The "Oolo-Austin Trigenics® Dissection Procedure (OAT) for Treatment of Adhesive Capsulitis Using Local Anesthetic.

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Abstract

The purpose of this article is to present and evaluate a "neuromanual" treatment for frozen shoulder (FS) using local anesthetic while the patient is fully conscious. The unique term neuromanual is used here to denote interactive, patient initiated, facilitative overload of shoulder muscle mechanoreceptors during the manual procedure. Although external incisions are not made, the term dissection is used in this article to denote the actual internal non-surgical separation of adhesed tissues during the procedure. (Using a therapeutic physical transduction, multimodal stimulation approach describes the neurosummative afferent overload methodology used in the "Trigenics®" treatment system which is also referred to in association with the phrases "Functional Muscle Neurology" and "Myoneural Medicine". Historically Trigenics is the first physical medicine treatment method to simultaneously combine resisted exercise with manipulative soft tissue treatment.) The name of the procedure "OAT", denotes its developer, Dr. Allan **O**olo **A**ustin who is also the originator or **T**rigenics®. Over 100 OAT procedures have been performed since its inception in 2004.

For this study, shoulder abduction was measured before and after the treatment. The results showed near or complete recovery of shoulder abduction as well as increased muscle strength and decreased pain immediately following the procedure. Readers of this study familiar with the generally accepted difficulty in achieving even minor results with conservative treatment of FS will acknowledge that results such as these without surgery or manipulation under general anesthetic are unprecedented. The results of this study are statistically significant with a p value of 0.00057. There were 6 women and 4 men. The right shoulder was more frequently affected than the left one.

Method: 10 patients who were suffering with frozen shoulder were randomly assigned to the study. Arm abduction using a digital inclinometer called the Microfet 3 was used to measure arm abduction before and immediately after the procedure. A case study was also

performed on one of the participants to determine patient's feedback on the treatment. Results showed that there was a remarkable recovery in shoulder abduction in the first treatment. The study concluded that the OAT Procedure represents an excellent alternative for frozen shoulder patients not wishing to undergo painful prolonged lengthy treatment programs or higher risk procedures such as surgery or manipulation under general anesthesia.

Introduction

"Frozen Shoulder" (FS) is a term used to describe what is otherwise referred to as **adhesive capsulitis.** The condition is commonly called frozen shoulder because of it's trademark loss of movement ability (Yang et al 2007) being analogous to anything which is completely frozen. It is a terribly painful, debilitating condition displaying very significant restriction (both passive and active) of shoulder motion in an individual whose radiographs are typically normal. Persons having this affliction are usually not able to abduct or flex their affected arm up more than 20-90 degrees (Fayad et al 2007) and are often unable to place their hand behind their back due to accompanying restriction of humeral rotation. Basically there are no movements of the shoulder which are totally free and without pain. Movements such as putting on a jacket or bra are often impossible. Frozen shoulder may also be referred to as **pericapsulitis** and, although not well known by the public, occurs in up to 5% of the general population. (Wies 2004) It is more common in women (60%) (Wong, Tan 2010) and 5 times more common in the diabetic population. (Dias, Cutts, Massoud 2005) The exact cause for this condition is unknown but is sometimes associated with previous injury to the shoulder. Some medical researchers contend the condition results from synovial inflammation with subsequent reactive capsular fibrosis. This condition often lasts for up to 3 years or more (Wang et al. 2006) and, in some cases, even for the life of the patient. (Shaffer et al., 1992) Major factors associated with this condition are age (40-60 age group), diabetes (20 % are affected) (Pal et al 1986), prior shoulder surgery, Parkinson's disease, multiple sclerosis and mental stress disorders.

Normally, the shoulder ball and socket joint allows more motion with more directions than any other joint in the body. In a frozen shoulder the capsule surrounding the joint contracts while the patient forms bands of adhesive scar tissue which drastically inhibits motion. In addition, one or more bursas may also stick together causing loss of ability to move the shoulder. (This seems to frequently occur with the subscapular bursa.) Contraction of the capsule with formation of the adhesions causes the shoulder to become remarkably stiff and cause movement beyond a certain degrees to become excruciatingly painful. The appearance is

