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# Case Report

## Beware of glenoid dysplasia mimicking bone trauma in the injured shoulder

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### ABSTRACT

The term 'primary glenoid dysplasia' is used to describe a rare developmental abnormality of the shoulder. The symptomatic presentation of glenoid dysplasia has two definite age-related peaks. The first peak is in adolescents and young adults; they generally present with symptoms of instability related to high levels of activity. The second is in the fifth or sixth decade when presumed degenerative changes occur in the gleno-humeral joint. It can crop up as an incidental finding, during chest X-ray, for example, or may present as marked upper limb disability.

This study reports an unusual presentation of this rare condition and describes it with clear illustrations of radiological and surgical investigations and treatment undertaken. It is presented as an 'aide-memoire' for orthopedic surgeons to consider this diagnosis when confronted with unusual X-rays or scans in their practice.

**Key words:** Arthroscopy, dysplasia, fracture, MRI, shoulder, trauma, X-ray

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### INTRODUCTION

The term 'primary glenoid dysplasia' is used to describe a rare developmental abnormality of the shoulder. It most commonly affects the lower two thirds of the glenoid fossa<sup>[1]</sup> and is likely to represent failure of ossification of the glenoid precartilage. It is most commonly an isolated finding, although it has been described as part of a syndrome such as Apert's.<sup>[2]</sup> The diagnosis if pointed exclusively to the shoulder girdle is often associated with symmetrical glenoid changes, relative dysplasia of the humeral head or morphological abnormalities of the coracoid or acromion.

A small number of cases were initially described by Giongo in 1927<sup>[3]</sup> and subsequently by Heupke in 1928.<sup>[4]</sup> Larger series have since been described,<sup>[5,6]</sup> including a recent radiological study that has quoted an incidence of moderate-to-severe glenoid dysplasia of 14.3% in its study population.<sup>[7]</sup> The incidence in the general population may be significantly higher than the incidence determined on the basis of the number of cases diagnosed, as a large proportion of patients remain symptom free. Clinically, however, primary glenoid dysplasia remains a rare diagnosis in an average orthopedic shoulder practice.

The symptomatic presentation of glenoid dysplasia has two definite age-related peaks.<sup>[6]</sup> The first peak is in adolescents and young adults; they generally present with symptoms of instability related to high levels of activity. The second peak is in the fifth or sixth decade when presumed degenerative changes occur in the gleno-humeral joint. It can crop up as an incidental finding, during chest X-ray, for example, or may present as marked upper limb disability. Smith and Bunker<sup>[6]</sup> report that all 12 patients in their series had bilateral changes and all were male. Previous series describe both sexes being affected.

### CASE REPORT

A 38-year-old left-handed office-based manager, male, presented for a specialist shoulder opinion having fallen from his mountain bike several weeks before. During a rural woodland hillside descent, the patient was thrown from his bike, sustaining a heavy direct blow to the anterior aspect of his dominant shoulder as he slammed against a tree.

He experienced immediate pain but was able to complete his journey. The initial pain settled over 2 weeks, but he was left with constant discomfort. He experienced pain lying on his

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shoulder, as a result of which he often woke up from sleep at night. He had pain at rest but no neurological symptoms and denied previous symptoms in either shoulder, including instability. Symptom control with oral medication had been satisfactory.

Clinical examination revealed some global muscle atrophy around the left shoulder girdle. He was tender to palpation anteriorly but demonstrated an almost full range of motion. Active elevation was limited by pain at the extreme. Passive external rotation was uncomfortable, but formal testing of the rotator cuff revealed no weakness. The acromio-clavicular joint was neither tender nor irritable on provocation.

Anteroposterior (AP), lateral and axillary plain radiographs revealed marked abnormality. The glenoid had an irregular contour on the AP radiograph with medialization of the joint surface [Figure 1]. The axillary view [Figure 2] further demonstrated medialization of the glenoid and 53 degrees of retroversion. In the general population, the average is approximately 2 degrees of retroversion, with a range from

9.5 degrees of anteversion to 10.5 degrees of retroversion; however, there is a relationship between glenoid version and race.<sup>[8]</sup>

Considering the traumatic history, delayed presentation and nature of current symptoms, the radiological findings could have represented a 10-week-old glenoid fracture. However, the humeral head was noted to be of abnormal shape and size; therefore, a differential diagnosis of primary glenoid dysplasia was also considered. Plain radiographs of the uninjured contralateral shoulder revealed similar appearances [Figure 3] on the injured side, with a dysplastic infero-posterior glenoid and a small humeral head. Both shoulders showed no evidence of 'bossing' of the distal clavicles; however, the coracoids appeared unremarkable. To confirm the absence of bony injury of the injured shoulder, a CT scan was obtained [Figure 4]. The axial section demonstrated 53 degrees of retroversion of the articular surface and a hypoplastic postero-inferior corner of the glenoid. A subsequent MRI scan to ensure rotator cuff integrity was reported as showing 'glenoid dysplasia with hypertrophy of the posterior labrum' [Figure 5].



