‡
	IR	33.0 (11.0)	40.1 (21.3)	0.415†
ASES score (points)		86.8 (4.4)	83.0 (11.2)	0.286‡

SD standard deviation; FE forward elevation; ER external rotation; IR internal rotation; Abd Abduction AbdER External rotation in abduction; AbdIR Internal rotation in abduction; ER External rotation with the arm at the side; IR Internal rotation with the arm at the side
† Mann-Whitney U test
‡ two-sample t-test