

## Current Concepts In Shoulder Arthroscopy

Faour Martín O<sup>1</sup>, Martin Ferrero Ma<sup>2</sup>, Vega Castrillo A<sup>2</sup>, Ardura Aragon F<sup>3</sup>, Simon Perez C<sup>2</sup>, Valverde García Ja<sup>4</sup>, De La Red Gallego Ma.<sup>5</sup>

1. Department of Orthopaedics, Hospital of Ávila-Sacyl, Spain;
2. Department of Orthopaedics, School of Medicine, University of Valladolid, Spain;
3. Department of Orthopaedics, Hospital Clinic of Valladolid, Spain;
4. Department of Orthopedics, Hospital of Río Hortega of Valladolid, Spain;
5. Department of Orthopedics, Hospital of Valdecilla Santander, Spain.

**Conflict-of-interest statement:** The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

**Open-Access:** This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

**Correspondence to:** Faour Martin O, Department of Orthopaedics Surgery And Traumatology, Asistencial Complej Of Avila - Sacyl. Spain.

Email: [ofmartin@msn.com](mailto:ofmartin@msn.com)

Received: December 6, 2019

Revised: November 26, 2019

Accepted: January 28 2019

Published online: February 28, 2020

### ABSTRACT

Shoulder diseases have been defined as one of the most common musculoskeletal disorder. A revision of the current concepts in shoulder arthroscopy is presented, including the general complications of the current techniques at this respect and the new trends in the surgical management of the shoulder pathology.

**Key words:** Arthroscopy; Shoulder; Update; Rotator Cuff; Shoulder Instability

© 2020 The Author(s). Published by ACT Publishing Group Ltd. All rights reserved.

Faour Martín O, Martin Ferrero Ma, Vega Castrillo A, Ardura Aragon F, Simon Perez C, Valverde García Ja, De La Red Gallego Ma. Current Concepts In Shoulder Arthroscopy. *International Journal of Orthopaedics* 2020; 7(1): 1224-1226 Available from: URL: <http://www.ghrnet.org/index.php/ijo/article/view/2806>

### 1. ROTATOR CUFF

Shoulder pain has been defined as the second-most common musculoskeletal disorder after low back pain<sup>[1-12]</sup>. Rotator cuff tears are among the most common causes of pain and functional disability in the shoulder, which generally affect the supraspinatus tendon.

Arthroscopic Repair of full-thickness rotator cuff tears is routinely performed using suture anchors, which produce secure and effective soft tissue to bone repair. Outcome of rotator cuff surgery is unpredictable, because the biological process that leads the tendon to reattach to the bone have not been clearly identified. The use of autologous platelet-rich plasma or similar products containing platelets has been widely studied in bone and tendon tissue healing and reconstruction. Platelet-rich plasma (PRP) is known to contain more than 1500 bioactive proteins that are important for tendon healing, including growth factors such as transforming growth factor beta (TGF-β), fibroblast growth factor (FGF), and platelet-derived growth factor (PDGF). Platelet-rich plasma, glucocorticoids, local anaesthetics, or hyaluronic acid are used to reduce pain and improve performance in patients who undergo rotator cuff repair. Rotator cuff tears occur as a result of normal ageing, excessive loading, and microtrauma. They are common in the general population and can have serious effects on a person's work and life. Several therapies have been reported; however, the problem can be difficult to manage. Thus, attention has turned to novel treatments. PRP has been investigated for its biological effects on the human rotator cuff<sup>[3]</sup>. However, the available evidence to support treatment is inadequate and even conflicting. A metaanalysis of 13 randomized controlled trials to compare the efficacy of platelet rich plasma or platelet-rich fibrin matrix application in conjunction with arthroscopic rotator cuff repair is describe in the literature<sup>[3]</sup>. The systematic review and meta-analysis reveals that

PRP treatment with arthroscopic repair of rotator cuff tears decreases the retear rate and improves the clinical outcomes.

The use of biodegradable implants in arthroscopic rotator cuff repair (RCR) procedures is relatively recent. In fact, biodegradable anchors avoid the potential risk of metal anchors of bone resorption and implant dislodgement. Other advantages of biodegradable over metal implants include less postoperative MRI artefacts and easier revision surgery. Nevertheless, three main disadvantages are associated with the use of biodegradable suture anchors: higher costs, undesired biological response and shorter fixation. The first types of suture anchors used for RCR were metallic. However, they may be associated with well documented complications such as migration, incarceration of the metal implant within the joint, chondral damage, loosening and technical difficulty with revision surgery. Mobilization of metal implants can be identified at radiography. Evidence at this respect, concludes that there are no statistically significant differences at a mean follow-up of 4.05 + 2 years in clinical and functional outcomes of single row arthroscopic RCR using metallic or biodegradable suture anchors for RC < 5 cm<sup>[4]</sup>.

