8 Rotator Cuff Tear Arthropathy: Clinical Evaluation

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Rotator cuff tear arthropathy (RCTA) includes a wide spectrum of clinical signs and symptoms caused by the contemporary presence of three main features: rotator cuff insufficiency, degenerative changes of the glenohumeral joint, and superior migration of the humeral head. Consequently, the severity of the symptoms complained by the patients can be different, depending on the severity of the glenohumeral joint arthritis, the possible compensation of the residual rotator cuff tendons and deltoid muscle, the severity of the joint effusion, and finally the pain. In end-stage arthropathy, RCTA can be severely painful and debilitating, affecting the shoulder function and the patient's quality of life. Patients with rotator cuff tear arthropathy are typically elderly, usually in their 70s, more commonly female with the dominant side involved. Bilateral RCTA involvement is reported up to 60% of the cases [1].

Medical History: For a complete clinical examination, it is important to collect a complete record of the patient, investigating the past medical history and the current general conditions. Age, comorbidities, medical therapy, previous surgeries, occupation, activity level, and functional requests are essential for addressing the treatment. Regarding the shoulder, the past medical history must consider all the previous attempted treatments that most of the times include multiple corticosteroid injections and previous surgeries, like acromioplasty or rotator cuff repair.

Patients affected by RCTA typically complain a long-standing pain (often worse at night and increasing with shoulder activity), progressive loss of motion, and chronic joint effusion, with recurrent and painful swelling episodes.

- *Pain*: Typically, patients refer a history of progressively worsening pain, which is perceived over the lateral and posterior side of the shoulder, with arm irradiation. The pain usually worsens at night and with the use of the shoulder, improving with rest and, sometimes, with local ice application. The scale of pain can range from mild and tolerable ache, generated only by forced shoulder movement, to sharp and constant pain, severely affecting the patient's quality of life.
- *Loss of motion*: A progressive loss of motion, causing a significant limitation in activities, is typical in patients affected by RCTA. Different degrees of muscle weakness, pain, and stiffness can influence the shoulder functions. In presence of a relative stable fulcrum of motion, the deltoid is still able to elevate and abduct the arm even without the rotator cuff action, so that, thanks to the compensation performed by the deltoid muscle, some patients demonstrate

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an acceptable range of active shoulder motion [2]. Others, the majority, will show a pseudoparalysis, consisting in a complete inability to actively move the shoulder: attempting to abduct and forward flex the shoulder, a superior migration of the humeral head is easily noticed. Deficiencies in the active range of motion are also evident in external rotation, where the deltoid compensation possibilities are even lower.

- *Joint effusion*: Most of the patients report chronic shoulder swelling, with episodes of recurrent worsening, often associated to pain increase and function decrease (Fig. 8.1).

Physical Examination: A comprehensive systemic examination, including bilateral entire upper extremities and cervical region evaluation, should be undertaken. It is mandatory to investigate associated cervical disorders on patient's complains.

Initially the patient should be visited in a sitting position over the examination table. Both shoulders, back, and neck, both front and back sides, should be undressed and accessible for clinician's inspection. Many preliminary information can be obtained by observing the patient taking off his/her clothes: difficulties, compensation movement, functionality of the contralateral shoulder, and pain.

Fig. 8.1 Shoulder swelling, caused by synovial and/or hemorrhagic joint effusion

- *Inspection*: The initial physical examination starts with the inspection, focused on the shoulder and the scapular region. Typically, in patients affected by RCTA, it is possible to detect the following:
  - Shoulder swelling (Fig. 8.1).
  - Muscular atrophy of the supraspinatus and infraspinatus.
  - A "Popeye" biceps sign can be present, in cases when the long head of the biceps is already spontaneously ruptured. This sign is more evident in skinny patients where the biceps muscle is covered by a thin layer of subcutaneous fat.
  - A geyser sign: in case of a long-standing massive rotator cuff tear and advanced degenerative change of the shoulder, the glenohumeral joint fluid can herniate superiorly through the acromioclavicular (AC) interval, causing a subcutaneous pseudotumor, causing both symptoms and cosmetic impairment to the patient (Fig. 8.2).
- Palpation: By palpation, the perception of fluid collection around the shoulder joint can be easily confirmed (Fig. 8.1).
- During passive rotational movements of the shoulder, palpable crepitation is easily perceived. Tenderness and pain at the level of the long head of the biceps (if present and not already torn) are easily evoked, expression of a synovitis of the tendon sheet. Pain and contracture at the level of the trapezius muscle are frequently associated.
- *Motion*: Both active and passive glenohumeral range of motion should be assessed. A patient with cuff tear arthropathy may present varying degrees of active range of motion: if the glenohumeral fulcrum is compensated by a preserved deltoid muscle, a functional movement can be preserved. However, in the majority of severe cases, a pseudoparalysis, in abduction and forward flexion, is present. In these cases, the attempt of active shoulder abduction or elevation reveals the typical superior subluxation or escape [1, 3–7] of the humeral head (Fig. 8.3).

