The Alvik glenoplasty for the unstable shoulder

Modification of the Eden-Hybbinette operation in 66 cases

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66 shoulders treated with the Alvik modification of the Eden-Hybbinette operation for recurrent anterior dislocation or subluxation were examined with an average follow-up of 6 years. Two shoulders had redislocated and one had subluxations. Forty-five of the 57 cases radiographically examined showed bony healing of the transplant; nonunion of the transplant occurred in 6 cases and resorption in another 6. The objective results were excellent in 35 cases, good in 18, fair in 3, and poor in 3 cases. The patients' subjective rating was excellent or good in 61 of the 66 cases. The Alvik operation can be recommended.

Treatment of anterior instability of the shoulder by reconstruction of the anterior glenoid with a bone graft is well-known in Scandinavia (Palmer and Widén 1948, Jakobsson 1949, Hindmarsch and Lindberg 1967, Skogland and Sundt 1973). In the original procedure an iliac bone graft was inserted under the glenoid labrum and the periosteum without additional fixation (Eden 1918, Hybbinette 1932). Alvik (1948) modified the Eden-Hybbinette operation by reconstruction of the anterior glenoid with an iliac bone graft placed in a performed wedge-shaped groove in the neck of the scapula (Figure 1). The few results published from this procedure have been encouraging. Said and Medbö (1969) reported 21 patients with no recurrences, and Schröder and Fristed (1985) reoperated on 2/31 because of instability.

We report 66 shoulders operated on with the Alvik modification.

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Patients and Methods

From 1970 to 1984, 65 patients (10 females and 55 males) underwent the Alvik operation for anterior instability of the shoulder at Skellefteå hospital; both shoulders were operated on in 1 patient.

Twenty shoulders had had several disabling subluxations with a positive apprehension test; and 46 had recurrent anterior dislocations, with more than 10 in 40 shoulders.

The operation was essentially performed as described by Said and Medbö (1969) through an anterior approach via the deltopectoral groove. To obtain better access an osteotomy of the coracoid process was performed in 7 cases; it was reattached with a wire. The subscapularis tendon was transsected 1 cm from its insertion. A 12-mm-long and 5-mm-wide groove was made with an osteotome in the anterior aspect of the scapular neck 5 mm from the glenoid rim. An iliac-crest graft measuring 20 x 12 x 5 mm was wedged into the groove with its cortical side and the convex crest facing laterally, thus expanding the glenoid cavity anteriorly and laterally about 10 mm (Figure 1). The subscapularis tendon was sutured double at its insertion, and the wound was closed. Postoperatively, the arm was protected against the body for 5 (2–7) weeks. The median operation time was 2 hours. Superficial postoperative infection at the iliac-crest occurred in 2 cases and healed within 4 weeks in both. There were no deep infections. Two patients were reoperated on in the