Lesions associated with the biceps tendon are commonly detected during arthroscopic repair of rotator cuff tears. Acquiring a preferable technique to repair both cuff and long head of biceps tendon (LHBT) lesions was the aim of several recent studies<sup>[1]</sup>. Two-thirds of patients with long head of biceps tendon (LHBT) pathology have simultaneous rotator cuff tear, which may lead to anterior shoulder pain and forward flexion dysfunction. Large and massive rotator cuff tears (tears > 3 cm) associated with LHBT pathologies benefited from intraarticular or subpectoral tenodesis similarly, with no differences in short- or mid-term results between these two techniques.

## 2. SUBACROMIAL DECOMPRESSION

Since the original description of Neer various technical modifications have been proposed for the anterior acromioplasty. Ellman *et al*<sup>[1]</sup> described an arthroscopic technique to perform a resection of the anterior acromion undersurface, coracoacromial ligament release and bursal debridement. Others authors<sup>[8]</sup> have indicated the need of avoiding resection or release of the coracoacromial ligament in order to avoid the potential complication consisting in the avulsion of the deltoid origin due to its weakening by the procedure.

Supporters and detractors of acromioplasty during rotator cuff procedures have based their surgical practice on different theoretic pathogenesis models. There is increasing number of published reports examining the role of acromioplasty in the treatment of rotator cuff disease. Evidence does not support the routine use of acromioplasty in the treatment of rotator cuff disease, mainly in relation to tears management, on the basis of multiple well-designed studies suggesting acromioplasty providing no added benefits in terms of pain relief, better function or improving quality of life<sup>[1,8]</sup>.

Symptomatic rotator cuff tears that are unresponsive to conservative measures remain in controversy regarding definitive treatment in older patients, particularly in those past 65 years of age. These patients, with persistent pain and shoulder disability leading to loss of functional independence, may have surgical treatment as the most viable option. Despite the lack of a unanimous agreement regarding the success of rotator cuff repair in such cases, it is an acknowledged fact that rotator cuff disease alone is a primary determinant of health status and consequently, surgery for rotator cuff disease reliably and significantly improves this parameter. Based on current literature, rotator cuff repair in patients older than 65 years imparts favorable improvement in clinical outcome scores and overall patient satisfac-

tion<sup>[2]</sup>. From 2010 to 2018, there were changes in the management of full-thickness rotator cuff tears, including decreased preoperative utilization of corticosteroid injections as well as a decrease in concomitant biceps tenodesis<sup>[4]</sup>.

## 3. NON-REPARABLE SHOULDER TENDINOPATHY

The term massive rotator cuff tear has been widely used to identify very large tears that are particularly difficult to repair. Massive rotator cuff tears occur most often in elderly people and are associated with an uncertain prognosis. If we try to repair the rupture even partially, there is a high risk of re-rupture due to the improper quality of muscle tissue and extensive fatty degeneration. It has been widely accepted that the repair of massive rotator cuff tears is difficult and associated with a high incidence of failure.

The alternative surgery for massive and irreparable shoulder rotator cuff tears in older patients is the debridement of subacromial bursa, biceps tenotomy, and tuberopecty (reverse acromioplasty) without coracoacromial ligament excision. The short-term results showed in current studies<sup>[8]</sup> indicated that large and massive tears can be successfully treated with arthroscopic tuberopecty. This surgery is an appropriate method for the treatment of this ruptures, especially for elderly people. According to the obtained results of the literature, this method improved performance, range of motion, and pain in the investigated patients<sup>[8]</sup>.

