



This is an enhanced PDF from The Journal of Bone and Joint Surgery The PDF of the article you requested follows this cover page.

## The coracoid transfer for recurrent dislocation of the shoulder. Technical aspects of the Bristow-Latarjet procedure

L Hovelius, L Korner, B Lundberg, C Akermark, P Herberts, T Wredmark and E Berg J Bone Joint Surg Am. 1983;65:926-934.

## This information is current as of October 24, 2010

<b>Reprints and Permissions</b>	Click here to <b>order reprints or request permission</b> to use material from this article, or locate the article citation on jbjs.org and click on the [Reprints and Permissions] link.
Publisher Information	The Journal of Bone and Joint Surgery 20 Pickering Street, Needham, MA 02492-3157 www.jbjs.org

# The Coracoid Transfer for Recurrent Dislocation of the Shoulder

**TECHNICAL ASPECTS OF THE BRISTOW-LATARJET PROCEDURE** 

BY L. HOVELIUS, M.D.\*, GÄVLE, L. KÖRNER, M.D.†, GÖTEBORG, B. LUNDBERG, M.D.\*, GÄVLE, C. ÅKERMARK, M.D.‡, STOCKHOLM, P. HERBERTS, M.D.†, GÖTEBORG, T. WREDMARK, M.D.‡, STOCKHOLM, AND E. BERG, M.D.§, LUDVIKA, SWEDEN

From Gävle Hospital, Gävle; Eastern Hospital, Göteborg; Huddinge Hospital, Stockholm; and Ludvika Hospital, Ludvika

ABSTRACT: One hundred and twelve shoulders with recurrent anterior dislocation were treated with the Bristow-Latarjet procedure and had a two to five-year follow-up after surgery. The incidence of redislocation was 6 per cent, and an additional 7 per cent of the patients reported occasional subluxation. In 106 shoulders, a radiographic study was carried out in order to determine the importance of factors such as healing and position of the transferred coracoid process with regard to the postoperative clinical results. No redislocation or subluxation occurred in the forty patients in whom the transplant showed osseous or fibrous union at the scapula and was located inferior to the equator of the glenoid and less than one centimeter medial to its rim. In shoulders in which either the transplant had migrated more than 1.5 centimeters from that position or was placed one centimeter or more medial to the glenoid rim, the incidence of redislocation or subluxation was significantly increased.

Transfer of the coracoid process through the subscapularis tendon as a method of treating recurrent anterior instability of the shoulder was described in 1954 by Latarjet, who used a screw to secure fixation of the coracoid to the scapular neck. The Bristow procedure, in which the coracoid process is merely sutured to the anterior part of the scapular neck through a transversely sectioned subscapularis muscle, was described by Helfet in 1958. The modifications of the Bristow procedure<sup>3,9,10,13</sup> are in fact exactly the same procedure as was first described by Latarjet. It therefore seems proper to give credit to Latarjet in the naming of the operation.

To date, papers on the Bristow procedure have given little information about the importance of certain technical aspects of the surgery affecting the final position of the transferred coracoid process. Sweeney et al. reported bone union of the transferred coracoid process to the scapular neck in 85 per cent of their patients, and were of the opinion that migration of the transplant did not influence the postoperative stability of the shoulder. Others<sup>5</sup> have come to the opposite conclusion. In one account transfer of the trans-

926

plant to the anteroinferior part of the neck was recommended<sup>2,16</sup>, and it has been claimed that the action of the transplant need not necessarily be that of a bone-block<sup>16</sup>, contrary to previous ideas<sup>3,9</sup>.

The purpose of the present study was to analyze the bearing of several technical factors on the clinical results, to answer the following questions. Is postoperative redislocation related to: (1) solid fusion of the transplant, (2) its position medial to the glenoid rim (so-called longitude position), or (3) its position superoinferior to the glenoid rim (socalled altitude position)? Is solid fusion of the transplant related to: (1) fracture of the transplant at surgery, (2) duration of postoperative immobilization of the shoulder, or (3) length of the screw and its penetration of the posterior part of the cortex of the scapular neck?

