Anterior instability of the glenohumeral joint with humeral avulsion of the glenohumeral ligament

A REVIEW OF 41 CASES

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We studied retrospectively a consecutive series of 547 shoulders in 529 patients undergoing operation for instability. In 41, the cause of instability was considered to be lateral avulsion of the capsule, including the inferior glenohumeral ligament, from the neck of the humerus, the HAGL lesion. In 35, the lesion was found at first exploration, whereas in six it was noted at revision of a previous failed procedure. In both groups, the patients were older on average than those with instability from other causes. Of the primary cases, in 33 (94.3%) the cause of the first dislocation was a violent injury; six (17.4%) had evidence of damage to the rotator cuff and/or the subscapularis. Only four (11.4%) had a Bankart lesion. In patients undergoing a primary operation in whom the cause of the first dislocation was a violent injury, who did not have a Bankart lesion and had no suggestion of multidirectional laxity, the incidence of HAGL was 39%.

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The role of anterior capsular structures in preventing dislocation of the glenohumeral joint is well described.\textsuperscript{1,3} Lateral detachment of the capsule and an inferior glenohumeral ligament can be reproduced in experimental studies in older patients,\textsuperscript{4} but this pattern of injury is rarely seen in clinical series. Nicola\textsuperscript{5} gave the first description in a report of five acute dislocations which had surgical exploration. Wolf, Cheng and Dickson,\textsuperscript{6} in an arthroscopic study of 64 shoulders with anterior instability, diagnosed humeral avulsion of the glenohumeral ligament (HAGL) in six (9.3%). They described the arthroscopic appearance of the lesion and suggested that it should be sought in the presence of traumatic anterior instability in which there was no evidence of a Bankart lesion.\textsuperscript{7,8} Nerot et al\textsuperscript{9} described seven cases and Fukushima et al,\textsuperscript{10} six. In both series it was noted that Bankart lesions were less common in these patients. Field, Bokor and Savoie,\textsuperscript{11} however, have reported six patients with combined HAGL and a Bankart lesion, the ‘floating anterior band’.

Although infrequently recorded, HAGL represents a cause for recurrent instability with specific clinical findings. It requires a different approach for repair. Our aim was to report the incidence of HAGL in a consecutive series of patients with anterior instability, to describe the clinical features and, by comparison, to illustrate some of the differences between this group of patients and those with anterior instability.

Patients and Methods

Between January 1989 and December 1996, the senior author (DJB) operated on 529 patients (547 shoulders) with a diagnosis of traumatic anterior instability of the glenohumeral joint, in 514 for primary instability and in 33 after failure of anterior stabilisation. Open reconstruction was carried out in 502 patients, while 45 had arthroscopic repairs. The type of repair did not reflect a difference in the pathology of the patient, but an alteration in the author’s practice.

We examined the case notes and details of patients with HAGL, the history of instability and the operative reports. Of those with primary instability, HAGL was seen in 35 patients while six in the revision group had the lesion. We compared these with the rest of the patients with anterior instability.

The mean age of those with HAGL was slightly greater than the overall group and those without HAGL, which agrees with other series in the literature.\textsuperscript{12,13} This pattern is also reflected in those patients with HAGL found at revision operations (Tables I and II).

Mechanism of first dislocation. The percentage of patients in whom the first dislocation had a ‘violent’ cause is slightly higher in the patients having a revision procedure compared with those in the primary group, although the...
numbers are too small for statistical analysis. The recording of a ‘violent’ mechanism is to some extent dependent on the opinion of the clinician who takes the history. This subdivision may not necessarily be regarded as definitive. The higher numbers of rugby injuries may reflect the senior author’s practice, although it remains possible that this is a lesion with a particular relationship to trauma from this game (Tables III and IV).

### Operative technique
The technique of the senior author (DJB) for open stabilisation of the shoulder with anterior instability involves exposure of the joint as for an inferior capsular shift procedure. Careful blunt dissection must be undertaken to separate the subscapularis muscle from the capsule. The lack of reference to HAGL in the literature may reflect the greater number of procedures performed when the two are divided together, which may mask HAGL. Often there is scarring around the inferior muscular portion of the subscapularis, which may give an indication of the presence of HAGL. Unless care is taken by the surgeon, exposure of HAGL may be interpreted as an iatrogenic breach of the capsule. This can be distinguished by the presence of a thickened, rolled edge in the capsular defect. The HAGL lesion is nearly always below the level of the subscapularis in the inferior pouch of the shoulder (Fig. 1). After exposure and opening of the rest of the capsule, a Bankart lesion is sought and if encountered is then repaired. The avulsed edge of the lesion is secured to the roughened medial humeral neck, using suture anchors or drill holes. Acromioplasty is performed in the presence of a tear of the rotator cuff only if it is thought that there is a degenerative and impingement component. In our series acromioplasty was carried out in only one of the patients with a lesion of the cuff.

