

COMBINING MASSAGE AND THERAPEUTIC HOT/COLD STONE THERAPY FOR THE TREATMENT OF UPPER CROSSED SYNDROME

Improving Posture Dysfunction and Restoring Range of Motion
of the Cervical Spine and Glenohumeral Joints



NOVEMBER 20, 2020

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ACKNOWLEDGEMENTS

I would like to extend my gratitude to the case study participant who for the sake of science endured treatments he wouldn't have typically chosen, but who was open enough to the idea of trying something different to achieve the possibility of the results we both wanted. I would also like to thank my case study advisor, Gillian Freeman, who supported me throughout the process.

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ABSTRACT

Objective: The topic explored for this case study was Upper Crossed Syndrome (UCS). The purpose of this research was to see if UCS could be successfully corrected in a timely and efficient manner using hydrotherapy (hot and cold rocks) as the main therapy modality coupled with supplementary manual therapy techniques.

Background: Upper Crossed Syndrome is a common condition and/or postural pattern typically seen in office workers. It is the presentation of the strong and tonic muscles of upper trapezius, levator scapulae, suboccipitals, and pectoral group crossing with the weak and phasic muscles of the rhomboids, middle and lower trapezius, serratus anterior, and deep cervical flexors

Methods: The case study followed the progression of the patient's Upper Crossed Syndrome over the course of ten massage treatments. The treatments were completed over a 5-week timeframe, typically twice a week or an average of one session every 3-4 days. The main modality used for treatment was hot rock stone therapy and supplemental massage techniques.

Results: Final results demonstrated a net positive impact. A complete full restoration of range of motion or a range of motion within normal limits was achieved in both the cervical spine as well as the bilateral glenohumeral joints.

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Additionally, an overall decrease in pain and patient perceived stretch or tension was also achieved, as well as a decrease in headache frequency.

Conclusion: Combining massage and therapeutic hot/cold stone therapy for the treatment of Upper Crossed Syndrome is both efficient and effective.

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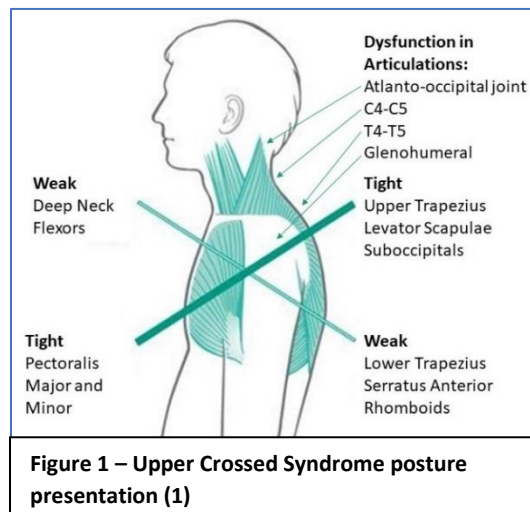
INTRODUCTION

Purpose

The topic explored for this case study was Upper Crossed Syndrome (UCS). The purpose of this research was to see if UCS could be successfully corrected in a timely and efficient manner using hydrotherapy (hot and cold rocks) as the main therapy modality coupled with supplementary manual therapy techniques.

Overview of Upper Crossed Syndrome

Upper Crossed Syndrome is a common condition and/or postural pattern typically seen in office workers. It is the presentation of the strong and tonic muscles of upper trapezius, levator scapulae, suboccipitals, and pectoral group crossing with the weak and phasic muscles of the rhomboids, middle and lower trapezius, serratus anterior, and deep cervical flexors (Figure 1). This crossing causes the postural dysfunction presentation of head forward posture, a decrease in lordotic curve of the cervical spine (c-



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spine), anteriorly rotated glenohumeral joints, and a rounded upper back. (2,3)

As a result of the postural dysfunction, the symptomatic presentation often involves tension headaches, restricted range of motion (ROM) in the neck and/or shoulders, jaw pain, fatigue, as well as pain, stiffness or aches in the neck and back. (4)

Upper Crossed Syndrome is commonly treated by either stand alone exercises, chiropractic care to realign misaligned joints, or physiotherapy which may use a combination of both manual therapy and exercise to lengthen short and tight muscles, and strengthen weak and long muscles. It is recommended that all three be employed for UCS correction. (4)

Case Study Hypothesis

The goal of this study is to show the therapeutic value of hot/cold therapeutic stone massage used in tandem with elements of massage therapy (including manual muscle therapy and recommendations of specific stretching and strengthening exercises for homecare that are available within the scope of practice for massage therapists). Specifically, the study will determine if:

Massage therapy and Hot/Cold Therapeutic Stone Massage when used together will improve the postural dysfunction, decrease associated pain, and increase pain-free range of motion of an individual with Upper Crossed Syndrome within 10 massage sessions.

Theory and Reasoning

The treatment of posture correction (specifically Upper Crossed Syndrome) is typically facilitated by different therapists using single modalities: chiropractic care, physiotherapy, and exercise (facilitated by a personal trainer, kinesiologist, or simply given as homecare by either a chiropractor or physical therapist). Each modality on their own are beneficial in their own right for specific therapeutic purposes (ie. chiropractic intervention typically focuses on restoring joint function, but lacks addressing the muscular dysfunction); however, it is recommended that a combination of all three would be most beneficial in treating UCS. (4)

Treatment of UCS do not typically involve heat as a modality; however heat can and has been used in a static form (hot pack or thermophore) to be used to warm up muscle tissue of a generalized area prior to the performance of manual therapy and the manipulation of tissues and musculoskeletal structures.

