

## • CASE REPORT •

## PulStar treatment in 45 cases of supraspinatus tendon calcification

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**Key words** shoulder joint; calcification

Calcification of the supraspinatus tendon is often caused by chronic strain or mild localised sprain, and leads to acute episodes of severe pain exacerbated by shoulder movement, potential spasming or atrophy of the shoulder muscles, and restricted joint mobility when symptoms are severe. Using PulStar therapy, we treated a total of 45 patients for calcification of the supraspinatus tendon between August 2012 and August 2014, and the results were excellent in 99.4% of cases, good in 0.6% of cases, and poor in none of the cases.

### 1. Subject data

Forty-five patients were included in this study, of whom 33 were female and 12 were male. Age of onset ranged from 39-71 years with a mean age of onset of ( $52.5 \pm 1.4$ ) years, of which age of onset was 39 years in 2 patients, 41-50 years in 12 patients, 50-60 years in 25 patients, and 61-71 in 6 patients. The condition was localised to the left shoulder in 15 cases and to the right shoulder in 30 cases. Patients were given a clinical diagnosis upon admission, where the diagnostic criteria were: acute pain in the shoulder *jianqian* region and around the deltoid; restricted shoulder mobility; protective forced position of the contralateral side during inner rotation of the affected arm; pain induced by impact test; patient also presenting with mild fever and slight increase in white blood cells; positive drop arm test; positive signs of painful arc; X-ray evidence of abnormal calcification in the subacromial space or near the greater tubercle, where the calcified shadows are spotted, flaky or oval in nature. The patients' clinical manifestations also comprised: (1) pain centred around the greater tubercles at the shoulder and constantly radiating to the neck, shoulder and upper arm, with shoulder abduction considerably aggravating the pain to the extent that the patient will often avoid this movement. (2) Restricted mobility of the shoulder joint: shoulder abduction to 60-120° causes significant pain, but no pain or mobility restrictions above or below this range. Certain patients may be completely unable to move their shoulder due to pain<sup>[1]</sup>. (3) Frequent tenderness where the supraspinatus meets the greater tubercle, and pain when the humeral head rotates and moves affects sleep.



*Before treatment (left) and after treatment (right)*

All patients presented with obvious clinical symptoms and required immediate treatment. We chose to use the PulStar multiple impulse therapy device, manufactured in the USA and equipped with deep shockwave functionality. Its treatment modes comprise myofascial trigger point mode, scrape mode, sweep mode (targeted impulse release or rolling release), and meridian treatment mode (acupoint impulses). The PulStar deep probe was used to pulse the *jianjing*, *jianqian*, *jianzhen*, *tianzhong*, *jianyu*, *dachui*, *quchi* and *waiquan* acupoints as well as the tissue surrounding the shoulder joint. Each patient underwent impulse therapy

for 4 min, and then the aforementioned points were pulsed once again for 3 min using the shallow probe, before finally switching to Sweep mode and performing scraper impulse therapy for 2 min. 5-10 repetitions of this procedure constituted one course of treatment, and all patients recovered their original shoulder functionality within one course of treatment [2]. The results of the clinical treatment were judged as follows: Excellent – pain symptoms in the shoulder joint have completely disappeared and joint function has returned to normal; Good – pain symptoms in the shoulder joint have completely disappeared and joint function has returned to normal, except shoulder abduction and external rotation are still restricted slightly. There were no cases where symptoms worsened. The treatment results were: Excellent 99.4% and Good 0.6%. Typical cases: Z\*\*\*\* L\*\*\*\*, female, 49 years old, diagnosed on 30 July 2014. Pained expression upon examination, presenting with throbbing pain in her right shoulder and restricted mobility of the right arm occurring for the past 6 days, with pain worsening at night and preventing sleep. X-ray examination revealed a 1 cm x 2 cm calcified shadow in the subacromial space and greater tubercle. The pain subsided considerably by day 2 of the aforementioned course of treatment, yet mobility was still restricted. The pain eased further on day 3 of treatment and the patient was able to lift her right arm by 40°; on day 5 pain had all but disappeared entirely and right shoulder abduction was possible to 120°; an X-ray revealed the calcification had disappeared. S\*\* S\*\*\*\*\*, female, 54 years old, diagnosed on 5 August 2014. Had been experiencing severe pain in the right shoulder for 4 days accompanied by difficulty moving her right arm, especially at night, affecting her sleep and making her restless. X-ray examination revealed a 1 cm x 0.5 cm calcified shadow on her right shoulder. Following 8 days of treatment as described above, her pain symptoms subsided completely and a second X-ray showed that the calcified shadow had also disappeared.

## 2. Discussion

At present, the causes behind calcinosis of the supraspinatus tendon are still unknown, but they may be linked to factors such as degeneration of the tendons, ischaemia, hypoxia, or increased local pressure. Calcific tendonitis has a defined course of progression, which can be divided into precalcific, calcific and postcalcific stages. The precalcific stage sees fibrocartilaginous metaplasia in limited places, and is usually asymptomatic. In the calcific stage, calcium deposits slowly build and gradually replace or erode the cartilage, after which the disease enters its resting phase. The length of this period varies from patient to patient, during which they will experience no symptoms until the disease progresses to its resorptive phase. Here, the dead space fills with granulation tissue and is when the patient will feel the most pain, usually prompting them to seek medical treatment. In the postcalcification stage, the granulation tissue turns into mature collagen tissue and once again forms tendon tissue. Once more, this will be painful for the patient. As the calcium is absorbed and thins out, the emerging tendon tissue infiltrates the subacromial bursa and causes intense pain. As such, severe pain is one of the indicators that the disease has entered the resorptive phase and any minor trauma, cold or fatigue will trigger intense pain [3]. Conventionally, the primary treatment methods for calcification of the supraspinatus tendon are massage, blocking, immobilisation, minimally invasive surgery or invasive surgery. Patients who receive

massage therapy experience high levels of pain and slow results, and in many cases reduced shoulder mobility. Block therapy and surgery are more invasive, with the possibility of post-operative adhesion leading to difficulty abducting, lifting and internally/externally rotating the shoulder joint. However, patients who are given PulStar treatment experience minimal pain, recover quickly, and require smaller doses, shorter treatment times and incremental administrations. The calcified deposits are thus resorbed quickly, alleviating pain and restoring the shoulder to its previous degree of mobility. PulStar is also a cost-effective method that can be delivered as inpatient or outpatient treatment. It works by reducing the demyelinated nerves around a tissue, releasing Substance P, stimulating microcirculation (of blood and lymph), increasing cell membrane permeability, releasing nitric oxide, stimulating growth factors and promoting the resorption of calcified tissue, until the patient no longer experiences pain symptoms, all inflammatory mediators have been absorbed and shoulder mobility is restored. As society continues to advance and populations continue to age, calcification of the supraspinatus tendon will become increasingly commonplace – and this treatment method will be a boon for a greater number of patients.

## References

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