J Shoulder Elbow Surg (2014) 23, 807-813

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Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

Intensity and distribution of shoulder pain in patients with different sized postero-superior rotator cuff tears

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Background: The vast majority of studies regarding rotator cuff tears (RCTs) are focused on etiopathogenesis and treatments, but information on shoulder pain characteristics needs further investigation. We analyzed the intensity and distribution of shoulder pain in patients with different sizes of RCTs.
Methods: Two hundred eighty-five consecutive patients with postero-superior RCTs were enrolled for this study. Tear size was intraoperatively classified. Before surgery, all patients completed an upper limb pain map (dermatome map made by Keegan). Shoulder pain intensity was assessed with a visual analogue scale (VAS). Data were submitted to statistical analysis.
Results: Shoulder pain intensity caused by a RCT was greater in females ($P = .024$); it did not vary with the side nor with age. Pain intensity was less in massive tears ($P < .05$) and in patients whose pain was distributed only to the shoulder ($P = .035$). Furthermore, patients whose pain persisted for more than 6 months maintained the same pain intensity. Pain was localized predominantly on dermatomes C5-C6, was more diffuse in massive tears ($P < .05$), and rarely extended beyond the elbow. In the presence of intense shoulder pain, its precise distribution was not well-delimited.
Conclusion: Shoulder pain characteristics in patients with RCTs may be influenced by gender and size of tear. Cuff tear pain distribution principally involves the antero-lateral aspect of the shoulder with extension down the lateral surface of the arm to the elbow. Information about pain intensity and distribution in patients with RCTs may contribute to a more accurate diagnosis.
Levels of evidence: Level III, Cross Sectional Study.

Keywords: Rotator cuff tear; shoulder pain; pain intensity; pain distribution

Introduction

Rotator cuff tears (RCTs) have always attracted great interest because they may be responsible for shoulder pain, loss of strength, simple or complex disabilities, partial or total inability to work, and reduced quality of life. Several

No funding has been received.
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1058-2746/$ - see front matter © 2014 Journal of Shoulder and Elbow Surgery Board of Trustees.
http://dx.doi.org/10.1016/j.jse.2013.09.011

studies have been performed with the aim to understand the etiology[6-8,13,22,23,26] and natural history[10,20,31] of the lesion and how to treat it.[9,25] Additionally, countless studies have been conducted about physical examination,[2,5,14,16,30] to better understand the integrity of the cuff and if the pain originates from the shoulder or is caused by cervical spine disease.[11] However, the shoulder literature does not accurately focus on RCT pain intensity and distribution.

Modern pain mapping was introduced in 1949 by Palmer[24] who provided outline diagrams of the human body and asked patients to diagram on anatomy charts the area of their pain distribution. The use of pain maps in clinical practice is now widespread. However, pain mapping for common shoulder disorders has been reported in only 1 study[4] performed on 94 patients, with only 22 of them having a rotator cuff tear.

Therefore, the aim of our study was to investigate the intensity and distribution of shoulder pain in a sample of 285 patients with different sizes of postero-superior RCTs and to analyze differences between patients with acute or chronic symptoms, and differences in pain intensity according to age, gender or involved side.

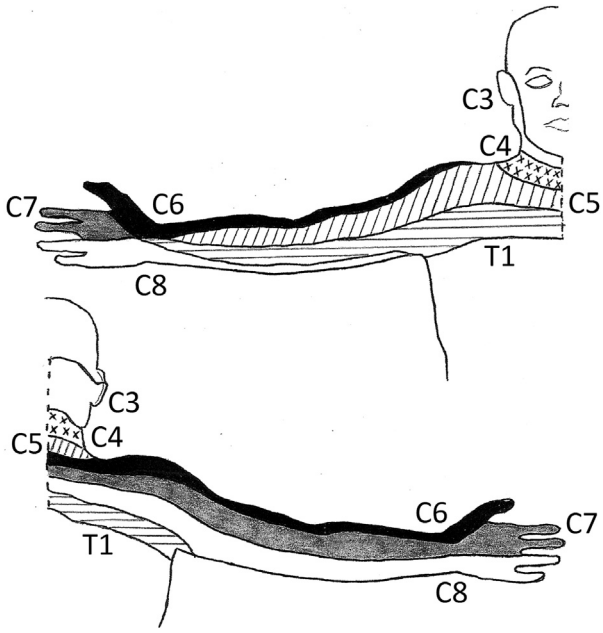

Figure 1 Upper limb dermatomes.