### Results

#### Associated pathology
In the unselected group there were 130 shoulders in which there was no Bankart lesion. Of these, 35 belonged to the HAGL group, giving a likelihood of encountering HAGL in a patient with anterior instability but no Bankart lesion of 26.9% (Tables V and VI).

In the HAGL groups, both primary and revision, 15 patients had some form of tear of the cuff; eight had scarring of the inferior portion of the subscapularis, six a partial avulsion of the subscapularis, usually involving the...
lowermost fibres, or other tears of the rotator cuff and one had a partial tear of both the subscapularis and supraspinatus. There was a notable difference in age between those with and without tears of the cuff. In the HAGL group, the six patients with tears had a mean age of 33.8 years with three being over 35 years, while those with isolated HAGL had a mean age of 25.9 years (17 to 41).

Only four patients in the HAGL group were considered to have multidirectional laxity at the initial clinical assessment. Thus, in patients in whom the cause of the first dislocation was thought to be a violent mechanism and who had no Bankart lesion or evidence of multidirectional laxity, the incidence of HAGL was 39% (30 out of 77 cases).

### Radiological findings

The incidence of Hill-Sachs lesions between groups could not be accurately compared since radiographs had been taken at different centres and not all patients had films which would reliably show the lesion. HAGL is said to display a specific abnormality on the anteroposterior film, either scalloping on the medial side neck of the humerus, or a small bone fragment medial to it. Although relatively specific for HAGL, this was seen in only seven of the 41 patients, all of them primary cases (Fig. 2).

The arthrogram may show an abnormal reflection of a large inferior pouch, medial to the neck (Fig. 3).

### Arthroscopic findings

The appearance of HAGL at arthroscopy is distinctive. Wolf et al\(^6\) described the visualisation of the fibres of subscapularis through the avulsed inferior capsule as the cardinal arthroscopic sign. We have found disruption of the ‘wave’ formed by the reflection of the inferior capsule onto the humeral neck to be a reliable indication (Figs 4 and 5).

### Discussion

Neviaser and Neviaser\(^12\) described a series of 31 patients with tears of the rotator cuff after primary dislocation of whom eight had ruptured the subscapularis tendon through an underlying capsular avulsion from the lesser tuberosity. Bach et al\(^13\) reported two male patients with lateral capsular avulsion. They noted the unusual nature of the lesion and described repair of the capsule to the medial side of the neck and the lesser tuberosity. They cautioned that if damage to the labrum was not found at...
operation for anterior instability, the possibility of lateral capsular avulsion should be considered. They were unable to comment on the prevalence of the lesion in patients with glenohumeral instability.

HAGL remains an uncommon, but important, cause of anterior glenohumeral instability, noted in 7.5% of our patients. In other reported series of anterior instability it is rarely mentioned. This may reflect different surgical techniques in which the subscapularis is divided along with the capsule, suggesting that HAGL may be an iatrogenic injury. Wolf et al. thought that the incidence was much higher, although dealing with small numbers. The true frequency remains uncertain.

There are a number of factors which may affect our observations. Much of the senior author’s practice includes professional sportsmen, of whom a significant number are rugby league and union players. They form a disproportionate group who suffer violent trauma to their shoulders regularly, and present promptly for reconstruction when their livelihood is threatened. This preselection may include a larger number with HAGL than is the norm. There may also be a population prevalence of HAGL after trauma which does not cause recurrent instability because it heals, and this cannot be measured. Many patients with instability do not request surgery because their functional demands are sufficiently low for dislocation never to occur. This includes a more elderly group in whom HAGL may be more common.

**Conclusion.** HAGL is a recognisable cause of anterior instability with characteristic radiological and arthroscopic findings requiring particular surgical management. It is found in the older male patient with recurrent anterior instability after a primary dislocation caused by a violent mechanism. It should be sought particularly in patients who are found not to have a Bankart lesion at operation, but may be seen in those who have.

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**References**