analogous to that of a hinge if one were to “freeze” it.. The typical symptoms of FS is dull aching shoulder pain, severely limited shoulder movement, feeling incredible pain if it is moved beyond a certain point, difficulty with normal arm activities and feeling pain when sleeping on that shoulder. (Lorbach et al 2010) Although patients with frozen shoulder describe chronic pain symptoms, the primarily complaint is actually that of the severe debilitating stiffness The loss of range of motion causes various degrees of significantly impaired function, including limited reaching (overhead, across the chest, etc) and limited rotation (unable to scratch the back, put on a coat, etc). The three stages of frozen shoulder are the freezing stage (most pain, restrictive movement), the frozen stage, and the thawing stage (partial movement).
On physical examination, patients with a frozen shoulder will have at least a 50 percent reduction in both active and passive range of motion compared with the unaffected shoulder (Anderson, 2008). A digital inclinometer is recommended for accurate measurement of motion ranges. Range of motion is estimated as follows: 1) the Apley scratch test is used to assess rotation of the shoulder joint; patients with normal glenohumeral motion should be able to scratch the midback at the T8 to T10 level; patients with frozen shoulder are often not even able to scratch even their lower back; 2) the NFL touchdown sign is an active maneuver used to assess range of motion of the shoulder joint and the strength of abduction; patients with a frozen shoulder are unable to fully lift their arm straight overhead with most unable to abduct beyond 90 degrees; 3) passive movement of the arm in abduction and external rotation also is significantly reduced; the normal glenohumeral joint rotates externally to 90 degrees and abducts to 90 degrees.

Etiology:
The actual etiology of frozen shoulder is still unknown. Of note, however, is the first authors hypothesis that most frozen shoulders (and many cases of tendonitis) have a predisposing related cervical disc lesion etiology. In over 30 years of practice with clinical observations of thousands of shoulder syndromes, the OAT developer has observed that the vast majority of frozen shoulder cases have associated spinal lesions on the same side of the shoulder condition mostly at the level of C5-6. In this observation, it is considered more likely that the etiology of many shoulder condition are more likely to be cervicogenic rather than vice versa. It would stand to reason that, under the circumstance of being neurologically inhibited or impaired, the muscles of the shoulder would become damaged if put under a load which they would otherwise normally be able to accommodate. Overloading muscles is likely to happen when excessive force is put on normal tissues but also in cases

when either normal or abnormal load is put on neurologically inhibited or otherwise damaged tissues.

The OAT Procedure

The "Oolo-Austin Trigenics Procedure" was performed on the study group by using non-incisive dissection of scar tissue in shoulder joints and bursas. The OAT Procedure involves a multimodal methodology with the patient awake and interactively participating during the procedure to facilitate outcome. With manipulation under anesthesia (MUA), the patient is completely flaccid and helpless. With the OAT Procedure, the patient is actually contracting specific muscles heavily during the manipulative dissection procedure. Follow up rehabilitative therapy and Trigenics myoneural retraining treatments are provided in stages over the period of 1 week to 6 weeks depending on the severity of the FS and the distance traveled by the patient for treatment. No surgical dissection instruments are used and no actual cutting or incisions of tissue is performed requiring sutures. The protocols of the OAT procedure, in it's entirety, lasts no more than 30 minutes with each actual dissection usually taking place in a matter seconds. The OAT treatment is normally only required to be performed once during the course of the frozen shoulder treatment therapy program.

Prior to the procedure, patients are given local anesthetic injections in the common anterior and posterior shoulder joint injection sites. Unless contra-indicated, a corticosteroid is also injected simultaneously to prevent post-procedural inflammation. Oral or injectable sedatives are also provided at the patients request or prescribed by the injecting physician if they are deemed to have pre-procedure anxiety. In the initial stages of its development, the procedure was actually performed without the aid of injectable medication with usually quite good results. In providing medication assistance, however, pain perception during the procedure was obviously found to be significantly reduced for the patient. Using local anesthetic then also usually makes the procedure easier to administer for the performing practitioner with more patient compliance and less resistance. (Although the shoulder is now frequently anesthetized during the procedure, patients do still experience some pain briefly during the actual procedure.)

