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Extracorporeal shock wave therapy for chronic calcifying tendinitis of the shoulder

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Abstract Over the past few years, extracorporeal shock wave therapy (ESWT) has been introduced for the treatment of some orthopedic diseases. The aim of this study was to assess the efficacy of ESWT on chronic calcifying tendinitis of the shoulder through a prospective study. We studied 30 patients (mean age, 56.6 years) with chronic calcifying tendinitis of the shoulder. The patients were treated for a mean of 6 sessions, with 1400 impulses for each session. We used the new device Electro Medical Systems-Swiss Dolorclast (Electro Medical Systems, Nyon, Switzerland), which emits radial expanded shock waves, pneumatically generated. Patients were evaluated before treatment and after a mean of 10 weeks on a patient-oriented questionnaire (Dawson shoulder question-

naire, validated Italian version) and by radiological and ultrasound examinations. Radiographic disintegration and partial resorption of the calcium deposit were respectively recorded in 50% and 30% of cases, and the ultrasound image showed modification of echogenicity in all cases. Clinically a good response to pain and to joint movement was recorded; the questionnaire also showed a statistically significant improvement. Shock wave therapy for calcifying tendinitis of the shoulder is effective from the patient's perspective and according to imaging outcomes. It could be considered an effective therapy for chronic calcifying tendinitis of the shoulder.

Key words Calcifying tendinitis • Outcome • Questionnaire • Shock wave therapy • Shoulder

Introduction

The traditional treatment of calcifying tendinitis of the shoulder was based on many therapies: the use of analgesic and anti-inflammatory drugs, local steroid injections, lavage, needling, physiotherapy and surgical or arthroscopic removal have been proposed and applied. In fact, in the medical literature there are still conflicting suggestions about the management of this disease.

Extracorporeal shock waves were first used in the 1980s for the treatment of urolithiasis. In the past few years they were introduced in orthopaedics for the treatment of tendon diseases such as enthesopathy, calcaneal spur, tennis elbow

and calcifying tendinitis of the shoulder. The results of extracorporeal shock wave therapy for chronic calcifying tendinitis of the shoulder are discordant in literature [1–5].

Conventional shock waves are acoustic waves generated in water by an electrohydraulic, piezoelectric or electromagnetic sources. These waves are focused on a target point in the tissue by means of an acoustic lens or a reflector system. We used a radially expanded shock waves pneumatically generated with no need of focusing.

On the basis of the experience accumulated in literature, we report the results of a prospective study about the effects of extracorporeal shock wave therapy (ESWT) in calcifying tendinitis of the shoulder, using a radial shock wave source.

Materials and methods

We studied 30 patients, 15 men and 15 women of mean age of 56.6 years (range, 30–74 years), affected by chronic calcifying tendinitis of the shoulder. The inclusion criteria were shoulder pain associated with calcareous deposits in the rotator cuff for at least 12 months and with an unsuccessful conservative therapy for at least 6 months. Evident calcification was present at radiological and ultrasound examinations. Exclusion criteria were radiographic initial deposit disintegration image, degenerative changes in the glenohumeral or acromioclavicular joint, subacromial impingement, rotator cuff tear documented with sonography or magnetic resonance imaging (MRI), blood coagulation disorders, pregnancy, tumor or infection in region of treatment, neurological disorders and systemic diseases. No other procedures or drugs were used in the week before treatment or in the week before follow-up. The technique and the possible risks were explained to the patients in detail before treatment.

We used a pneumatic generator of radially expanded shock wave (EMS Electro Medical Systems, Swiss Dolorclast). The machine consists of a handpiece and a control unit in which compressed air is regulated. It generates shock waves through a ballistic device. The projectile, in the handpiece, is accelerated to high speed by compressed air; when it strikes the base of a metal applicator, installed in the handpiece, its kinetic impact energy is transformed into mechanical tension, producing waves. The shock waves emitted from the tip of the applicator expand radially in the body; they need no focusing as do traditional shock wave devices.