Figure 1: AP left shoulder showing irregular glenoid and small humeral head



Figure 2: Axillary view left shoulder showing medialisation of the joint surface and posterior bone hypoplasia of the glenoid



Figure 3: AP right shoulder showing similar findings of glenoid irregularity and joint medialisation

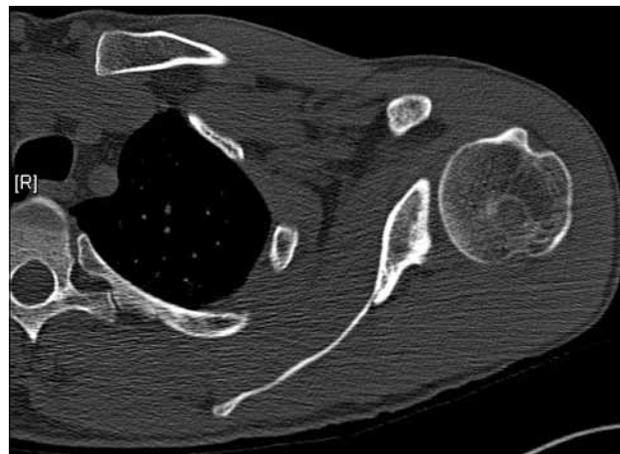


Figure 4: Axial section of glenoid showing 55 degrees of retroversion and hypoplastic glenoid

The patient was reviewed in the outpatient clinic, along with the results of the radiological investigations. He had regained a full range of motion but still had a painful arc of motion on forward elevation and strongly positive impingement signs. A diagnosis of subacromial impingement secondary to rotator cuff contusion and traumatic subacromial bursitis was made, and an injection of steroid (40 mg triamcinalone) and local anesthetic (10 mL 0.5% marcaine) was administered.

Clinical review 8 weeks later revealed excellent transient response to the injection. There had been no pain for 3 weeks. Unfortunately, by the time of review, the symptoms had returned and were as bad as they were in the pre-injection state. Examination findings once again concurred with a diagnosis of subacromial impingement. Surgery was recommended, and arthroscopic subacromial decompression (ASAD) was performed.<sup>[9]</sup>

Standard arthroscopic technique was undertaken with the patient in 'beach chair' position. Examination under anaesthesia revealed a full range of movement and no instability. The posteriorly facing glenoid articular surface was normal except for some minor fissuring and disruption of the articular cartilage in the inferior third. This was clearly demonstrated at the level of the probe in the arthroscopic image [Figure 6]. The surrounding glenoid labrum appeared to be large and overlapping the glenoid on all sides [Figure 7]. The labrum was probed carefully; and although it was overhanging and frayed at the edges, there was no detachment that required repair. Unstable articular cartilage and the edge of the labrum were debrided with the shaver. As predicted from the previous imaging, the humeral head articular surface appeared to be quite short and the rotator cuff insertion was medialized as compared to normal appearances. Subacromial bursoscopy revealed a thick, folded bursa and coraco-acromial ligament (CAL) scuffing, in keeping with subacromial impingement. Standard ASAD incorporating bursectomy, CAL release and acromioplasty was performed. The bursal surface of the rotator cuff was intact and normal.

The patient was discharged home the same day and was referred for outpatient physiotherapy rehabilitation. At the 6-week review, the symptoms had resolved, full range of motion and function had been reestablished and the patient had returned to all normal work and leisure activities.

## DISCUSSION

We present this case as an 'aide-memoire' for emergency department staff and trainees of orthopedic surgery and radiology. If a patient presents with an abnormal glenoid appearance on plain radiography, whether he or she is symptomatic or not, the diagnosis of 'glenoid dysplasia' should be considered.

If the diagnosis is in question, plain X-rays of the contralateral



**Figure 5:** MRI showing intact subscapularis and dysplasia. The large posterior labral complex can be seen.



**Figure 6:** Arthroscopic inferior glenoid showing fissures and fibrillation of labrum



**Figure 7:** Large circumferential 'curtain like' labrum

shoulder may prove helpful in confirming suspicions as bilateral changes are common. If there is no suspicion of an underlying syndrome and it appears to be an isolated condition, the following classical X-ray features should be considered;

irregularity and dysplasia of the inferior glenoid<sup>[1]</sup> and flattening or hypoplasia<sup>[10-12]</sup> of the humeral head with varus angulation of the humeral neck. Excessive retroversion of the glenoid may also be seen; however, this can be difficult to visualize on the anteroposterior X-ray and may be more obvious on the axial views. Hooking or bossing of the distal clavicle<sup>[10,13]</sup> and enlargement of the acromion and coracoid<sup>[10,12]</sup> are also described in the literature.

The causes of primary glenoid dysplasia are not fully understood. The role of genetic inheritance is still open to debate, but an autosomal dominant condition with incomplete penetrance and the possibility of spontaneous mutation may account for the variability seen in the presentation.<sup>[14-17]</sup> Other associations of the condition include perinatal brachial plexus injuries, neuromuscular conditions and numerous syndromes that usually have more obvious signs and symptoms.

The presentation of glenoid dysplasia can vary greatly. The very young tend to be symptom free.<sup>[6]</sup> The adolescents and young adults often present with signs and symptoms of instability or posterior labral pathology,<sup>[6]</sup> and older patients generally present with degenerative symptoms. It is almost certainly a significantly under-diagnosed condition,<sup>[7]</sup> and therefore the majority of cases are likely to be never recognized.

Although the optimal management of symptomatic glenoid dysplasia is still debated, it appears the majority of younger patients that present prior to developing degenerative changes respond well to physiotherapy.<sup>[6,12,18]</sup> It is recommended that such patients refrain from high-impact and repetitive activities and sports involving contact or overarm throwing.<sup>[13,18]</sup> Occasionally surgical intervention is required for gleno-humeral instability in this younger group, and arthroplasty surgery is occasionally required in the older group of patients. Arthroplasty is normally successful in reducing pain; however, outcome is less favorable when compared to arthroplasty in standard osteoarthritis of the gleno-humeral joint.<sup>[6,8,19,20]</sup> Shoulder arthroplasty should therefore be considered only for unremitting pain and reduced function. Consideration should be given to obtaining a CT scan preoperatively to accurately assess the available bone quantity if insertion of a glenoid component is considered.

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