The procedure requires 2 practitioners or therapists to perform with one attending to the scapulae and the other to the shoulder joint itself. A third person acting as an additional assistant is also recommended. The OAT Procedure is considered to be a better choice than performing manipulation under general anesthesia as it is performed with the patient fully conscious and interactively participating in the procedure to ensure than no iatrogenic damage occurs to the joint the bones or the surrounding tissues. In addition, the patient is able to immediately begin

active range of movement exercises designed to create immediate sensorimotor retraining. Immediately following the procedure, patients are taken off of the treatment table and put through a series of OAT recovery exercises which involve movement in the full ranges of arm abduction and rotation to which they are newly capable. They are then sent home with a series of specific PNF exercises they are required to do hourly for 3 days prior to follow-up attendance for rehabilitative physiotherapy.

Other treatments for frozen shoulder include conventional physiotherapy, manual medicine, cortisone injections and surgery. Normally treatment requires a multitude of approaches and takes 9-18 months of often painful therapy to observe any difference if the patient is responsive unless spontaneous recovery occurs. (Dodenhoff et al 2000) In some cases, over exuberant practitioners have actually caused a worsening of the patients symptoms.

Early stages of Frozen Shoulder are often treated with physical therapy, exercises and home therapy. Various other forms of treatment have been employed, over the years, consisting of oral or injectable analgesics (pain killers), NSAID anti-inflammatory, steroid injections, physiotherapy and various forms of manual medicine including chiropractic and osteopathy. For refractory intractable cases, more aggressive treatment involves manipulation of the shoulder joint under anesthesia (Dias, et al., 2005) or an arthroscopic surgical capsular release (Griffen, 2003) or arthroscopic hydrodilation (Quraishi et al 2007). Doctors have tried using multiple shoulder manipulation techniques including manipulation with steroid injection, use of systemic steroids, manipulation following saline injection, manipulation under regional anesthesia and manipulation under general anesthesia (MUA). Although MUA is effective in terms of joint mobilization, it has been shown that iatrogenic intra-articular damage can result.(Loew, Heichel, Lehner 2005). When MUA is performed, it is with the intention of breaking up and mechanically dissecting or literally ripping open the adhesions surrounding the joint capsule to increase shoulder movement. While anesthetized, the patient is unconscious or under conscious sedation and in state of total muscular flaccidity. They are, therefore unable to provide any feedback or resist any forceful movements imposed upon their adhesed frozen shoulder joint. The practitioner also has little concept of where the physiological end range of shoulder joint movement exists with that patient.

Complications Of MUA

Manipulation under anesthesia (MUA) is commonly used treatment modality for frozen shoulder syndrome but carries the risk of humeral fracture, dislocation, tearing of the rotator cuff or joint capsule, laberal

tears or brachial plexus injury.(Dodenhoff et al, 2007)
Fracturing the humerus during shoulder manipulation under anesthesia is a one of the worst complication that is sometimes difficult to prevent especially in the osteoporotic or osteopenic bone. With all frozen shoulders being manipulated, any rotational torque placed on the arm can cause a fracture to occur before scar tissue can tear. (Hollis, Lahav, West Jr. 2006).

Complications Of Surgery
According to Gill and Hawkins (2006) possible complications of surgical techniques include axillary neuropraxia, diffuse brachial plexopathy, operative instability, mild anterior instability with apprehension on full abduction and external rotation and diffuse swelling. Neurovascular damage is also reported by Zanotti, Kuhn (1997) as well as intra-articular lesions within the glenohumeral joint (Speed, 2006).

Complications Of General Anesthesia
In addition to the above possible complications which can occur, there are also other basic complications of using general anesthetic for any surgery or manipulative procedure: Although uncommon, possible complications of GA are as follows:
Death (1/151,000 – 1/244,000)*, Hypothermia, Damage to mouth or pharynx including damage to teeth and artificial crowns during intubation, Hypoxemia, Hypercapnia and hypocapnia, Hypoventilation, Aspiration pneumonia, Perioperative neuropathy, Minor idiosyncratic/allergic reaction to agents, producing nausea and vomiting, Major idiosyncratic/all gic reaction to agents incites cardiovascular collapse, respiratory depression or obstruction and jaundice, Lung infections, Stoke, Heart Attack, Slow recovery from anesthetic due to poor cardiac, hepatic or renal function, drug interactions, incorrect drug or dosage, Hypotension, Hypertension, Arrhythmias, Malignant hyperpyrexia caused by anesthetic gas or suxamethonium, Prolonged apnea (non-breathing state) after succinylcholine caused by pseudocholinesterase deficiency (rare), Memory dysfunction. With some patients following general anesthesia, information is retained in the memory, but not accompanied by conscious recall of events, Awareness' during surgery can occur when the patient is paralyzed but without effective anesthetic. (This means that the patient is literally tortured as the patient actually feels the pain of the cutting in the operation but is completely unable to respond.), Postoperative psychic trauma e.g. insomnia, depression, sleep disturbances, dreams, anxiety and fear of death which may persist for months or years, Malignant Hyperthermia (possibly fatal).