## 4. ACROMIOCLAVICULAR DISLOCATION

The acromioclavicular joint (ACJ) is one of the more common sites of shoulder girdle injury, accounting for 4-12% of all such injuries, with an incidence of 3-4 cases per 100 000 persons per year in the general population<sup>[6,7]</sup>. In daily clinical practice, both arthroscopically assisted acromioclavicular joint stabilization for dislocation injury with so-called “pulley systems” and hook plate fixation are regarded as standard techniques. During arthroscopically assisted AC joint stabilization, a transclavicular-transcoracoid tunnel is drilled under arthroscopic guidance and a suture anchor construct is placed, supported by 2 small titanium plates underneath the coracoid and above the clavicle to secure the reduction achieved. Here, today a technique with only one coraco-clavicular tunnel of a significantly smaller diameter (2.4 mm) is increasingly used to minimize the risk of clavicular and coracoid fracture. To date no significant difference was found for the functional outcome, but a trend towards better outcomes for arthroscopic/minimally invasive techniques has been reported. Subjective patient satisfaction and cosmetic results were significantly better after arthroscopic surgery<sup>[6]</sup>.

## 5. SHOULDER INSTABILITY

Shoulder instability encompasses a wide spectrum from subluxation to frank dislocation with a high prevalence affecting mainly the young, active population with a significant impact on the quality of life. Several aspects in the management of anterior shoulder instability continue to be controversial with a lack of consensus on treatment protocols especially in the face of glenoid and/or humeral head bone loss. At this respect, arthroscopic anatomic glenoid reconstruction using bone grafts has been proposed as an alternative to the complex all arthroscopic Latarjet procedure with excellent short-term results, minimal complications and a relatively easier learning curve<sup>[12]</sup>. Capsular reconstruction has emerged as option for the management of in-

stability with poor quality or absent capsular tissue. Future long-term outcome studies and randomised comparative trials will determine if these innovations stand the test of time.

## 6. GENERAL COMPLICATIONS OF THE PROCEDURE

General complications during shoulder arthroscopy procedure are rare. Neurocognitive complications after beach chair position are exceedingly rare but potentially catastrophic events that may affect patients without pre-existing cerebrovascular risk factors. A previous systematic review of 24,701 cases reported the overall incidence of neurologic deficits after arthroscopy in the upright position to be 0.004%<sup>[9]</sup>. The severity, frequency, and duration of hypoperfusion that cause cerebral ischemia and subsequent neurocognitive deficits have yet to be defined in arthroscopic shoulder surgery. Multiple previous reports have failed to establish a correlation between intraoperative complications and postoperative neurocognitive deficits. Large prospective clinical studies and further preclinical research are still needed to understand the clinically significant thresholds of magnitude, duration, and frequency of intraoperative neurocognitive adverse events to clearly establish a relationship with postoperative neurocognitive complications. Such large studies are also needed to further illuminate modifiable patient risk factors and to establish a system of sensitive, safe, and cost-effective cerebral perfusion monitoring.

Subcutaneous emphysema (SE) is a condition in which air infiltrates in the subcutaneous tissues. SE due to the arthroscopy itself may be explained by transient changes of the pressure in the subacromial (SA) space relative to the atmospheric pressure during the procedure. When the SA pressure is lower than the atmospheric pressure due to suction performed to eliminate debris, air may enter in the SA space. The positive pressure from the infusion pump may push this air subsequently into the subcutaneous tissues after turning of the suction and thus cause SE. The air may penetrate into the axillary sheath and extend through the prevertebral space of the neck surrounding the trachea and oesophagus, which can result in a pneumomediastinum. Increasing pressure in the mediastinum by positive pressure ventilation or during expiration may cause a rupture in the mediastinal parietal pleura and eventually cause a pneumothorax<sup>[10]</sup>. A third way in which arthroscopy may cause SE, is by inflow of air through the portals. This risk can be minimised by using cannulae equipped with a sealing dam. If, despite this, air still comes into the subacromial space, the air bubbles would immediately limit the view so the arthroscopy cannot be continued properly. It is important to keep in mind that subcutaneous emphysema can occur after arthroscopic shoulder surgery and to recognise this in time so an adequate therapy can be established if needed.

The rate of infection after shoulder arthroscopy has been reported to range between 0.16% and 0.85%<sup>[11]</sup>. The advent of arthroscopic techniques brought a significant reduction in infection rates if compared to open shoulder surgery. Among the different arthroscopic procedures, rotator cuff repair has shown the highest infection rate, while Bankart repairs the lowest<sup>[12]</sup>. Arthroscopic revision surgery, involving higher complexity procedures, carries an infection rate of 2.1%<sup>[11]</sup>. The most common pathogens associated with shoulder infection after shoulder arthroscopy are *P. acnes* and *Staphylococci*: they are the most common isolates in sebaceous areas of the skin and

account for nearly all infection cases. Treatment of early, superficial infections could rely on antibiotic administration. Deeper and later infections usually require surgical debridement. It is important to discontinue any antibiotic treatment five to seven days before surgical debridement: during surgery, specimens must be obtained and cultured in order to obtain or confirm an aetiological diagnosis and perform a targeted antibiotic treatment. Surgical debridement could be either open or arthroscopic, and it can be associated with hardware removal.