The study was based on the first 112 Bristow-Latarjet procedures performed at four Swedish hospitals. In another article we analyzed the same series of patients with regard to the clinical results after two to five years of follow-up<sup>6</sup>. Seven (6 per cent) of the dislocations had recurred postoperatively, and one patient had an injury to the musculocutaneous nerve. The limitation of outward rotation as compared with the other shoulder averaged 19 degrees in adduction and 21 degrees in abduction. There was a measurable loss in strength (10 per cent) as judged by comparison of the two shoulders. One hundred and one (90 per cent) of the patients considered the result to be excellent or good; eight, fair; and three, poor. Prior to injury, thirty of the total of 112 patients had engaged in competitive sports (ice hockey, soccer, rugby, and so on) and fifty had engaged in recreational sports activities. Ninety per cent of these patients returned to their preinjury level of athletic participation<sup>1</sup>.

#### **Material and Methods**

Between January 1975 and November 1979, 113 Bristow-Latarjet procedures were performed in four Swedish hospitals<sup>6</sup>. Before then this operative repair had not been used in these hospitals, and during 1975 to 1977 it was adopted as the only operative procedure for recurrent anterior instability of the shoulder. Since one patient was lost to follow-up, the study includes 112 shoulders. Some details on the selection of patients and surgical treatment in the four hospitals (Table I) summarize and supplement our previous report<sup>6</sup>. Twenty of the dislocations were classified

<sup>\*</sup> Orthopaedic Department, Gävle Hospital, 801 17 Gävle, Sweden. Please address reprint requests to Dr. Hovelius.

<sup>†</sup> Eastern Hospital, Göteborg, Sweden.

<sup>‡</sup> Huddinge Hospital, Stockholm, Sweden.

<sup>§</sup> Ludvika Hospital, Ludvika, Sweden.

	Hospital I	Hospital II	Hospital III	Hospital IV
No. of shoulders	36	35	30 (1 bilat.)	10
Type of dislocation (no.)	3 spont., 33 traum.	5 spont., 30 traum.	11 spont., 20 traum.	1 spont., 9 traum.
Duration of surgery (mins.)	54 (35-90)	67 (25-100)	89 (50-185)	73 (55-110)
Screw most often used	Malleolar	Malleolar	Cortical, and washer	Malleolar or cancellous
Length of screw (cm)	3.5-4.5	2-3.5	3-6	3-5
Joint opened or not	33 yes, 3 no	Yes	18 yes, 13 no	Yes
Coracoid fractured (no.)	1	5	9	1
No. of surgeons	2	2	6	1
No. with radiographs at follow-up	36/36	30/35	31/31	9/10
Bone-healing confirmed by fluoroscopy	Yes	No	Yes	No
Bone-healing (no.)	24/36	11/30	14/31	6/9
Fibrous union (no.)	10	7	11	2
Migration of transplant (no.)				
≤1.5 cm	2	3	4	1
>1.5 cm	0	6	1	0

TABLE I Data on the Patients

as spontaneous, meaning that the initial dislocation was caused by insignificant trauma which a normal shoulder ordinarily would tolerate, such as an imprudent movement of the arm when throwing a ball. No shoulders with voluntary dislocations<sup>12</sup> were included in the study.

The surgical technique essentially followed the principles described by Latarjet and later by May, Lombardo et al., and Collins and Wilde. The aim was to secure the transferred tip of the coracoid process to the anterior part of the scapular neck medial to the glenoid rim. In seventy-one shoulders the subscapularis muscle was divided along its fibers. In forty-one shoulders (all in Hospital I) an additional, more or less transverse, division was made. No capsular imbrication was performed. In sixteen shoulders the joint was not opened, and in fifty-seven of the ninety-six shoulders in which the joint was opened the surgeon described a Bankart lesion. In twenty-nine shoulders no lesion of the articulation was found and in ten shoulders there was no information available in this respect. Two shoulders had osteoarthritis, and in one shoulder loose bodies were removed from the joint.

