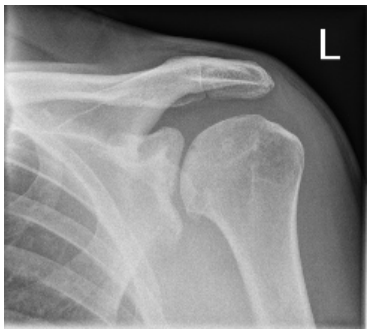
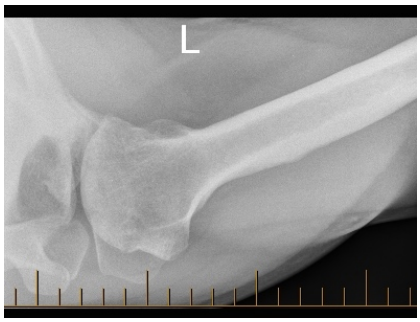
Case 61

Middle aged farmer with a history of trivial injury and since then pain and stiffness in the L shoulder. Inflammatory markers were negative.





Diagnosis GLENOID DYSPLASIA

DEFINITION

The classic constellation of glenoid and humeral head hypoplasia, varus angulation of the humeral head, and coracoid and acromial hyperplasia. The recognition of localized posteroinferior glenoid bone deficiency or hypoplasia may be important as these often subtle findings have been correlated with posterior labral tears and recurrent atraumatic posterior shoulder instability affecting shoulder function.

APPLIED ANATOMY

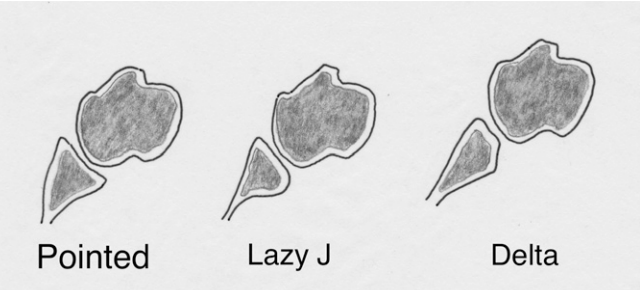
The glenoid consists of 2 ossification centers: a superior ossification center at the base of the coracoid, and a horseshoe- shaped growth center inferiorly. The upper ossification center appears between ages of 9 and 15 years; the lower ossification center appears between ages of 12 and 16 years. It is hypothesized the lack of stimulation of the inferior growth center results in glenoid hypoplasia.

The genes that govern the development
PAX1 (acromion and scapular spine), Emx2 (scapular body), and Hoxc6 (coracoid and glenoid).

PATHOLOGY

A spectrum of dysplasia

Posteroinferior hypoplasia was defined as a “dropping away” of the normally flat plateau of the posterior part of the glenoid beginning 1.2 cm caudad to the scapular spine.



CT types [Skeletal Radiol. 2000 Apr;29[4]:204-10.]

1. Pointed
2. Lazy J
3. Delta

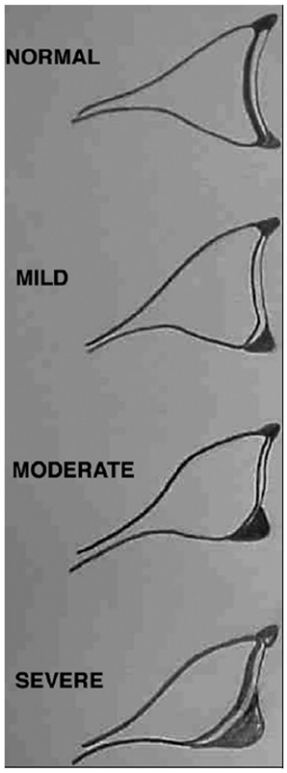


Fig. 2
The classification system developed by Harper et al. showing normal through severe dysplastic morphologies of the glenoid[6]. (Reproduced, with permission of the *American Journal of Roentgenology,* from: Harper KW, Helms CA, Haystead CM, Higgins LD. Glenoid dysplasia: incidence and association with posterior labral tears as evaluated on MRI. AJR Am J Roentgenol. 2005; 184[3]: 984-8.)

Glenoid Version

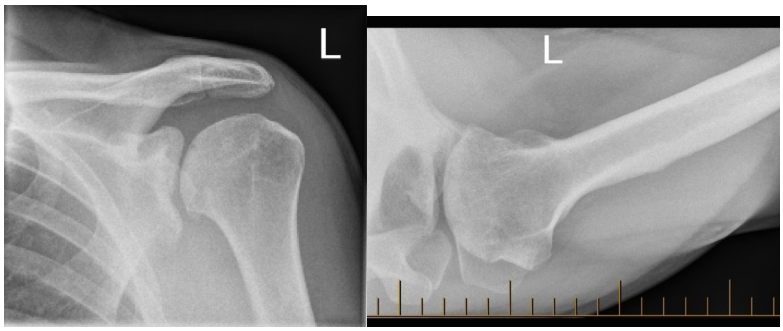
Normal glenoid version is 4• to 7• of retroversion. >17• more risk of posterior instability.