## REFERENCES

1. Faour Martín O. Rotator cuff disease management. Current role of acromioplasty. *Int J Orthop*. 2015 May; **7(3)**: 263-268.
2. Familiari F, Gonzalez-Zapata A, Ianno B, Galasso O, Gasparini G, McFarland EG. Is acromioplasty necessary in the setting of full-thickness rotator cuff tears? A systematic review. *J Orthop Traumatol*. 2015; **16(3)**: 167-74. [PMID: 26003837]; [DOI: 10.1007/s10195-015-0353-z]
3. Aslani H, Nourbakhsh ST, Zafarani Z, Ahmadi-Bani M, Ananloo ME, Beigy M. Platelet-rich plasma for frozen shoulder: a case report. *Arch Bone Jt Surg*. 2016; **4(1)**: 90-3. [PMID: 26894228]; [DOI: 10.1186/s125456]
4. Longo UG, Petrillo S, Loppini M, Candela V, Rizzello G, Maffulli N, Denaro V. Metallic versus biodegradable suture anchors for rotator cuff repair: a case control study. *BMC Musculoskelet Disord*. 2019 Oct 25; **20(1)**: 477. [PMID: 31653247]; [DOI: 10.1186/s12891-019-2834-3]
5. Han C, Na Y, Zhu Y, Kong L, Eerdun T, Yang X, Ren Y. Is platelet-rich plasma an ideal biomaterial for arthroscopic rotator cuff repair? A systematic review and meta-analysis of randomized controlled trials. *J Orthop Surg Res*. 2019 Jun 20; **14(1)**: 183. [PMID: 316585122]; [DOI: 10.1186/s13018-019-1207-9]
6. Martetschlager F, Kraus N, Scheibel M, Streich J, Venjakob A, Maier D. The Diagnosis and Treatment of Acute Dislocation of the Acromioclavicular Joint *Dtsch Arztebl Int*. 2019 Feb 8; **116(6)**: 89-95. [PMID: 31407555]; [DOI: 10.7507/1002-1892.201903019]
7. John R, Wong I. Innovative Approaches in the Management of Shoulder Instability: Current Concept Review. *Curr Rev Musculoskelet Med*. 2019 Jul **23**: 386-396. [PMID: 316684686]; [DOI: 10.1007/s12178-019-09569-z]
8. Mirzaee F, Aslani MA, Zafarani Z, Aslani H. Treatment of Massive Irreparable Rotator Cuff Tear with Arthroscopic Subacromial Bursectomy, Biceps tenotomy, and Tuberopecty. *Arch Bone Jt Surg*. 2019 May; **7(3)**: 263-268. [PMID: 31312685]; [DOI: 10.5435/19212154]
9. Salazar DH, Davis WJ, Ziroglu N, Garbis NG. Cerebral Desaturation Events During Shoulder Arthroscopy in the Beach Chair Position. *J Am Acad Orthop Surg Glob Res Rev*. 2019 Aug 2; **3(8)**: e007. [PMID: 316754215]; [DOI: 10.5435/19-0000710]
10. Van Nieuwenhuysse ES, Kerens B, Moens J, Kiekens G. Subcutaneous emphysema after shoulder arthroscopy. A case report and review of the literature. *J Orthop*. 2017 Mar 31; **14(2)**: 287-289 [PMID: 2877434]; [DOI: 10.1016/j.jor.2017.03.009]
11. Bauer T, Boisrenoult P, Jenny JY. Post-arthroscopy septic arthritis: Current data and practical recommendations. *Orthop Traumatol Surg Res*. 2015 Dec; **101(8 Suppl)**: S347-50. [PMID: 26412207]; [DOI: 10.1016/j.otsr.2015.09.004]
12. Willemot LB, Elhassan BT, Verbort O. Bony reconstruction of the anterior glenoid rim. *J Am Acad Orthop Surg*. 2018; **26(10)**: e207-18. [PMID: 29659379]; [DOI: 10.5435/JAAOS-D-16-00649]