A malleolar screw about four centimeters long was used most often. A cortical screw with a washer was used in fewer than one-third of the shoulders. Altogether eleven surgeons were involved, all but one of them senior surgeons. Postoperatively the shoulder was immobilized with the arm against the body for two to six weeks or was merely held in a sling. In sixteen patients the transplant was acci-

	Patients with Failed Surgery Prior to the Bristow-Latarjet Procedure*									
Case	Sex	Type of Initial Dislocation	Age at Initial Surgery (Yrs.)	Type of Failed Procedure	Time from Surgery to Recurrence	Result of Bristow-Latarjet Repair				
1	М	Spontaneous	22	Putti-Platt	13 mos.	Poor				
2	F	Traumatic	20 25	Putti-Platt Eden-Hybbinette	4 yrs. <1 yr.	Excellent				
3	М	Spontaneous	28 30	Putti-Platt Putti-Platt	1 yr. 6 mos.	Good				
4	М	Traumatic	21	Putti-Platt	18 mos.	Good				
5	М	Traumatic	25	Putti-Platt	18 mos.	Poor				
6	М	Traumatic	31	Putti-Platt	2 yrs.	Excellent				
7	М	Traumatic	17	Putti-Platt	4 mos.	Excellent				
8	М	Traumatic	20	Putti-Platt	6 mos.	Excellent				
9	М	Traumatic	17	Putti-Platt	6 mos.	Excellent				
10	М	Traumatic	25	Nicola	3 mos.	Excellent				
11	М	Traumatic	24 25	Putti-Platt Putti-Platt	1 wk. 1 yr.	Good				
12	М	Traumatic	24 26	Putti-Platt Eden-Hybbinette	6 mos. 11 mos.	Good				

TABLE II

\* Cases 1, 5, and 12 are documented further in Table VI.

dently fractured during surgery. The shoulder was immobilized postoperatively for five weeks in eight of these patients, for four weeks in four, and for three weeks in three. A sling was used for two weeks in one patient. At follow-up these patients did not differ from the whole series regarding range of movement of the shoulder.

In twelve shoulders, previous surgery had failed (Table II).

The minimum follow-up was two years (mean, thirty

months; range, two to five years), at which time a clinical and radiographic examination was done, with special attention to reports of postoperative redislocation or subluxation. The shoulders were classified as stable, subluxated, or redislocated. Subluxation was defined as one or more specific transient episodes when the patient felt the shoulder to be almost dislocated, with immediate spontaneous reduction. The patient usually did not feel pain. Redislocation was defined as an incident that required manipulative reduction.



FIG. 1-A Osseous union.



FIG. 1-B Fibrous union.

The radiographic examination, which was performed on 106 of the 112 shoulders, included four different projections (frontal, subcoracoid, side, and axillary)<sup>7</sup>. Bone union of the transplant to the scapular neck was considered to be present when there was no visible radiolucent zone between the transplant and the scapular neck on the four radiographs (Fig. 1-A). This was routinely confirmed by fluoroscopy in two of the four hospitals. We did not use fluoroscopy to establish whether the transplant was stable. Fibrous union was considered to be present when the transplant showed separation from the scapular neck by a radiolucent zone no wider than five millimeters (Fig. 1-B). This group was divided into two subgroups (stable and unstable) as indicated by signs of instability of the screw. In the unstable subgroup the radiographs showed a radiolucent zone of one millimeter or more around the intrascapular part of the screw, and we inferred that the transplant as well as the screw was unstable. In the stable subgroup, the radiograph showed no signs of osteolysis around the screw.