The patients were treated for a mean of 6 sessions once per week, with 1400 impulses each session (1000–2000) for a total of 8180 impulses (6000–12 000) at the end of treatment. Each patient was placed in “beach-chair” position with internal rotation of the shoulder. The energy flow density was equal to a working pressure of 2.4 bar and the frequency of the shock wave was 3 Hz in multiple shock mode. The tip of the applicator was placed at the highest

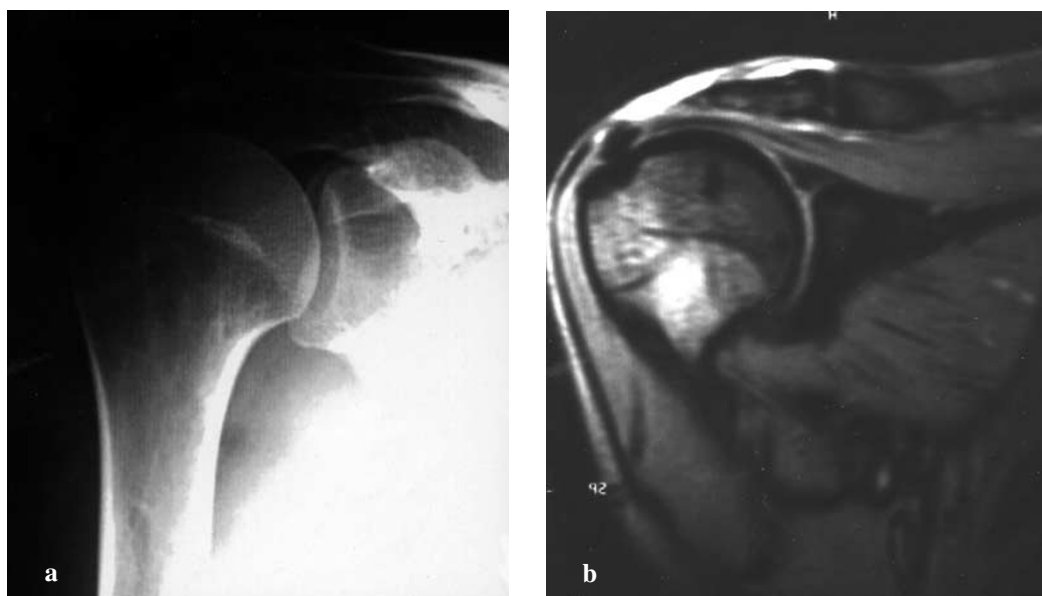
point of pain using a common gel ultrasound to couple the applicator to the skin. All patients were evaluated before treatment and after 10 weeks (range, 8–15) by radiography, sonography and a patient-oriented questionnaire: the Dawson shoulder questionnaire, validated Italian version [6]. The Dawson shoulder questionnaire consists of 12 questions with 5 multiple-choice responses, from 1 (best) to 5 (poorest), which investigates the severity of symptoms and function. The final score ranges from 12 (best) to 60 (poorest). It is a simple and easy to perform questionnaire that provides an assessment of shoulder treatments, except instability; it is reliable, valid and sensitive to clinically important changes [7].

Anteroposterior and axial radiographs of the shoulder were taken before treatment and at follow-up. In some cases anteroposterior X-rays in internal or external rotation were required to point out the calcified deposit.

Results

We treated 30 patients with chronic calcifying tendinitis of the shoulder (Fig. 1) with extracorporeal shock wave therapy. After a mean 10-week follow-up period, complete radiographic disintegration of the calcium deposit was recorded in 15 cases (50%) and a partial resorption in 9 cases (30%). In all patients, sonographic images showed changes of echogenicity in the calcified area after shock wave therapy. The calcium deposits disintegrated or fragmented with partial resorption (Fig. 2, 3). Analysis of the questionnaire showed a mean score of 34.8 (range, 27–40) before treatment and 25.5 (range, 14–33) at follow-up. Outcome assessment showed good response to treatment with a statistically significant reduction of pain and improvement of function.

Fig. 1a, b Calcifying tendinitis in the right shoulder. **a** Radiograph. **b** MR image



