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ARTHROSCOPY FOR IMPINGEMENT SYNDROME TECHNIQUES; REVIEW

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Abstract:
Over the last few years, advances in the understanding of impingement syndromes and advancements in hip arthroscopic techniques, such as chondrolabral preservation and labral repair, have led to improvements in success rates, functional outcomes, and return to sports. This improvement in outcomes is also due to a greater awareness of the importance of performing capsular closure after treating intra-articular hip pathology to preserve the biomechanical properties of the hip and shoulder. We conducted a narrative review using most popular databases such as ; PubMed and Embase to search the literature using keywords for all related studies publish up to 2022. Impingement syndrome treatment includes both operative and non-operative approaches, and the treatment method varies greatly depending on the severity of the case. Nonetheless, there is disagreement in the literature regarding both operative and non-operative methods of treating shoulder injuries. Several studies have concluded that conservative treatments are effective for many people, particularly in minor cases.

INTRODUCTION:
FAI (femoroacetabular impingement) was first identified as a cause of hip pain in the early 2000s, particularly in young, active patients. Furthermore, FAI is thought to be a cause of hip osteoarthritis [1,2]. However, the best way to treat symptomatic FAI remains debatable. For symptomatic FAI, there are two broad treatment options: surgical and nonsurgical interventions. Even though nonsurgical treatment such as physiotherapy (PT), activity modification, or pain medication is the initial treatment option for symptomatic FAI, physicians must decide whether to convert to surgical treatment or continue nonsurgical treatment if symptoms do not improve. PT protocols for symptomatic FAI vary, but all strategies aim to improve hip muscle weakness, lower trunk strength, dynamic single-leg balance, and dysfunctional muscular impairments [3,4,5].

Surgical treatment for FAI has become a well- established option. The goal of surgery is to reshape the hip joint to resolve impingement, alleviate hip pain, and improve hip function [6]. Initially, open surgery was used to treat FAI, but arthroscopy is now more commonly used [7]. To date, several studies have reported excellent efficacy and safety outcomes for FAI-associated hip arthroscopy. Hip arthroscopy has more than quadrupled in the United States over the last two decades [8]. However, there is insufficient evidence to support either arthroscopy or nonsurgical treatment as the superior treatment option for symptomatic FAI. According to some studies, surgical intervention is not superior to nonsurgical treatment for FAI [9]. Furthermore, the cost-effectiveness of hip arthroscopy for FAI is debatable. In the 2016–2017 Medicare budget, the Australian government removed arthroscopic treatment for FAI as a covered procedure [9].

Shoulder impingement syndrome (SIS), the most common cause of shoulder disability, is a major health issue in adults [10]. SIS, a problem that causes shoulder disability, pain, and loss of function, is linked to up to 65% of all shoulder pathologies [10]. Shoulder impingement syndrome is a progressive, degenerative rotator cuff disease characterized by soft tissue entrapment [11]. Initially, the aetiology of SIS revolves around an extrinsic mechanism in which a decrease in subacromial space distance causes shoulder "impingement." As our understanding of SIS grows, it is suggested that intrinsic factors and programmed cell death may both play a role in the pathogenesis of degenerative cuff tendinopathy [11].

SIS is primarily a clinical diagnosis, with imaging modalities serving as an aid in identifying pathology and ruling out other causes of shoulder pain [11]. A plain radiograph is a good starting point because a narrowed acromiohumeral distance indicates rotator cuff tendinopathy or tear. The rotator cuff tendon can be evaluated quickly using magnetic resonance imaging (MRI) and computed tomography (CT) arthrography [12].

Subacromial impingement syndrome (SIS) is a clinical syndrome that is most commonly associated with patients who present with shoulder pain [13]. SIS is a syndrome that includes a variety of subacromial pathologies such as bursitis, rotator cuff tendinosis, and partial tears that progress to full-thickness rotator cuff tears.

Cam and pincer morphology has been found in 10% to 67% of asymptomatic individuals in imaging studies [2, 7]. This suggests that the pathology in patients with symptoms may include unsatisfactory muscle strength, control, and movement patterns in addition to bony shape. Several reports [14] have been published on targeted physiotherapy programmed (TPP) that aim to improve these latter factors. In one study, TPP helped half of FAIS patients in the short term, but cam morphology was a predictor of poor outcome [12]. Most of these programmed have included activity restriction [8, 10], but this is not always a viable treatment option.

Surgical bone reshaping can correct the pathology's structural component. Initially, open surgery was the only option for impingement correction. However, hip arthroscopic techniques have advanced dramatically over the last two decades. These have been used in the treatment of FAIS and related pathologies, with good results, return to sports, and restoration of range of motion [14].

The current review aims to provide a clinical update on the treatment of athletes with shoulder impingement syndrome. We concentrated on arthroscopy techniques for Impingement Syndrome, such as subacromial impingement, internal impingement, and subcoracoid impingement syndromes, which are common in the athletic population.