When a radiolucent zone of more than five millimeters between the transplant and the scapular neck was demonstrated on one or more of the four radiographs, the implant was classified as migrated (Fig. 1-C). Slight migration meant that the interval was 1.5 centimeters or less and severe migration, more than 1.5 centimeters. Generally we could not establish if this interval was the result of malpositioning of the bone-block at operation or if the coracoid had moved in the postoperative period. We use the term "migration" because we consider the last circumstance to be more probable.

In our analysis of the bearing of the position of the transplant on the clinical results, the eighty-five shoulders that had only osseous or fibrous union were studied (Table IV). The analysis was carried out with regard to position with reference to two axes: medial-lateral (the longitude position) and superior-inferior (the altitude position). For the longitude position, the shoulders were assigned to two groups: those in which the transplant was one centimeter or more medial to the glenoid rim comprised one group and the remaining shoulders, the other group (Figs. 2-A and 2-B). For the altitude position, the shoulders were divided into three groups: high, middle, and low altitude (Fig. 3).



FIG. 1-C A migrated transplant.

Discriminant analysis including analysis of variance and the chi-square test with Yates correction were used for the statistical evaluation.

### Results

At follow-up, seven shoulders (6 per cent) had redislocated. Another eight shoulders (7 per cent) had had one or two subluxations. Five of the seven patients with redislocation and seven of the eight with subluxation had the complication within the first postoperative year. In the remaining three patients the recurrences or subluxations occurred during the second postoperative year. There were no redislocations during the two to four-year follow-up (twenty-three patients) or the four to five-year follow-up (seven patients).



FIG. 2-A



FIG. 2-B

Figs. 2-A and 2-B: Longitude position. Axillary radiographs demonstrating a transplant close to the joint (Fig. 2-A) and one that is situated one centimeter medial to the glenoid rim (Fig. 2-B).

ì

930

	Trau	matic Dislocations (N	0.)	Sponta	aneous Dislocations (	No.)					
	No Recurrence	Recurrence	Subluxation	No Recurrence	Recurrence	Subluxation					
Hospital I	30	1	2	3	0	0					
Hospital II	25	1	4	4	0	1					
Hospital III	18	2	0	7	3	1					
Hospital IV	9	0	0	1	0	0					
Total	82	4 (4%)	6 (7%)	15	3 (15%)	2 (10%)					

TABLE III Results Obtained at the Four Hospitals

Postoperative dislocation or subluxation was only once caused by significant trauma (Case 2, Table VI), and this patient was the only one who had to visit a hospital to have the shoulder reduced. Consequently the diagnosis of a redislocation or subluxation in the majority of patients (fourteen of fifteen) was based on information from the



Fig. 3

Altitude position. Radiograph (side view) demonstrating a transplant situated above the equator (1). The arrow indicates the middle position on the equator (2), and (3) shows the low position (below the equator).

patient that was not confirmed radiographically.

With regard to the traumatic and spontaneous dislocations, the results obtained in each of the four hospitals (Table III) revealed that even though there were more redislocations and subluxations in the group in which the index operation had been performed after spontaneous dislocation (five of twenty) than in the group with traumatic dislocation (ten of eighty-two), the difference was not statistically significant.

## Healing and Migration of the Transplant (Table IV)

Of 106 shoulders, in 52 per cent the transferred coracoid showed bone union; in 28 per cent, fibrous union; and in 16 per cent, migration. Seven shoulders (7 per cent) had more than 1.5 centimeters of migration from the presumed original position. In this group of seven severely migrated transplants, two shoulders had recurrence and two had subluxation, a significant (p < 0.01) difference from the incidence in the other patients (eleven of ninety-five). The difference regarding recurrences among slightly migrated transplants (one of ten) compared with severely migrated transplants (four of seven) was not statistically significant.

In the group with a stable transplant, seven (10 per cent) of sixty-seven shoulders had symptoms of instability (subluxation or dislocation). The corresponding figure for the thirty-five patients with an unstable transplant was eight (23 per cent). Even though this difference may be important, especially when redislocations only are considered, it is not statistically significant.