*It should be noted that cases of malignant hyperthermia (MH) which are very serious and known to be fatal, are normally brought on specifically by agents used in general anesthetics. General anesthetic drugs that have triggered MH include isoflurane, desflurane, enflurane, sevoflurane, methoxyflurane, cycl-propane halothane, and succinylcholine. MH, however, is not associated with drugs used for local or regional anesthesia.

Possible Complications of OAT

The authors acknowledge that risks such as fractures or dislocations could exist with this procedure in certain circumstances. The OAT Procedure is designed specifically to prevent such occurrences but if performed improperly or without proper work-up and risks assessment for contra-indications or possibly with sudden uncontrolled movements by the patient during the procedure, injuries could conceivably result. The actual procedure itself is, therefore, not delineated in this article to mitigate liability from readers attempting to perform the OAT procedure without proper qualifications or training. A randomized controlled study also still needs to be done with a much larger number of subjects to accurately ascertain success and risk factors.

Study Objective

To determine the potential effectiveness of the OAT mobilization procedure on Frozen Shoulder.

Patient records

Each frozen shoulder case presented themselves to the treatment facility having been previously diagnosed with frozen shoulder by a medical physician.

Case 1 This is the 55 year old female referred to in the herein contained case study.Case 2 was a diabetic female who had suffered with her frozen shoulder for 2 years. She had attended for 1 year of physiotherapy treatment with no results at all.Case 3 was a diabetic male who had dislocated his shoulder previous to the freezing. It had been frozen for 4 months.Case 4 was had the condition for 9 months prior with no results from therapyCase 5 had frozen shoulder for 3 years and had also had previous surgery for frozen shoulder 1 year prior with some results from physiotherapy but not complete as the shoulder was still not moving beyondCase 6 had the frozen shoulder for 4 years with no results from any forms of therapy50 degrees abductionCase 7 was idiopathic had had the condition for 6 months with physiotherapy not able to achieve results.Case 8 was idiopathic. He had had the condition for 13 months with physiotherapy not able to achieve results.Case 9 was idiopathic with

the condition existing for 26 months. No results with extensive physiotherapy and chiropractic treatments.Case 10 had a prior dislocation before onset of frozen shoulder

Procedure

According to Aetna Clinical Policy Bulletin: no 0204 regarding Manipulation Under Anesthesia: MUA is considered medically necessary for chronic, refractory frozen shoulder (adhesive capsulitis) that meets the following criteria:

1. Adhesive capsulitis should be documented by restricted active and passive glenohumeral and scapulothoracic motion for at least 1-month duration which has either reached a plateau or worsened; and2. Significant reduction in range of motion (at least a 50 percent reduction in both active and passive range of motion compared with the unaffected shoulder); and3. Causing various degrees of impaired function, including limited reaching (e.g., overhead, across the chest) and limited rotation (eg, unable to scratch the back, difficulty putting on a coat); and4. Persons have undergone at least 1 month of conservative management, and have failed to improveAlthough only local anesthesia was used, this study was conducted in such a way that all 10 patient subjects fell within these guidelines.Although most patients are referred by their physician and have already been diagnosed with frozen shoulder, the patients are still initially assessed with a physical examination wherein ranges passive assisted abduction ROM is measured digitally using Microfet III digital inclinometer. All subsequent measurements are also carried out using this device for accuracy. For the purposes of this article, we have only referred to the abduction component although all ranges of motion are treated during the procedure. Radiographs and/or MRIs are reviewed and a decision to go ahead with the procedure is made if there appear to be no contraindications. The procedure requires either 2 doctors or a doctor and an assistant.

The patients shoulder joint is injected from the anterior and posterior capsule with corticosteroids and local anesthetics. If they are particularly anxious, they are also provided with an oral benzodiazepine sedative prior to the procedure.