DISCUSSION:

Shoulder impingement syndrome is frequently diagnosed in athletes experiencing shoulder pain, particularly those who engage in overhead and/or throwing activities [7]. There are several types of shoulder impingement, including subacromial impingement, subcoracoid impingement, and internal impingement [7,12]. Subcoracoid impingement is the impingement of the anterior soft tissues of the shoulder (subscapularis tendon, long head biceps tendon, and biceps reflection pulley) between the coracoid process and the lesser tuberosity, which occurs most often when the arm is in flexion, adduction, or internal rotation [3]. Subacromial impingement syndrome (SIS) is a common cause of athlete shoulder pain [3,8]. A partial or complete tear of the rotator cuff tendon frequently occurs with SIS, and rotator cuff integrity must be evaluated in these patients. Freestyle swimmers have an increased risk of SIS due to repetitive microtrauma during the overhead-cyclic motion of the upper extremities combined with shoulder hyperlaxity [6,10]. Internal impingement (impingement of the rotator cuff's undersurface) is uncommon in the general population and almost always occurs in athletes. Internal impingement is a common cause of shoulder pain in baseball players, and it occurs when the rotator cuff is compressed between the greater tuberosity and the posterosuperior labrum during the late cocking and early acceleration phases of throwing [10].

Because this condition (regardless of type) is multifactorial, diagnosing and treating shoulder impingement syndrome in athletes can be difficult [9]. Athletes suspected of having shoulder impingement syndrome should be encouraged to demonstrate the motion(s) that cause their symptoms. Other conditions that may accompany shoulder impingement should be ruled out in addition to rotator cuff disease. Glenohumeral instability, shoulder muscle imbalance, nerve entrapment syndromes, and scapular disorders are examples of the latter [11]. SICK (Scapular malposition, Inferior medial border prominence, Coracoid pain, and malposition, and scapulothoracic dyskinesis) scapula syndrome or scapulothoracic dyskinesis refers to abnormal scapula motion that causes shoulder impingement and dysfunction. In athletes with suspected shoulder impingement syndrome, radiographic evaluation is frequently followed by ultrasound or magnetic resonance imaging (MRI) [12]. Conservative treatment with physical therapy, oral medication, and/or subacromial injections remains the first-line therapy for athletes with impingement syndrome, with operative treatment reserved for refractory cases. However, surgical treatment may be the first-line therapy in athletes with impingement syndrome who also have severe rotator cuff pathology and/or bony abnormalities [12].

Subacromial Impingement Syndrome (SIS):

SIS is the most common cause of shoulder pain in the general population (accounting for 44-65% of all shoulder complaints), and it is frequently diagnosed in athletes. The pathophysiologic basis of SIS is narrowing of the subacromial space due to any aetiology [15]. Like internal impingement syndrome, the true incidence rate of SIS in athletes is difficult to estimate due to the disease's multifactorial nature, and thus it has not been reported. Based on the underlying shoulder abnormalities, SIS has traditionally been classified as "structural" (primary SIS) or "functional" (secondary SIS) [16]. Structural SIS develops because of bony or soft tissue abnormalities that cause compression of subacromial space structures such as the rotator cuff tendon, long head of biceps, and subacromial bursa [17]. During humeral abduction, these anatomical structures can be compressed between the acromion, acromioclavicular joint, coracoacromial ligament, and the humeral head [16]. In modern literature, "extrinsic compression" refers to the compression of the rotator cuff tendon, specifically the supraspinatus tendon, which is most likely to contact the acromion with the humerus when the arm is 90° abducted and 45° internal rotated [17].

The "functional" type of SIS develops because of muscle imbalance or rotator cuff disease (loss of the force couples around the shoulder) and/or glenohumeral instability, resulting in superior migration of the humeral head and narrowing of the subacromial space [18]. For example, intrinsic rotator cuff tendon degeneration results in decreased (downward) antagonizing force against the (upward) deltoid force, resulting in superior humeral migration [18]. SIS encompasses a wide range of shoulder conditions, including rotator cuff disease, biceps tendinitis, and subacromial bursitis. Over the years, the relationship between SIS and rotator cuff tears has been a source of contention between the theories of extrinsic compression and intrinsic tendon degeneration, as described above. Scapular dyskinesia, posterior capsular contracture, os acromiale, hook-shaped acromion, malunion of greater tuberosity fracture, and glenohumeral instability are all conditions that may be associated with SIS [19,20].