## Distance of the Transplant from the Glenoid Rim (Longitude Position) (Table V)

In seven shoulders the transplant was ten millimeters or more medial to the rim. Two of the shoulders had redislocated and two others had subluxated. The prevalence of instability was significantly greater in these shoulders than among those in which the transplant was situated closer to the joint (six of seventy-eight) (p < 0.01).

## Position of the Transplant with Respect to the Superior-Inferior Axis (Altitude) (Table V)

The majority of subluxations (four of six) and the four recurrences occurred among the forty-two shoulders in which the transplant was at or above the equator. Discriminant analysis emphasizes the significance of too medial a position (F = 17.9, p < 0.01) and also shows that there is

	Stable '	Fransplants	Unst	Unstable Transplants			
	Fibrous Union,		Fibrous Union,	Mig	rated		
	Bone Union	Stable Screw	Loose Screw	≤1.5 cm	>1.5 cm	Resorbed	No Radiographs
Total no. of shoulders	55	12	18	10	7	4	6
Redislocations	2 (4%)	0	2 (11%)	1 (10%)	2 (29%)	0	0
Subluxations	5 (9%)	0	1 (5%)	0	2 (29%)	0	0

TABLE IV

REDISLOCATIONS	AND SUBLUXATION	ς as Relater	D TO HEALING OR	MIGRATION OF THE	TRANSPLANT

a significant relationship (F = 4.36, p < 0.05) between fewer recurrences and a position of the transplant below the equator. If the seven shoulders in which the transplant was situated one centimeter or more medial to the rim are excluded, there remain forty in which the transplant was less than one centimeter medial to the glenoid and below the equator, all of them stable, and thirty-eight in which the transplant was above or on the equator, of which two had redislocated and four had subluxated.

Table VI summarizes the characteristics regarding healing and position of the transplant in the patients with postoperative dislocation or subluxation.

Three Factors Affecting Stability and Healing of the Transplant (Fracture of the Transplant, Duration of Postoperative Immobilization, and Length and Penetration of the Screw through the Posterior Part of the Cortex) (Table VII)

In sixteen of the 112 shoulders, the transplant was fractured at surgery. In one of these sixteen the transplant was torn from its original position six months postoperatively when the patient lifted a heavy object. This patient never described any subluxation or dislocation but, due to pain, surgery was performed nine months after the Bristow-Latarjet procedure (a Putti-Platt procedure, including reattachment of the coracoid process to its original position). At follow-up no radiograph was made. Consequently, Table VII lists the radiographic results in only fifteen of sixteen shoulders with a fractured coracoid process. In four of them the transplant was merely sutured in place. Three of these bone-blocks migrated more than 1.5 centimeters. Only three (20 per cent) of the fifteen transplants that were fractured perioperatively showed osseous healing, compared with fifty-two (57 per cent) of ninetyone in the group of transplants that were not fractured. This difference is statistically significant (p < 0.05). Since fracture of the transplant seems to affect healing of the transferred coracoid, this group of shoulders was excluded from the analysis of the effect of immobilization and screw length on healing.

Forty-one (45 per cent) of the ninety-one shoulders were immobilized for less than three weeks postoperatively. No significant difference in healing could be detected between groups with fixation times of less than three weeks, three to four weeks, or five weeks or longer.

Osseous union was obtained in thirty-three (63 per

cent) of the fifty-two shoulders in which a screw measuring four centimeters or longer was used, compared with nineteen (49 per cent) of thirty-nine shoulders in which the screw that was used measured 3.5 centimeters or shorter. In shoulders in which the screw engaged the posterior part of the cortex of the scapula (analysis based only on shoulders in which a screw measuring four centimeters or longer was used), the incidence of osseous union was 76 per cent (twenty-two of twenty-nine shoulders). There is a significant difference (p < 0.05) when the group in which the cortex was engaged is compared with the group of shoulders in which a screw of 3.5 centimeters or less was used, but not when it is compared with the group that had a screw of four centimeters or longer.