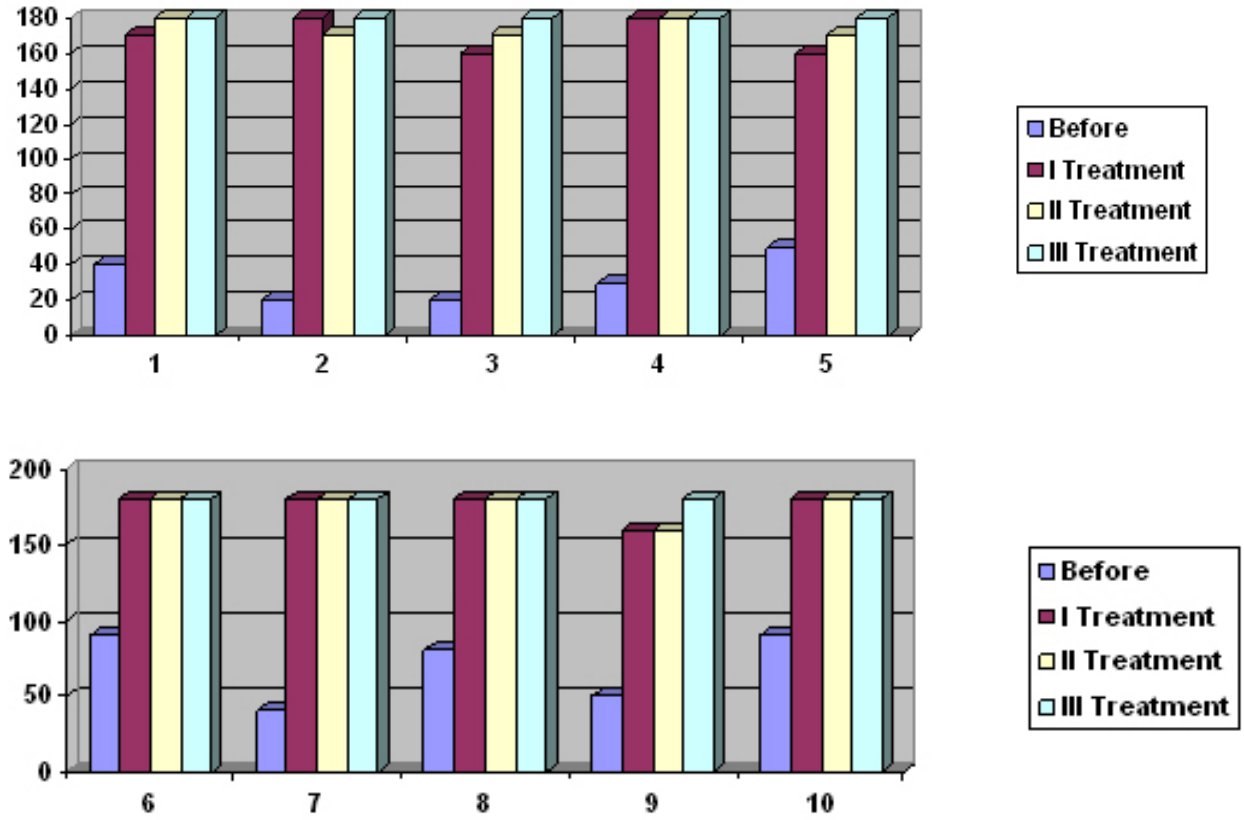
Once the anesthetic has taken effect, the procedure is conducted. Even with the anesthetic, the patient does briefly experience some pain during the procedure but this is of very short duration. (The procedure has also been carried out quite successfully without anesthetic in those patients who express a desire not to have the injection but the level of pain associated with the procedure in these cases is higher.) Quite audible cavitation releasing sounds will normally emanate from the involved shoulder as adhesions are dissected and separate during the procedure and

the shoulder is abducted beyond its frozen ROM. Once the shoulder is up to or near its normal abduction range of motion (180 degrees) and the upper arm is held firmly up to the side of the head, the patient will usually understand that the treatment has been a success. Some, however, will not be able to fully comprehend that they are able to put their arm in a position which, in most cases, has been impossible and unexplored for months or years. A mental adjustment is often required. Most patients will experience a degree of shakiness immediately following the procedure as the mechanical separating dissection of the capsular adhesions comes as somewhat of a shock to their system. This post-procedure response is quite temporary and does not usually last more than a few hours. Immediately following the OAT procedure, when the patient has adjusted to the new ROM, the patient is given proprioceptive neuromuscular facilitation (PNF) exercises which they need to do hourly during waking hours for a period of 3 days following the procedure.