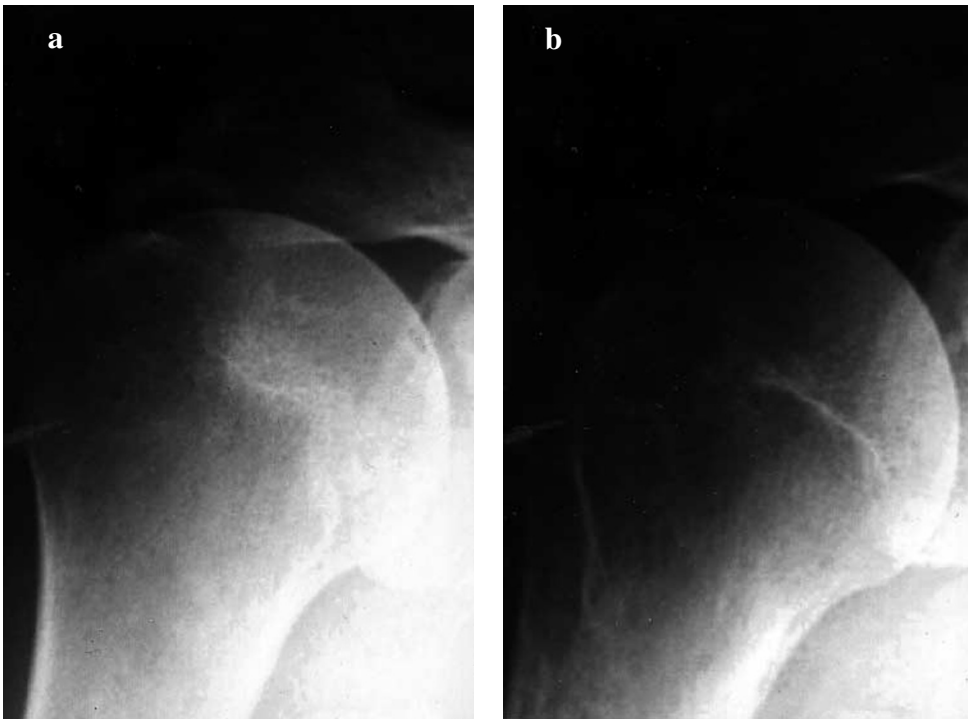


Fig. 2 a, b Radiographic images of the right shoulder. **a** Calcifying tendinitis before treatment. **b** Ten weeks after shock wave therapy disintegration of the deposit can be noticed



Fig. 3 Radiographic image of calcifying tendinitis in the left shoulder after treatment. Fragmentation and partial resorption can be noticed

No complications were noticed during or after treatment, besides soft irritation of the skin or little hematoma. Since all patients referred tolerable pain, local anesthesia was not necessary at the beginning of each session of treatment.

Discussion

Treatment of calcifying tendinitis of the shoulder is still in debate for the natural history characterized by the possibility of spontaneous resorption. Wagenhaser described resorption of deposits in 27.1% of cases after 10 years [8]. Gartner observed the spontaneous evolution of 235 deposits for 3 years on average, with a high percentage of complete resorption [9]. The predisposition to spontaneous resorption of the deposit [10, 11] cannot guide the therapy: waiting for the spontaneous vanishing of the calcification could lead to important painful limitations of function [12]. Conservative attitudes give fair short-term outcomes [9, 13, 14], but in the long-term follow-up they lead to less encouraging results [5]. In the literature, few authors reported satisfying results in patients treated with shock-wave therapy for calcifying tendinitis of the shoulder, with improvement of symptoms and function. Maier et al. [2] reported a satisfying Constant and Murley score in patients after shock-wave application. Rompe et al. [15] observed partial disintegration in 47,5% and total

disintegration in 15% of patients after 24 weeks of treatment, with a Constant score varying from 49.3 to 76.9 points. Spindler et al. [4] studied patients affected by calcifying tendinitis of the shoulder submitted to shock wave therapy, who at 2 years of follow-up presented nor clinical symptoms or calcifications at radiography. Loew et al. [1] also reported encouraging results of shock wave therapy, and emphasized the correlation between dose of energy and effectiveness.

In agreement with the results reported in literature, our study suggests the validity of shock wave therapy for calcifying tendinitis of rotator cuff tendons. The shock wave therapy appears to be a safe noninvasive treatment with a low percentage of side effects. The treatment with pneumatically generated radially expanded shock waves is well tolerated and it can be performed on outpatients. Because of its

safety, tolerability, and clinical and radiographic outcome, this technique should be considered as an alternative treatment. Moreover, our study analyzed the patient perspective through a patient-oriented measure that becomes an important aspect of clinical outcome evaluation [6]. Since patient-oriented questionnaires can provide reliable and valid evaluations of health status, they represent an additional tool in the evaluation of the benefits of treatment [16–18]. The Dawson shoulder questionnaire, validated Italian version [6], used in our study showed good results, with a significant decrease of pain and a significant improvement of shoulder function.

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