Four patients (Cases 1, 4, 5, and 6) had a reoperation due to instability (Table VI). In Case 5 a new Bristow-Latarjet procedure was done, with reattachment of the loose transplant in a position below the equator. At the time of writing, fifteen months postoperatively, there had been no further dislocation. In Cases 1, 4, and 6 an Eden-Hybbinette procedure was performed (unsuccessfully in Case 1). Eight of the shoulders (Cases 8 through 15, Table VI) had subluxated from one to five times postoperatively, but none of the patients was especially bothered by the episodes. Case 2 had one redislocation but had no symptoms except for immediately after that episode, and Cases 3 and 7 had several recurrences and were subjectively unstable, but surgery was not considered necessary in these three shoulders.

#### Discussion

This study stems from four hospitals and is the first report of a large number of Bristow-Latarjet procedures performed by a number of surgeons. The incidence of failure was rather high in this series, and it presented an opportunity to analyze the importance of technical details

	TΑ	В	L	E	v
--	----	---	---	---	---

Relationship of Redislocation and Subluxation to Position of the Transplant

	Distan Rim	ce from (No.)	Relationship to Equator (No.)		
	0-9 mm	≥10 mm	Below	At	Above
Total no. of shoulders	78	7	43	21	21
Redislocations	2	2	0	2	2
Subluxations	4	2	2	2	2

Case	Sex, Age (Yrs.)	Type of Original Dislocation	Fracture of Transplant	Screw Size (cm)	Healing*	Altitude†	Remarks
Dislocation							
1	M, 24	Spontaneous	No	3.5	B (1.5)‡	Above	Reoperation (see Table II)
2	M, 34	Traumatic	Yes	None used	M (2-3)‡		1 redisloc.
3	F, 29	Spontaneous	Yes	2	M (3)‡		Minor disability
4	M, 32	Traumatic	Yes	4	M (1.5)‡		Reoperation
5	M, 28	Traumatic	No	4	F (0)‡	At	Reoperation (see Table II)
6	M, 22	Spontaneous	Yes	3	B (1.3)‡	At	Reoperation
7	F, 27	Traumatic	No	3.2	F (0.5)‡	At	Minor disability
Subluxation							
8	M, 19	Traumatic	No	3	B (0)	Above‡	2 sublux.
9	M, 27	Spontaneous	No	3	<b>B</b> (0)	Above‡	5 sublux.
10	M, 21	Traumatic	No	3	B (0)	At	l sublux.
11	M, 25	Spontaneous	No	3.5	F (1)‡	Below	2 sublux.
12	M, 28	Traumatic	No	4.5	<b>B</b> (0)	At	2 sublux. (see Table II)
13	M, 37	Traumatic	No	4	B (1)‡	Below	2 sublux.
14	F, 30	Traumatic	Yes	None used	M (3-4)‡		2 sublux.
15	M, 27	Traumatic	No	2.5	M (2)‡		2 sublux.

TABLE VI PATIENTS WITH RECURRENCE OF DISLOCATION OR WITH SUBLUXATION

\* B = bone union and F = fibrous union in good position but unstable, with total transplant-to-rim distance (in centimeters) in parentheses; and M = migration, with distance from the glenoid neck (in centimeters) in parentheses.

+ Above, at, or below the equator.

‡ Presumed reason for failure.

regarding the coracoid transfer. Even though it has been reported that the Bristow procedure may be successful even when the transplant has migrated two to three centimeters<sup>9,11,13</sup>, that complication has not been studied previously, nor have the other pertinent technical features of the procedure been analyzed.