>10 degrees: soft tissue surgery alone is contraindicated and need glenoid osteotomy

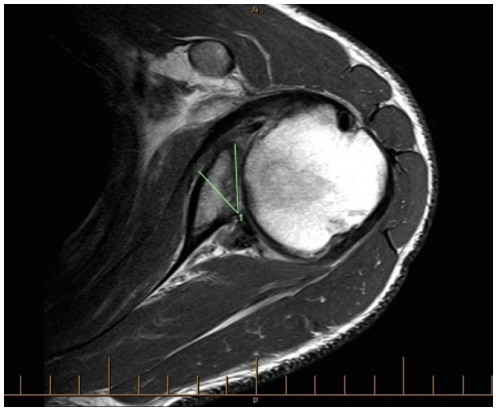
SYMPTOMS

1. May have asymptomatic joint with high level of sporting activity
2. Pain or instability may be attributed to a trivial event or injury
3. Patients with glenoid dysplasia may also have symptomatic osteoarthritis develop later in life
4. Look for instability sign or that of arthritis

Imaging
1.**X ray:**
Hypoplasia of the scapular neck,
Shallowness of the glenoid cavity
Overgrowth or enlargement of the coracoid or acromion



2. CT



CT include version and posterior humeral head subluxation.
An arthrogram provides information about the soft tissues of the shoulder including labral pathology and capsular abnormalities

3. **MRI**
MRI evaluation of posterior instability is useful to characterize associated capsular and labral lesions.

In an MRI study population, moderate to severe glenoid dysplasia incidence of 14.3%. There is a statistically significant increase in the incidence of posterior labral tears associated with shoulders with moderate or severe glenoid dysplasia [60%].

TREATMENT

1.Soft tissue procedure
Patients with symptomatic posterior instability and glenoid retroversion of less than 9.

2. Instability with version >10 degrees require osteotomy with a posterior-inferior capsular shift for symptomatic posterior instability.

Overall, their surgical cohort had an 80% success rate but they did not attribute their failures to osseous anatomy.

In conclusion, no specific recommendations can be made regarding the choice of a soft-tissue procedure versus an osseous procedure. More severe forms of dysplasia and retroversion of >10 degrees may represent a risk for failure with a soft-tissue procedure, but further research on this topic needs to be conducted.

Glenoplasty procedures are opening-wedge osteotomies resulting in version reorientation. Hawkins et al., however, described a complication rate of 29% (5 of 17 shoulders) and a recurrence rate of 41% (7 of 17 shoulders). Glenoplasty is technically demanding, and consequently, complications can be substantial, including loss of correction, intra-articular fracture, graft extrusion, and overcorrection with subsequent development of coracohumeral impingement.

3.Glenoid augmentation procedures are bone grafts from a variety of autograft and allograft sources, is placed in an extracapsular or intracapsular position.

4. Patients who present **with end-stage osteoarthritis** in the setting of glenoid dysplasia (a Walch type C glenoid with >25_ of retroversion)

Bonnevialle [J Shoulder Elbow Surg. 2011 Apr;20(3):378-84] reported good outcomes with hemiarthroplasty alone. Recommended the use of bone- grafting or prosthetic augmentation to address the glenoid dysplasia [J Bone Joint Surg Am. 2002 Apr;84(4):541-6]

REFERENCES

1. Eichinger: Bone Joint Surg Am. 2016;98:958-68

Glenoid dysplasia is a rare congenital abnormality that may be associated with vague shoulder pain, limitation of motion, and weakness of the upper extremity. In many cases it is an incidental finding on chest roentgenogram, and high-level function is usually possible before the onset of symptoms or degenerative changes.

Roentgenograms demonstrated dysplastic scapular necks, and arthrography showed a deformed, constricted shoulder capsule. Magnetic resonance imaging defined the extent of the cartilaginous anlage, and arthroscopy demonstrated progressive articular cartilage degeneration.

2. Clin Orthop Relat Res. 1992 Oct;(283):145-8.

Genetic analysis has revealed that glenoid vault and scapular development are controlled by different genes resulting in diverse glenoid morphologies. Patients with biconcave glenoids (ie, significant posterior glenoid wear) had the highest frequency of posterior subluxation.

3. J Shoulder Elbow Surg. 2012 Sep;21(9):1136-41.

Glenoid morphology in primary glenohumeral osteoarthritis (GHOA). 3 main glenoid types were defined: Type A (59%) was marked by a well-centered humeral head; symmetric erosion was explained by the absence of subluxation. Type B (32%), the posterior subluxation of the humeral head was responsible for the asymmetric load against the glenoid and the exaggerated posterior wear pattern. Type C (9%) was defined by a glenoid retroversion of more than 25 degrees, regardless of erosion; retroversion was primarily of

dysplastic origin and explained the early event of osteoarthritis.

4. J Arthroplasty. 1999 Sep;14(6):756-60.

In an MRI study population, moderate to severe glenoid dysplasia incidence of 14.3%. There is a statistically significant increase in the incidence of posterior labral tears associated with shoulders with moderate or severe glenoid dysplasia [60%]. A commonly accepted explanation is that this thickened material represents cartilage of the inferior glenoid that has failed to ossify. Dysplasia of the posteroinferior glenoid results from failure of ossification of the inferior ossification center.

5. AJR:184, March 2005

From 1998 to 2006, 9 patients (10 shoulders) with glenoid dysplasia and osteoarthritis were treated with shoulder hemiarthroplasty. The mean age at surgery was 54 years (range, 44-73 years). This surgery gives satisfactory results at medium-range follow up.

6. J Shoulder Elbow Surg. 2011 Apr;20(3):378-84.

Fifteen shoulders with primary osteoarthritis and dysplastic glenoid morphology underwent shoulder arthroplasty (eleven total shoulder arthroplasties and four hemiarthroplasties).