Results

Table 1: **Measuring Passive/assisted Shoulder abduction before and after Trigenics FSDP treatment following up with rehabilitation and physiotherapy.**

Patient Number	Before Treatment	After first Treatment	After Second treatment	After Third Treatment
1	40	170	180	180
2	20	180	170	180
3	20	160	170	180
4	30	180	180	180
5	50	160	170	180
6	90	180	180	180
7	40	180	180	180
8	80	180	180	180
9	50	160	160	180
10	90	180	180	180



The above charts show total arm abduction range before and after the OAT Procedure.A total of 10 subjects were studied. The average age of study subjects were 40 years. All subjects were medically diagnosed and confirmed to have adhesive capsulitis and had received physiotherapy prior to presentation with little or no results. Patients were screened with radiographs and/or MRI to confirm the absence of pathologies or contra-indications such as osteoporosis and degenerative joint arthritis. (Partial thickness rotator cuff tendon tears do not contraindicate performing the procedure.) There were 6 females and 4 males. The experimental group had average maximum of 51 degrees of abduction in the affected shoulder prior to the OAT procedure. Following the procedure subjects retained an average of 177 degrees of shoulder abduction 2 days later.

Case Study

A case study was performed on a 55 year old female (Case 1) who presented with a frozen shoulder. Her presenting symptoms were that of severely restricted shoulder motion, severe pain with certain movements and debilitating stiffness. Mrs. Smith stated that her shoulder pain and loss of motion varied in intensity and range, and was present for over 4 months. After examining the patient it was found that active and passive flexion, extension, abduction, adduction, internal rotation and external rotation were all restricted. She clearly fell within the guidelines for

confirming the diagnosis of frozen shoulder as denoted in this article. The OAT procedure was applied after which the patient's abduction immediately improved to 180 degrees with ROM in all other directions also immediately showing significant improvement. There was still some pain at end ranges with a hard end feel; however there was a remarkable improvement from the initial assessment.

Follow-up Trigenics myoneural facilitated exercises also complimented and retained the increases in her ranges of motion. Trigenics is a multimodal manual treatment methodology which utilizes the concepts of neurosummation to stimulate increased sensorimotor activity and motor unit recruitment. It is consistent with the principles of neuroplaticity and enhanced corticoneural re-organization of sensorimotor and somatosensory systems and is deemed to be a treatment of choice for many neuromusculoskeletal rehabilitation practitioners.

Discussion

During her interview, the patient referred to in the case study herein stated that she was very happy with the outcome of the procedure. This is the common reaction with patients often returning the following day ecstatic that they have regained their arm movement and their quality of life. Informed patients and therapists are aware that frozen shoulder has a natural history of about 10 to 18 months with or without treatment and that some cases never resolve completely. Most patients attending for the OAT procedure, have also tried many other treatments and therapies with little or no discernable results. Like many others, Ms Smith stated that she had initially not been fully convinced the procedure would make any difference however she was shocked when she was able to fully abduct her shoulder immediately post-OAT.

Frozen shoulder is a surprisingly common condition, especially after the age of 40. The treatment for frozen shoulder has not been clear and can often have many negative side effects. With application of the OAT, all of the patients in this study experienced a dramatic full or near-complete return of normal shoulder movement. Shoulder abduction was measured before and after the OAT procedure with measurements taken using the Microfet Digital Inclinometer. Movement of upper body and scapula during measurement was minimized by applying downward pressure on the acromion. Shoulder abduction angle was measured before and after the OAP procedure. As can be observed in the graphs, there was dramatic and sudden improvement of shoulder abduction in every case, immediately following the OAT procedure.

Conclusion

To date, there have been no treatments available which can easily and quickly restore shoulder ROM. Most of the literature indicates that even with treatment, resolution of this condition will not occur prior to its

usual course of 18 months. (Rizk et al 1991). The results of this pilot study for treating frozen shoulder with the Oolo-Austin Trigenics Dissection Procedure shows great promise in enabling patients afflicted with this painful and debilitating disorder to achieve an unprolonged, quick recovery.