If all shoulders showing (1) a migrated transplant, (2) a bone-block in a position one centimeter or more medial to the glenoid rim, and finally (3) a transplant situated at the equator or higher on the scapular neck were excluded from the present study, then the series would consist of forty shoulders with no postoperative redislocations or subluxations. Accordingly, we consider the orientation of the transplant in relation to the glenoid rim and obtained healing of the bone-block to be important. In the latest edition of Campbell's Operative Orthopaedics<sup>16</sup> and elsewhere<sup>9</sup> it was stated that the transferred coracoid process need not provide a bone-block effect. Therefore a more medial position of the transplant than that on the rim of the glenoid ought to be tolerated. Judging from our experience, this deviation in technique should be avoided. Our data show that there seems to be a limit for the longitudinal position of the transplant of about ten millimeters from the glenoid rim. Beyond that limit the incidence of recurrences increases (Table V). On the basis of our experience, we therefore recommend that the transplant be positioned one to five millimeters medial to the glenoid rim. We cannot exclude the possibility that the bone-block effect of the transplant is responsible for some of the success of the Bristow-Latarjet repair.

Our findings confirm those of Allman that the best results are obtained if the position of the transplant is below the mid-point of the scapular neck. An experimental study by Turkel et al. explained why this subequatorial position is best. They found that when the shoulder is abducted 90 degrees and externally rotated, the inferior glenohumeral ligament prevents the humeral head from dislocating. With the coracoid transplant positioned below the equator, the conjoined tendon is in the best position to take over the function of the inferior glenohumeral ligament. Hill et al. reported a fracture of the bone-block in seven (7 per cent) of 107 shoulders. Four of the fractured transplants were merely sutured to the subscapular tissue, and all seven shoulders eventually were stable. This is not in accordance with the findings in our series, in which the sixteen shoulders with a fractured bone-block showed several instances of migration or non-union of the transplant and a high rate of postoperative instability.

From the results of this study, we further conclude that an important factor in obtaining adequate healing of the transferred coracoid process to the glenoid neck is the method of stabilizing it. We recommend the use of a malleolar or a cancellous bone screw, very seldom shorter than four centimeters and preferably penetrating the posterior part of the cortical bone of the scapular neck.

Postoperative immobilization for three weeks or more

	Not Visible at Follow-up (No.)	Bone Union (No.)	Fibrous Union (No.)	Migration of Transplant (No.)	Total (No.)	
Perioperative fracture of transplant Fixed by suture	1	0	0	3 (3 > 1.5 cm)	4	
Fixed by screw	1	3	2	5(2 > 1.5  cm)	11	
Postoperative immobilization						
<3 wks.	0	25	11	5(1 > 1.5  cm)	41	
3 to 4 wks.	1	17	7	3 (0 > 1.5  cm)	28	
≥5 wks.	1	10	10	1 (1 > 1.5 cm)	22	
Length of screw						
≤3.5 cm	1	19	13	6(2 > 1.5  cm)	39	
≥4 cm	1	33	15	3(0 > 1.5  cm)	52	
Screw (≥4 cm) through posterior part of wall of cortex of scapular neck						
Yes	1	22	5	1 (0 > 1.5  cm)	29	
No	0	11	9	2(0 > 1.5  cm)	22	
Extracted		-	i	,,	1	

TABLE VII

HEALING AND MIGRATION OF THE BONE-BLOCK IN RELATION TO SEVERAL OTHER FACTORS

does not seem to promote healing of the transplant. The postoperative immobilization can thus be short. We agree with Tagliabue and Esposito that one of the advantages of this type of repair is that the postoperative morbidity is so short.

#### Conclusions

This study indicates that optimum results of the Bristow-Latarjet procedure are obtained if the bone-block heals to the neck of the glenoid and the position of the bone-block is less than one centimeter medial to the glenoid rim and below the equator of the scapular neck. To ensure adequate healing, the bone-block should not be fractured during surgery, and should be securely fixed with a screw long enough to engage the posterior part of the cortex of the scapula. Divergence from these guidelines, however, does not exclude excellent or good results in some shoulders.