Materials and methods

The study comprised 285 consecutive patients who underwent arthroscopic repair of a full-thickness postero-superior RCT between January 2009 and May 2011. Before surgery, all patients completed an upper limb pain map. They were given clear verbal, written, and illustrated instructions on how to complete the pain map. The patients who agreed to complete the map were included in the study. The examining clinicians were blinded to pain map results.

We used the dermatome map designed by Keegan and Garrett[18] (Fig. 1) to obtain reliable descriptions of pain localization. This map illustrates areas of radiation (including the anterior and posterior parts of the arm, neck and shoulder). Shoulder pain intensity was assessed with a visual analogue scale (VAS). Patients rated pain intensity on a continuum from ''no pain'' to ''maximal, worst pain imaginable'' (scale from 0 to 10). The VAS score was the distance from the lowest pain level to the mark made by the patient.[17] Patients were also separated into 2 main subgroups: those whose symptoms persisted for more or less than 6 months, with six months chosen as the threshold to distinguish acute from chronic rotator cuff tears.

Exclusion criteria were: patients with previous shoulder surgery; neck pain symptoms, subscapularis tears; other ipsilateral upper limb problems (elbow; wrist and hand pathologies, neuropathies due to intrinsic or extrinsic factors); traumatic tears; biceps and/or labral pathologies; shoulder instability; acromioclavicular arthritis; shoulder stiffness (limited passive range of motion); diabetes (because of possible diabetic neuropathy); os acromiale; degenerative arthritis of the glenohumeral joint; autoimmune or rheumatologic disease, and workers' compensation claims. Furthermore, we excluded patients whose symptoms arose more than 12 months ago to avoid jeopardizing results due to previous medical or physical therapy. Two hundred eighty-five subjects with RCTs fulfilled all inclusion criteria. Table I shows the baseline characteristics of patients.

One hundred forty-seven patients were men (mean age: 64.3 [range, 37-82]) and 138 were women (mean age: 66.4 [range, 40-80]) ($P = .503$). The right shoulder was involved in 211 cases (74.0%) and the left in 74 (26.0%) ($P < .001$) (Table I). As we wanted to verify the correlation between pain intensity and patient's age, we arbitrarily distinguished 3 cohorts: (1) patients younger than 55 years (41 patients); (2) patients between 56 and 64 years old (95 patients); (3) patients older than 65 years (149 patients). To verify the correlation between pain intensity and time elapsed between the onset of symptoms and clinical examination, we arbitrarily distinguished 2 groups: (1) patients with pain for less than 6 months (123 patients), and (2) patients with pain for more than 6 months (162 patients).

All operations were performed by one senior author (SG), with patients in the beach chair position under general anaesthesia and interscalene block. A standard arthroscopic pump was used in all cases and standard posterior, lateral, antero-lateral, and midglenoid portals were used to perform a thorough diagnostic examination.

After the intra-articular evaluation, the scope was placed in the subacromial space. Subacromial bursa was removed to gain a clear view of the RCT. The Southern California Orthopedic Institute (SCOI) classification of complete RCTs[27] was used to classify tendon tears intraoperatively as:

- a small, complete tear, similar to a puncture wound (type I);
- a moderate tear (usually <2 cm) that encompassed only 1 rotator cuff tendon, with no significant retraction of the torn end (type II);
- a large, complete tear involving an entire tendon, with minimal retraction of the torn edge, usually 3 to 4 cm (type III);
- a massive RCT involving 2 or more rotator cuff tendons, frequently with associated retraction and scarring of the remaining tendons ends, and often an L-shaped tear that is frequently irreparable (type IV).