Table 1. Patients' data and results

A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	26	M	0	11	1	1	0	2	–	30	0	5	0
2	27	M	0	10	1	0	0	1	–	20	0	5	0
3	34	M	1	6	1	0	0	1	–	10	0	–	4
4	28	M	1	6	1	1	0	0	–	20	0	4	4
5	22	F	0	9	1	0	0	2	–	10	0	5	0
6	22	M	0	5	2	2	1	0	–	20	0	4	0
7	19	M	0	4	1	0	0	0	–	5	0	5	0
8	34	F	1	3	1	0	1	0	–	10	0	3	0
9	24	M	0	3	1	0	0	0	–	0	0	3	0
10	23	F	1	5	1	1	2	0	–	45	20	–	–
11	39	M	1	9	3	3	2	2	–	10	45	–	–
12	21	M	1	7	1	1	1	0	–	25	10	–	4
13	23	M	1	8	2	2	2	0	–	15	0	–	–
14	19	F	0	3	1	0	0	0	–	0	10	–	3
15	31	M	1	7	1	0	0	1	–	15	0	–	2
16	20	M	0	3	1	0	0	1	–	5	0	3	0
17	27	F	0	7	1	0	0	0	–	15	20	5	1
18	30	F	0	10	1	1	0	1	–	15	10	5	3
19	23	M	0	4	1	0	0	0	–	10	0	5	0
20	36	M	1	3	1	1	0	0	–	20	0	5	0
21	31	M	1	5	1	0	1	0	–	0	0	3	0
22	21	M	1	4	2	3	0	0	+	80	0	–	0
23	22	M	0	4	1	0	0	0	–	20	10	–	3
24	27	M	0	5	1	0	0	2	–	0	10	–	0
25	23	M	1	3	1	0	0	0	–	0	10	5	0
26	21	M	1	2	1	1	0	0	–	30	5	4	0
27	52	M	0	2	1	0	0	0	–	10	0	5	0
28	27	M	1	2	1	0	1	0	–	15	0	5	0
29	32	M	0	2	1	0	0	0	–	0	0	5	0
30	18	M	1	2	1	0	0	0	–	20	0	4	4
31	21	M	0	2	1	0	0	0	–	5	0	5	0
32	43	M	1	13	1	2	0	0	–	0	0	4	0
33	22	M	1	12	1	0	0	0	–	10	0	5	11
34	22	M	1	12	1	1	0	0	–	30	10	5	1
35	20	M	1	14	1	1	0	2	–	25	0	5	0
36	22	M	0	12	1	1	0	2	–	25	0	4	0
37	20	F	1	11	1	1	0	2	–	25	0	5	0
38	31	M	1	8	1	0	0	1	–	15	10	–	–
39	48	F	1	7	1	1	0	0	–	10	10	4	0
40	26	M	1	7	1	1	0	1	–	15	0	–	–
41	19	M	1	2	1	0	0	0	–	5	0	–	–
42	34	M	1	10	1	0	2	0	–	0	0	–	–
43	27	M	1	2	1	1	0	1	–	10	0	4	3
44	19	M	0	2	1	0	0	0	–	0	10	5	0
45	47	M	1	6	1	0	0	1	–	–	–	6	7
46	24	M	1	4	1	0				–	0	0	
47	21	M	0	7	1	1				–	0	0	
48	28	M	0	8	1	0	0	0	–	15	0	–	–
49	22	M	0	2	1	1	0	0	–	10	10	4	3
50	22	M	1	3	1	0	0	0	–	5	0	5	0
51	21	M	1	3	1	0	0	1	–	5	0	5	0
52	21	M	1	5	1	0	0	0	–	0	0	5	5
53	21	M	1	2	1	0	1	0	–	10	0	5	5
54	26	M	1	8	1	1	0	1	–	10	0	4	6
55	30	M	1	5	1	0	0	0	–	15	0	–	4
56	36	F	1	5	2	3	2	0	+	20	10	–	–
57	39	M	0	6	1	0	0	1	–	0	15	6	0
58	24	M	1	5	1	0	0	0	–	15	15	5	0
59	43	F	0	9	1	1	2	0	–	0	0	–	0
60	22	M	1	10	1				–				
61	18	M	1	6	1				–				
62	49	M	1	6	1				–				
63	22	M	1	8	1				–				
64	17	M	1	6	1				–				
65	31	M	0	15	1				–				
66	30	M	1	5	1				+				

A case
B age
C sex
D side
  0 dominant
  1 nondominant
E follow-up time (years)
F subjective evaluation
  0 excellent
  1 good
  2 moderate
  3 poor
G objective evaluation
  same as F
H union of bone block
  0 bony union
  1 pseudarthrosis
  2 resorption
I degree of arthrosis
  0 none
  1 mild
  2 moderate
J redislocation/resubluxation
K limitation of external rotation in adduction
L limitation of internal rotation
M altitude position of the bone graft
  given clockwise
  3 at the equator
  6 at the lowest part of the glenoid
N position of the bone graft medial to the glenoid rim in millimeters

Cases 46 and 47 are the patient who was operated on bilaterally. The patient refused a radiographic examination.

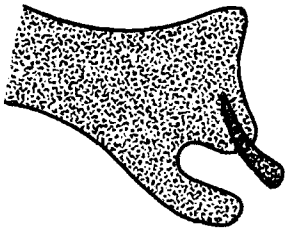

Figure 1. The iliac bone graft, with the cortical side towards the joint, jammed into a groove of the anterior glenoid.

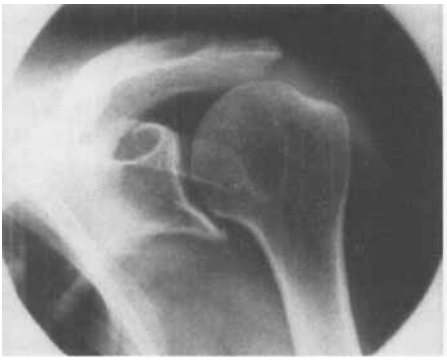

Figure 2. Frontal view of the shoulder with bony healing of the graft in Case 7.

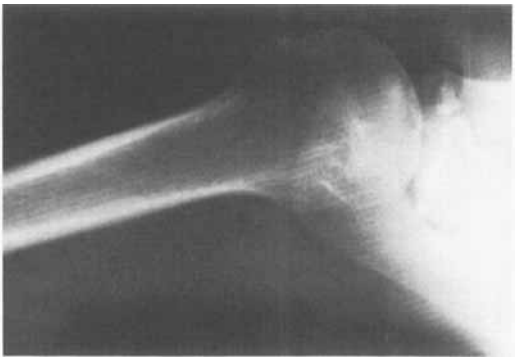

Figure 3. Axillary view of the shoulder with nonunion of the graft in Case 28.

Table 2. The results of the radiographic examination concerning the healing of the bone graft (N 57) in relation to the subjective rating of the patients and to the number of patients with recurrences

Type of healing of the graft		Subjective evaluation			Objective evaluation		
	n	Good	Fair	Poor	Good	Fair	Poor
Osseous union	45	44	1[a]	0	42	2	1[a]
Nonunion	6	5	1	0	5	1	0
Resorption	6	3	2[a]	1	3	1	2[a]

[a] Redislocation in 1 case.

immediate postoperative period because of bleeding.

