SURGICAL MANAGEMENT OF SCAPULOHUMERAL JOINT INSTABILITY
IN LLAMAS AND ALPACAS
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Key Points:
- Shoulder instability in llamas and alpacas usually manifests as subluxations or luxations
- Shoulder instability can be difficult to diagnose
- Surgical repair can result in a good outcome for return to function and comfort

Shoulder instability is reportedly uncommon in large animal species but has been reported in horses, cattle, goats, deer, and camelids. Among these species, alpacas and llamas seem to be more predisposed than others. Shoulder instability can result in either luxation or subluxation of the scapulohumeral joint. Although joint instability and resultant luxation can occur in either males or females, males are significantly more predisposed than females to development of this condition. These are traumatic injuries that likely result from severe abduction of one of the front limbs by fighting with other males or attempting to breed a non-receptive female.

Making the diagnosis of this condition can be a challenge for even experienced veterinarians. These animals usually present to the veterinarian with non-specific, non-localizing signs of lameness. The lameness can vary from a non-weight bearing lameness due to the severe joint instability to a mild, functional lameness. Because of the extra muscle mass on the proximal portion of the limbs, subtle anatomic abnormalities are often not obvious (like they would be on the distal limb). They are frequently more stable because of the supporting musculature, and swelling is also not as apparent as it would be if the lesion is located more distally on the limb. Manipulation of the shoulder may elicit some crepitus, but this crepitus may be minor due to a pseudoarthrosis present in chronic cases. Definitive diagnosis is made based on imaging studies such as radiographs. Because of the difficulty in making a diagnosis, many of the cases of scapulohumeral instability are missed until the lesion is somewhat chronic.

Options for fixation of animals suffering from scapulohumeral luxation include closed (non-surgical) reduction and open (surgical) reduction. Open reduction can be combined with multiple techniques to increase the stability of the joint including lateral extracapsular tension band wiring, lateral extracapsular imbrication, and scapulohumeral arthrodesis. The optimum fixation method depends on the chronicity of the lesion, secondary osteoarthritis, and concurrent problems such as fractures of adjacent structures.

Anatomy and Support:
The scapulohumeral joint is formed by the glenoid cavity of the scapula and the humeral head. The scapula contains the supraglenoid tubercle on the crainodistal aspect and the infraglenoid tubercle on the caudodistal aspect. In camelids the distal part of the scapular spine hooks and forms a prominent acromion that is prone to fracture. The proximal part of the humerus is home to the greater tubercle and the deltoid tuberosity.

Scapulohumeral support is conferred by the joint capsule and medial and lateral glenohumeral ligaments. There are not true collateral ligaments to support the shoulder joint, and the surrounding musculature adds considerable stability. The insertions of the infraspinatus and supraspinatus add support to the lateral aspect of the shoulder. The subscapularis confers
medial stability. Other muscles which pass over the scapulohumeral joint include the teres minor, the teres major, the deltoideus, coracobrachialis, and the biceps brachii muscle. Although these muscles probably offer some contribution, they are not thought to confer much stability to the shoulder joint.

**Closed Reduction:**
Closed reduction involves anesthetizing or heavily sedating the patient and placing traction on the affected limb in order to place the humeral head back into the glenoid fossa. Abduction and lateral rotation of the limb may further aid in reduction. In order for this technique to be successful the animal must have a simple luxation or subluxation (no fractures present). The patient must also have some inherent stability present at the joint which will allow the joint to remain in a reduced position. Luxations that are presented acutely are better candidates for closed reduction because muscle contracture is associated with chronicity. Severe osteoarthritis, secondary to chronic luxation, is an indication for open surgical reduction where specific joint pathology can be assessed (or addressed) or these cases may be candidates for surgical arthrodesis. In a previous report, 5/10 alpacas presented for scapulohumeral luxation were successfully reduced using a closed procedure. However the incidence of re-luxation was high following closed reduction.

**Open Reduction:**
Open reduction involves a surgical approach to the scapulohumeral joint. Advantages of open reduction includes an increased ability to work with damaged articular surfaces (articular fractures, and cartilage lesions) as well as removal of soft tissues such as joint capsule or fibrous debris that may be interfering with proper reduction of the joint. The author also feels that open reduction may be easier with chronically luxated joints that have a lot of muscle contracture because the surgeon can use the joint surfaces to gain leverage to aid in joint reduction.

The surgical approach to and reduction of the camelid scapulohumeral joint has been described. Basically, a curved skin incision is made beginning at the middle of the scapular spine crossing over the joint and continuing over the lateral humerus ending at the level of the deltoid tuberosity. The deep brachial fascia cranial to the deltoideus and ventral to the acromion is incised. This incision is extended caudally to the deltoid tuberosity exposing the lateral aspect of the joint capsule and infraspinatus tendon, and a tenotomy is performed on this tendon. The joint capsule is incised parallel to the glenoid. Reduction of the joint has been accomplished by a combination of leverage at the level of the joint using a blunt periosteal elevator, limb traction, and limb adduction with external and internal rotation.

An advantage to open surgical reduction includes the ability to augment joint reduction with surgical stabilization to prevent subsequent re-luxation. Tension band wiring and combinations of tension band wiring and imbrication have been described. The author has used imbrication alone with good success in several cases of scapulohumeral joint luxation. There is a case report of treatment of recurrent lateral luxation of the scapulohumeral joint treated with greater tubercle osteotomy and bicipital tendon transposition.

The most common method of tension band wiring consists of using tough non-absorbable suture material in a figure-8 pattern from the acromion process or scapular neck to the humerus near the area of the greater tubercle. Bone tunnels, screws and washers, and suture anchors have been used successfully to secure the suture and #5 Fiberwire and #5 braided polyester have been used as prosthetic implants. The suture should be tied with the limb in extension and slight
abduction. Following tension band placement, the joint capsule is closed. Imbricating sutures can be used to provide extra support for the joint.

If osteoarthritis is severe, the patient may benefit from arthrodesis of the scapulohumeral joint. Although a gait abnormality is expected following surgical arthrodesis, there is enough mobility provided by the scapula that these animals can remain functional.

Post-operative Care:
Animals are placed in a modified Velpeau sling for recovery and for 1-2 weeks post operatively to prevent use of the affected leg. Following that time, the leg is removed from the sling and the animal is allowed to use the leg in a controlled environment. The author recommends an additional 30-60 days of stall rest with a gradual increase in exercise. Animals will generally be reluctant to use the leg immediately following sling removal and then gradually increase in use and mobility. Flexural contracture can result from prolonged use of the Velpeau sling.

Prognosis:
The prognosis for animals undergoing correction of scapulohumeral joint luxation is favorable. Chronicity of the luxation and concurrent musculoskeletal injury decreases the prognosis for a successful outcome. Although complications are possible, previous reports indicate that most animals undergoing treatment for scapulohumeral luxation regain at least some functionality from the affected leg. Luxation of the camelid shoulder is significantly more common in intact males than female counterparts but it has been suggested that females may do better following closed reduction than males.2