#### References

- ÅKERMARK, C.; HOVELIUS, L.; HERBERTS, P.; WREDMARK, T.; GUSTAVSSON, B.; KÖRNER, L.; and BERG, E.: Results of the Bristow Repair: Sports Participation after Surgery. *In* Shoulder Surgery, pp. 92-94. Edited by J. I. Bayley and Lippmann Kessel. Berlin, Springer, 1982.
  ALLMAN, FRED: Symposium on Sports Injuries to the Shoulder. Contemp. Surg., 7: 82, Sept. 1975.
  COLLINS, H. R., and WILDE, A. H.: Shoulder Instability in Athletics. Orthop. Clin. North America, 4: 759-774, 1973.

- 4. HELFET, A. J.: Coracoid Transplantation for Recurring Dislocation of the Shoulder. J. Bone and Joint Surg., 40-B(2): 198-202, 1958. 5. HILL, H. A.; LOMBARDO, S. J.; KERLAN, R. K.; JOBE, F. W.; CARTER, V. S.; SHIELDS, C. L., JR.; COLLINS, H. R.; and YOCUM, L. A.: The
- Modified Bristow-Helfet Procedure for Recurrent Anterior Shoulder Subluxations and Dislocations. Am. J. Sports Med., 9: 283-287, 1981. 6. HOVELIUS, L.; ÅKERMARK, C.; ALBREKTSSON, B.; BERG, E.; KÖRNER, L.; LUNDBERG, B.; and WREDMARK, T.: The Bristow-Latarjet Procedure
- for Recurrent Dislocation of the Shoulder. A 2-5 Year Follow-up Study on the Results of 112 Cases. Acta Orthop. Scandinavica, 54: 284-290, 1983
- 7. LAMM, C. R.; ZACHRISSON, B. E.; and KÖRNER, L.: Radiography of the Shoulder after Bristow Repair. Acta Radiol. Diag., 23: 523-528, 1982.
- 8. LATARJET, M.: A propos du traitement des luxations récidivantes de l'epaule. Lyon chir., 49: 994-997, 1954
- 9. LOMBARDO, S. J.; KERLAN, R. K.; JOBE, F. W.; CARTER, V. S.; BLAZINA, M. E.; and SHIELDS, C. L., JR.: The Modified Bristow Procedure for Recurrent Dislocation of the Shoulder. J. Bone and Joint Surg., 58-A: 256-261, March 1976.
- 10. MAY, J. V., JR.: A Modified Bristow Operation for Anterior Recurrent Dislocation of the Shoulder. J. Bone and Joint Surg., 52-A: 1010-1016, July 1970.
- 11. POST, MELVIN: The Shoulder: Surgical and Nonsurgical Management, p. 452. Philadelphia, Lea and Febiger, 1978. 12. Rowe, C. R.; PIERCE, D. S.; and CLARK, J. G.: Voluntary Dislocation of the Shoulder. A Preliminary Report on a Clinical, Electromyographic,
- and Psychiatric Study of Twenty-six Patients. J. Bone and Joint Surg., 55-A: 445-460, April 1973. 13. SWEENEY, H. J.; MEAD, N. C.; DAWSON, W. J.; and FITZSIMMONS, PHILIP: Fourteen Years' Experience with the Modified Bristow Procedure for Recurrent Anterior Dislocation of the Shoulder. Read at the Annual Meeting of The American Academy of Orthopaedic Surgeons, San Francisco, California, March 5, 1975
- 14. TAGLIABUE, D., and ESPOSITO, A.: L'intervento di Latarjet nella lussazione recidivante di spalla dello sportivo. Italian J. Sports Traumat., 2: 91-100, 1980.
- 15. TURKEL, S. J.; PANIO, M. W.; MARSHALL, J. L.; and GIRGIS, F. G.: Stabilizing Mechanisms Preventing Anterior Dislocation of the Glenohumeral Joint. J. Bone and Joint Surg., 63-A: 1208-1217, Oct. 1981.
- WRIGHT, P. E.: Bristow Procedure. In Campbell's Operative Orthopaedics, edited by A. S. Edmonson and A. H. Crenshaw. Ed. 6, pp. 486-488. St. Louis, C. V. Mosby, 1980.