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## **Coracoid impingement: Current concepts**

*Knee Surgery, Sports Traumatology, Arthroscopy: Official Journal of the ESSKA. 2012; 20(11): 2148-55*

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### **ABSTRACT**

*For many years, coracoid impingement has been a well-recognized cause of anterior shoulder pain. However, a precise diagnosis of coracoid impingement remains difficult in some cases due to the presence of multifactorial pathologies and a paucity of supporting evidence in the literature. This review provides an update on the current anatomical and biomechanical knowledge regarding this pathology, describes the diagnostic process, and discusses the possible treatment options, based on a systematic review of the literature.*

*Level of evidence V.*

### **ANALYSIS**

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#### **Background Information**

Coracoid impingement (CI) is considered to be a known, yet uncommon cause of anterior shoulder pain, whereby the subscapularis and/or biceps tendon(s) become entrapped between the coracoid process and the lesser tuberosity of the humerus. Recent studies have shown this clinical syndrome to be more common than previously thought, but grossly underreported (1, 2).

Because of this, the authors of this narrative review sought to discuss the anatomical and biomechanical factors that can predispose an individual to CI, as well as discuss the most current and reasonable clinical management strategies.

## **PERTINENT RESULTS**

### **Etiology**

Three classifications of CI exist: idiopathic, iatrogenic or traumatic. Idiopathic CI can occur due to anatomical variations of the coracoid process, calcification, ossification or the presence of ganglion cysts within the subscapularis tendon. It can occur iatrogenically as a result of surgical procedures, namely coracoid transfer, posterior glenoid neck osteotomy and acromionectomy. The syndrome can also occur after trauma, such as fractures of the humeral head or neck, the glenoid, the scapular neck, as well as posterior SC joint dislocations. The coracohumeral space can also be narrowed (stenosis), subsequent to surgery or injuries resulting in anterior instability.

### **Diagnosis**

Medical History and Clinical Examination: the therapist or physician should ask about previous shoulder injury or pathology, and the onset and duration of the current discomfort. It is also important to determine which arm positions bring about the painful symptoms and to ask the patient about their profession and sports activity, as CI often occurs subsequent to repetitive strain and chronic overuse.

Symptoms of CI have been described as dull, anterior shoulder pain which is chiefly aggravated by concomitant forward flexion and internal rotation of the glenohumeral joint. Abduction and internal rotation can also provoke painful symptoms. Orthopedic examination of the shoulder may show positive rotator cuff and biceps tendon tests, as well as signs of anterior instability; these pathologies can result in a narrowing of the coracohumeral space. Tenderness to digital palpation at the coracoid process and/or the lesser tuberosity may be present. Specifically, the coracoid impingement test can be performed by passively placing the arm in internal rotation with the arm in horizontal adduction and anterior elevation (3).

Imaging: Plain films may show anatomical variants, such as a laterally projecting coracoid process in the anteroposterior view, or a chevron-shaped coracoid process in the supraspinatus outlet view.

CT and MRI axial sequences may show a shortened distance between the coracoid and humeral head. However, some studies have disputed the efficacy of MR scans, stating that the diagnosis of CI cannot be made via MRI findings alone (4). Some studies also show an ultrasonographic examination of the coracohumeral interval can lead to the diagnosis of CI.

Readers should know that the most important radiological criterion for the assessment and diagnosis of CI is the measurement of coracohumeral distance. However, measurement of the coracoid index (defined as the measurement of the lateral projection of the coracoid past the glenoid joint line through the use of CT and/or MRI) is also important.

Some reports of arthroscopic examination have been shown in the literature. Surgeons often enter posteriorly and look for possible bone or soft tissue impingement between the coracoid process and the humeral head. Impingement is also evaluated for while the arm is in different positions, especially abduction/flexion and internal rotation. Surgeons will also observe for signs of inflammation of the capsule, tendonitis, lesions to the biceps tendon and rotator cuff muscles, and for signs of anterior shoulder instability (i.e. capsulolabral lesion, elongation of the capsule-ligament complex).