According to the extrinsic theory, SIS has an extratendinous cause. SIS is thought to be caused by several degenerative processes. Tension of the CAL at its insertion point on the acromion has also been proposed to cause stress-induced spurs on the acromion's underside, contributing to the syndrome [15]. According to Wolff's law of strain, the CAL can also cause spur formation under the acromion, as well as thickening and potential reduction of the subacromial space. Acromion morphology variations have also been linked to this theory. This was first reported in 1986, when three distinct shapes were identified: Type I, a flat acromion, Type II, a curved acromion, and Type III, a hooked acromion. Several early studies appeared to suggest that patients with Type III acromion had a higher incidence of rotator cuff tears, but more recent studies have not been able to show a strong relationship between the two [16,18]. Gill et al. then proposed that Type III acromion was more likely a degenerative condition than a congenital variation [17]. Osteophytes from acromioclavicular joint osteoarthritis can cause a reduction in the subacromial space [15].

Neer and Marberry argued that early proponents of the extrinsic theory were incorrect in claiming that the lateral acromion was the source of external impingement and that treatment with lateral or total acromionectomy was unnecessary and resulted in deltoid injury [19]. His subsequent work on 100 cadavers led to the suggestion that spurs on the anterior aspect of the acromion's undersurface were the source of external impingement [15].

The SIS diagnostic process begins with a detailed history of the athlete's shoulder injury and a physical examination. The athlete with SIS typically reports a gradual onset of shoulder pain (weeks to months) that is exacerbated by arm elevation and/or overhead activities [21]. The pain is usually located anteriorly and/or lateral to the acromion, with or without radiating to the lateral aspect of the arm (deltoid tuberosity) [22]. Another sign of possible SIS is tenderness at the Codman point [23]. The presence of night pain should raise the possibility of a rotator cuff tendon tear [23]. Shoulder stiffness or weakness can occur on occasion. It is critical for athletes to investigate the sport-related manoeuvres that elicit SIS symptoms in order to determine the next steps in the diagnostic process. Freestyle swimmers have an increased risk of function (secondary) SIS due to shoulder hyperlaxity and repetitive microtrauma of the subacromial structures, as well as muscle imbalance [21,23]. Throwing sports such as baseball, tennis, and water polo expose the athlete's shoulder to SIS due to repetitive microtrauma of the subacromial structures [24].

The physical examination tests that are commonly performed in patients with suspected SIS are listed in Table 1. These tests' diagnostic performance has previously been investigated [24]. The Neer sign is made by flexing the arm forward while using the opposite hand to stabilise the scapula. In a meta-analysis, the pooled sensitivity of the Neer sign for subacromial bursitis (an indicator of SIS) was 72%, with a specificity of 60% [25]. According to the same study, the Hawkins-Kennedy test was 79% sensitive and 57% specific for subacromial impingement, while the painful arc test was 53% sensitive and 76% specific for this condition. Combining two or more tests during a physical examination or combining a test with specific patient characteristics or symptoms (such as age, shoulder clicking, and so on), can improve the diagnostic performance of shoulder physical examination tests (including those related to SIS) [25]. Although previous studies found that combining SIS tests resulted in only a marginal improvement in diagnostic performance (compared to an individual test), performing multiple diagnostic manoeuvres is recommended in these patients [26,27].

Table 1: Positive Interpretation of Commonly Performed Physical Examination Tests in Patients with Suspected Subacromial Impingement Syndrome (SIS)

Physical Examination Test	Positive Interpretation for the Diagnosis of SIS
Neer impingement sign	Shoulder pain with passive forward flexion of the shoulder > 90°
Neer impingement test	Negative Neer impingement sign following subacromial injection with local anesthetic± corticosteroid°
T sign	Shoulder pain with forced elevation of the arm (between flexion and abduction) between 70–110 °
Hawkins test	Shoulder pain with passive forward flexion of the shoulder to 90° with internal rotation
Jobe test (supraspinatus)	Shoulder pain with forward arm elevation to 90° and resisted pronation
Painful arc test	Shoulder pain with active arm abduction between 60°-120°

CONCLUSION:

In active young adults, SIS is a common and painful condition. The aetiology of impingement and rotator cuff tears is still being debated, but it is likely to be multifactorial. It has excellent outcomes when properly diagnosed and treated. Operative intervention should be recommended only after all nonoperative management options have been exhausted.

A radiographic examination is advised, and the extent of soft tissue abnormalities can be determined using ultrasound or magnetic resonance imaging of the shoulder. Based on the severity and chronicity of symptoms, as well as the associated structural abnormalities, shoulder impingement syndrome can be managed conservatively or surgically. This article provides an update on the treatment of SIS, subcoracoid impingement, and internal impingement in athletes.

Capsular plication of the vertical T-limb and plication closure of the interporal limb have been shown to improve outcomes. The degree of plication is determined by an intraoperative dynamic assessment of hip range of motion. The senior author suggests reflecting the medial and lateral leaflets with polyethylene sutures after T-capsulotomy to provide better exposure of the peripheral compartment, which can be used for closure.

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