Fig. 8.2 Geyser sign above the AC joint. It is a pseudotumor caused by the synovial fluid passing from the glenohumeral to the AC joint that creates a one-way valve mechanism, entrapping the liquid in the soft tissues in the upper part of the shoulder

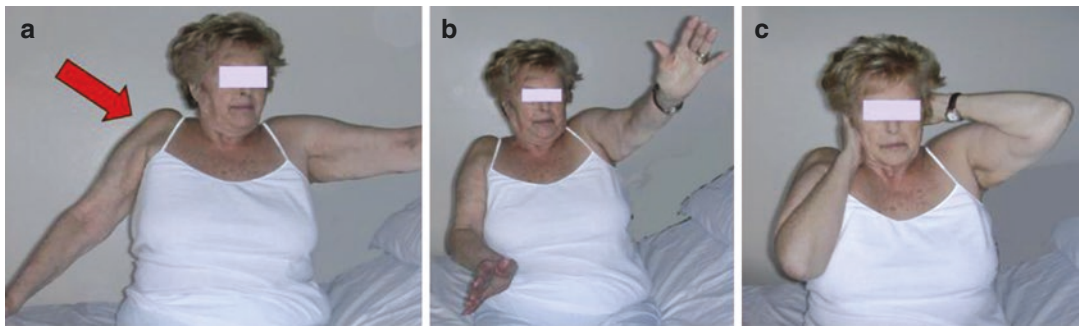

Fig. 8.3 A pseudoparalysis of the right shoulder is shown. (**a**, **b**) Typical anterior escape of the humeral head during active abduction and elevation attempt; (**c**) significant external rotation deficiency

- In case of concomitant severe subscapularis tendon, the escape of the humeral head from the glenoid fossa is frankly anterosuperior.
- After active shoulder movement evaluation, it is important to inspect the passive range of motion, to evaluate the severity of the shoulder stiffness. To reduce the possible spine compensation movements, the passive ROM examination can be better performed with the patient in a supine position.
- *Resistive movements*: After the evaluation of the active and passive motion of the shoulder, some tests should be performed on both shoulders, in order to carefully evaluate the residual presence of any rotator cuff muscle activity and to assess the validity of the other muscles around the shoulder.
- The Jobe test allows to evaluate the posterosuperior cuff strength. It was performed by applying downward force by 90° in shoulder

abduction, internal rotation, and elbow extension: this test usually cannot be performed, because of pain and stiffness, being the majority of the patients unable to reach the 90° of abduction required.

- The Patte test evaluates the external rotation strength. It can be measured with the 0° arm adduction and 90° elbow flexion.
- External rotation lag sign: the inability to maintain the externally rotated position with the elbow leaning to the chest is a sign of severe posterior and superior rotator cuff damage. If the lesion involves also the teres minor fibers, causing a complete active external rotation deficiency, the patient is forced to abduct the shoulder to bring the hand to the mouth: this pathognomonic sign has been called the "Hornblower sign" by Walch [8].
- The Napoleon test allows to evaluate the subscapularis muscle. The lift-off test, described by Gerber to analyze the subscapularis muscle, is usually too difficult and painful to be performed in patients affected by CTA.
- It is mandatory to assess the deltoid muscle function, in order to eventually consider the reverse prosthesis replacement as a possible surgical solution.

With an accurate clinical examination, completed by the medical history and a correct imaging (X-rays, MRI, and/or CT scan), it is possible to point out all the needed elements to address the patient to the more appropriate treatment.

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