Table of Contents

List of Figures

List of Tables

Shockwave Therapy versus Local Steroid Injection in Chronic Supraspinatus Tendinopathy

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ABSTRACT

Objective: To evaluate the efficacy of shockwave therapy versus ultrasound guided steroid injection in treatment of Chronic Supraspinatous Tendinopathy.

Methodology: The study was conducted on 30 patients with calcific and non-calcific Supraspinatus Tendinopathy for more than 3 months. Clinical assessment was done for all patients including pain scoring by the visual analogue scale and full shoulder examination at the start of the study and 6 weeks later. Shoulder ultrasound was done at the start of the study. Fifteen patients received 4 sessions of radial shockwave therapy (Intelect® Radial Shockwave, United Kingdom) 3 bar pressure, 2000 pulses, 20 HZ. Fifteen patients received a single ultrasound guided subacromial steroid injection (1 ml triamcinolone 40 mg and 1 ml lidocaine).

Results: Both groups showed statistical significant improvement regarding pain relief (VAS) and clinical examination: tenderness, shoulder range of motion and muscle power. There was no statistical significant difference between both groups.

Conclusion: Radial shockwave therapy has no additional benefit over ultrasound guided steroid injection on the short-term in patients with chronic supraspinatus tendinopathy.

Key words: Shockwave Therapy, Local Steroid Injection, Chronic Suprapinatus Tendinopathy.

INTRODUCTION

Shoulder pain is the third common musculoskeletal complaint after back pain and knee pain. It is caused by various disorders as rotator cuff tendinopathy, subacromial bursitis, shoulder impingement syndrome, adhesive capsulitis and acromio-clavicular joint disease **(Zheng et al., 2014).**

Rotator cuff tendinopathy is the commonest diagnosed condition causing shoulder pain. The supraspinatous tendon is the most affected tendon (80%) followed by the infraspinatous tendon (15%) then the subscapularis tendon (5%) **(Huisstede et al., 2011).** Chronic Supraspinatous tendinopathy is a common disabling condition **(Galasso et al., 2012).**

Chronic supraspinatous tendinopathy is more prevalent between the 3rd and 5th decades and more common in women **(Bas de Witte et al., 2013).** Several authors relate shoulder complaints to repetitive work, hand over head activities and high psychosocial demands **(Van der Sande et al., 2013).**

Calcific Supraspinatous tendinopathy is an enthesopathy caused by inflammation around calcium hydroxyapatite crystal deposits usually localized in the supraspinatous tendon and near its insertion in the humerus. The reported prevalence of asymptomatic calcifications in the rotator cuff tendons is 2.7% to 20%. The disease progression has 4 phases as described by **Uthoff and Loehr, 1997**, the pre-calcific phase where there is asymptomatic metaplasia of the tendinous tissue into fibrocartilage, the formative phase where there are calcium deposits in the tendon and it is either asymptomatic or causing only mild pain, the resorptive phase which is the most painful

phase where there is cell mediated calcium resorption by macrophages and multinucleated giant cells and the last phase is the repair and healing phase where there is still some residual pain and stiffness **(Ioppolo et al., 2013).**

Pain is the main symptom which is caused by the increasing intra-tendon's pressure with vascular proliferation occurring during resorption of calcifications. Also increasing the tendon's volume leads to its compression by the coracoacromial arch resulting in shoulder impingement syndrome whose consequences are functional loss and disability. By increasing calcification, a partial tendon rupture occurs while complete rupture of the tendon is rare **(Avancini-Dobrovic et al., 2011).** Clinical features also includes pain triggering loss of muscular strength, decrease range of motion and shoulder disability with localized pain in the deltoid region which increases after overhead activities **(Ioppolo et al., 2012).** The resulted limitation of function affects activities of daily life and sleeping leading to anxiety and distress **(Zheng et al., 2014).**

X-ray examination shows calcium deposits that aren't connected to the bone. Also MRI and Musculoskeletal Ultrasound show the calcifications, tendon status and exclude other rotator cuff disorders **(Avancini-Dobrovic et al., 2011).**

Treatment is usually conservative including oral and local NSAIDs and physical therapy. In chronic severe cases, subacromial corticosteroid injections, extracorporeal shockwave therapy and ultrasonic guided needling and lavage are used. Surgical intervention is the last line of treatment in severe resistant cases. **(Bas de Witte et al., 2013).**

The use of subacromial corticosteroid injections is still one of the most common procedures for treating shoulder pain. Corticosteroids have anti-inflammatory and anti-nociceptive effects. Corticosteroid injections vary in type and doses, the long acting corticosteroids are the most commonly used for treatment of shoulder pain. The most commonly used is triamcinolone acetonide with a dose range of 20 mg or 40 mg. Steroid injection in the subacromial bursa guided by US shows more pain relief, disability improvement and increasing active range of motion than blind injections **(Hong et al., 2011).**

Subacromial corticosteroid injection is less invasive, easy to perform, low adverse effects, low costs and available. Its short term effects include clinical improvement as pain relief, remissions, increasing the range of motion and also radiological improvement **(Bas de Witte et al., 2013).**

Extracorporeal Shockwave therapy (ESWT) is used in treatment of chronic enthesopathies as epicondylitis, plantar fasciitis by heel spur and chronic rotator cuff tendinopathy. The effects are tissue healing stimulation, destruction of calcifications and reactive vascularization and pain relief **(Huisstede et al., 2011).**There is evidence of midterm effects of ESWT as pain relief and improving shoulder function for chronic calcific rotator cuff tendinopathy more than non-calcific rotator cuff tendinopathy **(Kvalvaag et al., 2015).**