## Treatment

Upon diagnosis of CI, the first line of treatment is conservative, which should include activity modification, avoidance of painful positions and rotator cuff/scapular stability rehabilitation exercises.

If symptoms persist and conservative measures are unsuccessful, operative management may be considered. Both open and arthroscopic coracoplasty have been shown to have positive and reliable clinical results with regards to pain relief and functional improvement. The indications for surgery include persistent pain due to secondary reasons for CI, including calcification/ossification of the subscapularis tendon, ganglion cysts, prior surgeries such as coracoid transfer, posterior glenoid neck osteotomy or acromionectomy, and previous fractures/dislocations. Individuals with intractable anterior shoulder pain with clinical and radiographic evidence of CI are eligible for surgical treatment. Both general and interscalene block anaesthesia can be performed.

Should anterior shoulder instability be found arthroscopically, surgeons may decide to surgically stabilize the shoulder, which can result in a regression of symptoms. Additionally, surgical reparation of biceps tendon, subscapularis and other tendons/muscles must be performed, provided pathology is found. In the presence of a subscapularis tear, it is possible to find anatomical malformation of the coracoid process, which will necessitate shaving the coracoid process to 'medialize' and 'anteriorize' it.

After coracoplasty, active range of motion of the shoulder is encouraged as soon as possible. It is advisable to avoid impingement positions for at least 2 weeks post-surgery.

## CLINICAL APPLICATION & CONCLUSIONS

There is paucity in the literature regarding the diagnosis, clinical, examination, imaging, treatment (surgical and conservative) and prognosis of CI.

Some authors (5) advise that CI be diagnosed clinically. However, the clinical examination procedure, while well described in the literature, is subjective and has not been placed through rigorous scientific study to determine validity and accuracy.

Diagnosis of CI via plain film or advanced imaging is not as reliable as once thought. There is no study examining a reliable correlation between radiographic findings and CI. MRI is said to be 5.3% sensitive (rule out) and 97% specific (rule in) for CI. This means that an accurate diagnosis of CI cannot be made via imaging alone. Still, a narrowed coracohumeral distance is an important finding, should it be found on axial images. However, the exact cause and effect nature of this relationship needs to be elucidated.

*An important take away message from this article is that conservative therapy should be the first line of treatment for CI.* Unfortunately, specific recommendations regarding the type of conservative therapy cannot be made at this time.

Surgical intervention should be reserved for those with intractable pain, where conservative therapy has failed. Additionally, readers should also be aware of the scarcity of literature related to this topic – more biomechanical, radiological and clinical studies need to be performed.

## **STUDY METHODS**

The authors performed an electronic search using the PubMed and Embase databases, accessing articles up to 2011. Once the articles were collected, three independent reviewers screened all titles and abstracts found, and subsequently read the full articles in order to determine whether the articles should be included. Since there is great paucity in the literature, all of the original articles, review papers and case reports related to this topic were included in the systematic review.

Fifty-two articles related to coracoid impingement were included. No prospective RCTs or comparative studies were found. Because of the lack of high quality evidence, the researchers could not perform a full systematic review, and thus performed a current concepts review.

## **STUDY STRENGTHS / WEAKNESSES**

### **Weaknesses**

- The lack of high quality evidence prevented the authors from performing a systematic review.
- The authors only accessed the PubMed and Embase databases to search for articles. Perhaps if they have accessed other databases, they may have found more articles (or even higher quality ones) to allow for a mathematical analysis.
- The authors did not describe their inclusion/exclusion criteria.

### **Strengths**

- The authors used a lot of text words in their search, which broadened their ability to find articles.
- Inclusion of articles up to 2011
- Despite of their inability to make conclusions that can be backed up with statistical analysis, the authors still described the anatomical and biomechanical factors that contribute to CI, which is of value to clinicians in the field.
- The authors encourage conservative therapy prior to surgical intervention.

### **Additional References**

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