The capsule had lost its attachement to the anterior glenoid rim in 55 cases, and there was a fracture or cartilage lesions of the anterior glenoid in 41 cases. At a median follow-up time of 6 (2–15) years, 58 patients were examined by the authors, and 7 answered a questionnaire by telephone. Shoulder movement was recorded for outward and inward rotation. The results have been given as the difference in degrees between the operated on and nonoperated on side. We have also recorded the movement of the shoulder in inward rotation and extension as the number of spinal processes reached between the operated on and the nonoperated on side. The results were scored objectively according to Rowe et al. (1978) as excellent, good, fair, or poor. Further, the patients were asked for their own rating (good, fair, or poor).

Radiographs were obtained in 57 of the 66 shoulders and included four different projections (frontal, subcoracoid, axillary, and side views) according to Lamm et al. (1982). Frontal and side views were also taken of the nonoperated on side. Evaluation of the radiographs was done independently by a radiologist. Radiographic evidence of arthrosis was graded as mild, moderate, or severe according to Samilson and Prieto (1983).

The healing of the transplant was classified as osseous, nonunion (radiolucent zone between the transplant and the scapular neck), or resorption (no visible transplant). The position of the transplant was analyzed in the mediolateral position given as the distance in millimeters from the glenoid rim. The altitude position was noted clockwise with position three at the equator and position six at the most distal part of the glenoid (Hovelius et al. 1983 a).

Results

At follow-up two shoulders had redislocated. Case 22 was an ice-hockey player who sustained violent trauma against the shoulder half a year postoperatively. Case 56 sustained the redislocation during an epileptic seizure 2 years postoperatively. In addition

subluxations occurred in Case 66 within 2 years following the operation, but ceased after that.

The subjective rating was good in 61 cases, fair in 4, and poor in 1 case. In the 59 cases rated objectively, 35 were excellent, 18 good, 3 fair, and 3 poor (Table1).

Postoperatively, there was an average decrease in outward rotation of 13° (0°–80°) with the arm adducted and 11° (6°–45°), with the arm abducted. Inward rotation in adduction was limited 4° (0°–45°), but in extension with 1.6 (0–6) spinal processes. Eight of the 24 patients who were operated on on the dominant side complained of difficulty in throwing. The median time until 29 patients returned to preoperative sports activity was 5 (2–24) months. The bone transplant united in 45 of the 57 examined shoulders (Figure 2). Six shoulders had nonunion (Figure 3), and six had resorption of the transplant (Table 2).

There was a bony healing of the transplant in 1 of the patients with redislocations, whereas the patient with epilepsy had no visible transplant. The patient with subluxations was not investigated radiographicaly. It was possible to determine in 39 patients the altitude position of the transplant (Table 1). The 2 cases with the graft at the most distal part of the glenoid had no recurrences. The distance from the transplant to the glenoid rim was 5 mm or less in 47 of the 50 shoulders evaluated. The three shoulders with more than 5-mm distance were all stable. Mild or moderate arthrosis at follow-up, seen in a third of the shoulders, did not affect the results.

Discussion

Our rate of redislocations was 3 percent which compares favorably with other procedures such as Bristol (Hill et al. 1981, Hovelius et al. 1983b, Torg et al. 1987), Bankart (Morrey and Janes 1976, Rowe et al. 1978, Hovelius et al. 1979), and Putti-Platt (Brav and Jeffress 1952, Morrey and Janes 1976; Hovelius et al. 1979). In the Alvik procedure the bone block is wedged into a groove of the scapular neck and no additional fixation is used. Reoperations due to screw loosening as described in the Bristow procedure are thus eliminated (Hovelius et al. 1983b, Zuckerman and Matsen 1984). Average time for surgery was 102 minutes compared with 150 minutes for the Bankart procedure (Rowe et al. 1978), which is regarded as technically difficult by many authors (Solonen and Rokkanen 1972, Morrey and Janes 1976).

Our radiographic results with bony healing in the majority seem to be at the level of the best results published with other bone-block procedures, such as the original Eden-Hybbinette (Lindholm 1974) and Bristow operations (Sweeney et al. 1975, Hill et al. 1981) In another follow-up study of 29 patients operated on with our method 28 had bony healing of the transplant (Schröder and Fristed 1985). One of the 2 patients in the present series with redislocations had resorption of the transplant. Further 3 of the 6 patients with resorption of the bony graft rated the operation as fair or poor because of arthrosis or pain. Thus resorption of the bone graft seems to impair the clinical results.

The Alvik procedure seems to give good clinical results for recurrent anterior dislocations of the shoulder. It may also be useful in cases with a deficient anterior margin of the glenoid due to fracture or repeated dislocations or after other failed procedures.

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