The Trigenics myoneurology method of treatment using multimodal neurosummation has been clinically noted to improve the way patients with musculoskeletal disorders and pain syndromes respond to treatment. Historically, it was the first in history to introduce the concept of simultaneously combining stimulative soft tissue therapy with resisted exercise. Considered by some to be a leading innovation in the field of functional muscle neurology. The therapeutic effects of Trigenics methods are often reported by those using it to be clinically superlative.

The OAT Procedure combines the Trigenics multimodal neurosummatiion methodology with simultaneous shoulder joint mobilization. This statistically significant treatment combination has proven effective in a good number of cases and is brought forward for consideration as an improved methodology for treating frozen shoulder. Prior to the OAT Procedure, there has not been any other treatment documented which can re-mobilize a frozen shoulder in one procedure other than MUA or surgery. In light of the very positive findings of this study, it is recommended that further studies be conducted with larger test groups for corroborative verification.

References

Dias R, Cutts S, Massoud S. Clinical Review: Frozen Shoulder. BMJ 2005;331:1453–6

Dodenhoff, Levy, Wilson, Copeland. Manipulation under anesthesia for primary frozen shoulder: Effect on early recovery and return to activity J Shoulder Elbow Surg January/February 2000, 23-26

Fayad F, Roby-Brami A, Yazbeck C, Hanneton S, Lefevre-Colau M, Gautheron V, Poiraudeau S, Reve M. Three-dimensional scapular kinematics and scapulohumeral rhythm in patients with glenohumeral osteoarthritis or frozen shoulder. Journal of Biomechanics 41 (2008) 326–332

Gill TJ, Hawkins RJ. Complications of Shoulder Surgery. Treatment and Prevention. Lippincott, Williams & Wilkins. 2006: 105

Hollis, Lahav, West Jr. Manipulation of the Shoulder Using Codman's Paradox , Orthopedics 2006;29(11):971.

Loew M, Heichel TO, Lehner B. Intraarticular lesions in primary frozen shoulder after manipulation under general anesthesia. J Shoulder Elbow Surg. 2005; 14:16-21

Lorbach O, Anagnostakos K, Scherf C, Seil R, Kohn D, Pape D. Nonoperative management of adhesive capsulitis of the shoulder: Oral cortisone application versus intra-articular cortisone injections. J Shoulder Elbow Surg (2010) 19, 172-179
Milch H. Brachial Palsy after Manipulation of Frozen Shoulder. N Engl J Med 1954; 250:429-430
Pal B, Anderson J, Dick WC, Griffiths ID. Limitation of joint mobility and shoulder capsulitis in insulin- and non-insulin- dependent diabetes mellitus. Br J Rheumatol 1986;25:147-51.
Quraishi NA, Johnston P, Bayer J, et al. Thawing the frozen shoulder. A randomised trial comparing manipulation under anaesthesia with hydrodilatation. J Bone Joint Surg Br. 2007;89(9):1197-1200.
Rizk TE, Pinals RS, Talaiver AS. Corticosteroid injections in adhesive capsulitis: investigation of their value and site. Arch Phys Med Rehabil 1991;72:20-2
Shaffer, B., Tibone, J.E., Kerlan, R.K., 1992. Frozen shoulder: a long-term follow-up. Journal of Bone and Joint Surgery (American) 74, 738–746. Speed C. Shoulder pain. In: BMJ Clinical Evidence. London, UK: BMJ Publishing Group; February 2006.
Wies J. Treatment of eight patients with frozen shoulder: a case study series. Journal of Bodywork and Movement Therapies (2005) 9, 58–64. Yang J, Chang C, Chen S, Lin J. Shoulder kinematic features using arm elevation and rotation tests for classifying patients with frozen shoulder syndrome who respond to physical therapy. Manual Therapy 13 (2008) 544–551
Zanotti, Kuhn. Arthroscopic Capsular Release for the Stiff Shoulder. The American Journal of Sports Medicine 2007, 3(25): 294-298

http://www.scribd.com/doc/13236518/Complications-of-General-Anesthesia-Summary
http://www.mayoclinic.com/health/anesthesia/MY00100/DSECTION=risks
http://www.brandianestesia.it/english/genanesth.html
http://orthopedics.about.com/cs/frozenshoulder/a/frozenshoulder.htm
http://www.trigenics.com/trigenics/clinic.html
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