ESWT has two types: radial and focused shockwave therapy. Shockwave therapy is classified into low and high energy shockwave therapy according to the energy flux density. High energy shockwave therapy is better in improving shoulder

function and pain relief in chronic calcific supraspinatous tendinopathy **(Louwerens et al., 2015).**

The advantages of ESWT are good clinical results, widely applicable, relatively inexpensive, no severe side effects or long term complications but more time consuming as multiple sessions are needed to achieve these effects **(Louwerens et al., 2015).**

AIM OF THIS STUDY

The aim of the study was to evaluate the efficacy of shockwave therapy versus ultrasound guided steroid injection in treatment of chronic supraspinatous tendinopathy.

CHAPTER 1
CHRONIC SUPRASPINATUS TENDINOPATHY

Shoulder pain is one of the commonest musculoskeletal complaint. It is the third common complaint in the primary care setting, affecting up to one third of the general population particularly middle aged and older individuals **(Lee et al., 2016).** Supraspinatus tendinopathy is the commonest cause of shoulder pain leading to limitations in activities of daily living especially in people with repeated overhead activities **(Li et al., 2017).** It is a common disabling condition that becomes more prevalent after middle age **(Galasso et al., 2012).**

Rotator cuff tendinopathy has an estimated prevalence in the population ranging from 2.7% to 20% with calcific tendinitis occuring in up to 7.5% of asymptomatic shoulders **(Sconfienza et al., 2012).** It typically affects people in the fourth to sixth decades of life. Women are more affected than men. The right shoulder is more frequently affected than the left, although it is presented bilaterally in 10% to 20% of patients **(Suzuki et al, 2014).**

The Supraspinatus tendon is the most commonly affected tendon by 51% followed by the Infraspinatus tendon by 44.5%, teres minor by 23% and the least affected is the subscapularis tendon by 5% **(Suzuki et al, 2014).**

Clavert and Sirveaux (2008) reported the presence of the calcific deposits in the supraspinatus tendon in 76% of the

patients, in the infraspinatus tendon of 20% and the subscapularis tendon in 6% of patients. A symptomatic deposit may persist until it results in a tendon tear. According to an arthrographic study, a rotator cuff tear may coexist in approximately 25% of patients presenting with calcific tendinitis **(Oliva et al., 2011).**

Etiology & Pathogenesis:

Tendinopathy is a degenerative condition termed as angiofibroblastic hyperplasia with a secondary neurogenic inflammatory component outside the tendon in the surrounding tissues, so tendinosis is the other term, occurring with microtrauma, causing degeneration of tenocytes and the extracellular matrix **(Peck et al., 2016).**However there is a debate whether the inflammation or degeneration has the prominent role **(Abate et al., 2016).**

Angioblastic vascular hyperplasia and disorganized collagen are mainly due to decreased vascular supply and repeated overhead movements with inflammatory mediators that induce matrix metalloproteinases production leading to degradation of the extracellular matrix of the tendon and promotion of angiogenesis and neonerves that contribute to pain **(Abate et al., 2009).** Changes in the peripheral neuronal phenotype (up-regulation of the excitatory glutaminergic system and increased sensory neuropeptide expression) are also related to pain. In the early stages, inflammation plays an important role in the healing process, as shown by the increased number of inflammatory cells (macrophages, mast cells and T cells) in pathological tendons and inflammatory molecules, including IFN and NF-kB, while in advanced stages degeneration is more evident with weakening of the tendon **(Abate et al., 2016).**

Many theories have been proposed suggesting that supraspinatous tendinopathy has a multifactorial etiology as a result of extrinsic and intrinsic factors:

1) Extrinsic factors: leading to narrowing of the subacromial space with compression of the bursal side of the tendons.

These factors include anatomic variants of the acromion, subacromial spurring or osteophytes, alterations of scapular and humeral kinematics, postural abnormalities, rotator cuff and scapular muscle performance deficits, decreased extensibility of pectoralis minor or posterior shoulder and internal impingement; which is a unique extrinsic mechanism caused by compression of the posterior articular surface of the tendons between the humeral head and the glenoid; it isn't related to subacromial space compression **(Bazzocchi et al., 2016).**

2) Intrinsic factors: leading to rotator cuff degeneration; thinning and disorientation of collagen fibers, hyaline degeneration, increased ground substance and concentration of glycosaminoglycans and proteoglycans, chondroid metaplasia, calcification and imbalance of the matrix metalloproteinase in the extracellular matrix. This alteration in the tendon structure weakens the tendon, predisposing it to further degeneration or tearing due to compressive and mechanical load, being especially vulnerable at the tendon/bone interface, including: age-related chronic degeneration; in the form of decrease in collagen metabolism and increase in free radical production in favor of catabolic activity, avascularity and overloading, genetics, smoking and alcohol consumption and prolonged use of anti-inflammatory drugs that delay healing. **(Seitz et al., 2011 and Yoon et al., 2016).**

A positive association has been demonstrated between tendinopathies and endocrino-metabolic diseases (overweight, diabetes, hyperlipidemia, hyperuricemia, hyperparathyroidism, and hyper/hypo-thyroidism). In diabetes, the condensation of glucose with amino groups results in an accumulation of Advanced Glycation End-products (AGEs) in the tendon