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In conventional hot stone therapy, hot stones are used for the therapeutic goal of relaxation and promotion of sleep and improvement of sleep quality. (5)

There is no current research to prove the effectiveness of hot stones massage for the therapeutic purpose of posture correction; however, it has been proved that hydrotherapy in the form of exercise in a heated pool has been “effective in improving postural control, pain and function in women with Fibromyalgia Syndrome”. (6)

According to a publication in the Harvard Medical School newsletter, it is possible to observe an improvement in posture in as little as six to 12 weeks with a simple change of habits that have led to poor posture, taking frequent breaks from activities that place the body in head forward posture, and exercising. (7) However, the intent of the study is to prove that not only can the UCS be fully corrected (not merely improved) by using this new method, but also that the complete correction can occur in a shorter time frame than by any other method alone.

Furthermore, despite the popularity of strengthening the weak muscles of UCS and lengthening the strong and tight muscles of UCS (as is the focus of physiotherapy), “very little research has been conducted based on this theory”

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and “some review studies have questioned the effectiveness of strengthening and stretching exercises to improve postural disorders.” (2)

The intention of the study is to show that hot/cold stone massage is more than just beneficial for simple relaxation, and that it can serve as an effective therapeutic purpose when combined with manual muscle techniques. The study will not only show that the addition of hydrotherapy in tandem with manual muscle techniques, and the incorporation of a strategic homecare plan can be an effective tool when used together in the improvement and correction of Upper Crossed Syndrome, but also that it will correct and improve UCS in a timely manner.

The significance of this study lies both in its simplicity and complexity. Simplicity in that it proposes that there only needs to be one therapist performing the task of UCS correction; complexity in that the one therapist is combining many tasks into one. The importance of this study in its ability to prove that this method of treatment for Upper Crossed Syndrome works, would be highly beneficial to both the patient and the medical system. It would negate the need for multiple therapists to work on one condition saving the patient money, it would decrease the need for doctor visits and pain medications, as well as correct a dysfunction that would mitigate the possibility of work interruption. This would decrease the

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burden on our health care system, the insurance providers, and the companies the patients work for.

Relevant Research

In the abstract “Effects of Hydrotherapy on Postural Control of Women with Fibromyalgia Syndrome: A Single Arm Study” (6), systemic hydrotherapy was found to have a positive impact on posture, pain, and function over a 16-week period of twice weekly treatments of 45minutes each. In the abstract “Upper Crossed Syndrome and Its Relationship to Cervicogenic Headache” (8) myofascial release, cryotherapy, stretching, and isometric exercises were all effective in treating cervicogenic headaches associated with UCS. In the abstract “The Effect of Middle and Lower Trapezius Strength Exercises and Levator Scapulae and Upper Trapezius Stretching Exercises in Upper Crossed Syndrome” (9), strengthening of the middle and lower trapezius muscles and stretching of the upper trapezius and levator scapulae muscles were found to be very effective in correcting UCS. These articles all support my theory.

The gaps in research regarding this condition revolve around the effectiveness of prolonged localized contrast hydrotherapy specifically using hot and cold stone as a treatment method for UCS. Most research articles regarding hot stone

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therapy were based on the effectiveness of the hot stone massage therapy on sleep quality only. This study is testing the theory that massaging with the contrast hot/cold stone therapy tools (not just hot/cold application pre or post massage) will enhance the massage therapy treatment and correct musculoskeletal dysfunction more efficiently and more effectively than just basic massage with therapist hands alone.

There is no indication that the specific treatment plan and/or hypothesis proposed within this case study has been tested before. In comparison to current research, this case study has the similarities of including stretching, strengthening, manual manipulation with the possibility of hot packs to generalized areas, but differs in that this case study will implement the use of specific hydrotherapy tools used to directly target specific muscles to act as an extension of my hands rather than a simple and generalized pre-muscle warm up.

Patient Profile

The subject of study was a 33-year-old male college instructor. The patient was recently diagnosed with sleep apnea (2019) which is managed by a CPAP machine, and a slight left-sided cervical spine stenosis of C4-C5. He also had a

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previous history of whiplash from a car accident in 2006. The patient presents as an endomorph and reports having occasional headaches in the occipital region of approximately one occurrence per week (generally in the evenings), and occasional numbness and tingling down his left arm from the cervical spine stenosis; however, the patient's overall health is classified as normal and healthy by his doctor. The activity level of the patient is relatively low; he cycles or hikes very occasionally (a few times a year), he walks for 30min once per week, and frequently enjoys fishing and riding his motorcycle. The patient's typical lifestyle is mostly sedentary and involves seven hours of sitting at a computer for work support (course development and teaching online) in a home environment with improper ergonomic, as well as slouching on a couch to watch TV or surfing his cell phone after work.

The patient presents with posture dysfunction (bilateral anteriorly rotated glenohumeral joints, head forward posture, left-sided listing, and slightly rounded upper torso, as well as decreased range of motion for both cervical spine and bilateral glenohumeral joints. The patient reports feeling shoulder pain for the past year, in the right posterior superior medial aspect of his upper torso between his scapula and thoracic spine, nearest to the vertebrae. He describes the nature of the pain as constant with flare ups after long periods of sitting, and

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describes the quality of the pain as aching, tender, throbbing, stabbing, and sharp. The duration of the pain has been for one year. He also reports that movement relieves it, and work aggravates it. To alleviate his pain, the patient sporadically attends chiropractic sessions, as well as ingests Advil for the headaches.

With the patient profile as indicated above, we discussed patient and therapist goals to achieve which would fit into the overall treatment picture of the presenting Upper Crossed Syndrome. The common goal of our sessions was to provide symptomatic relief. The goal of the patient was to decrease the pain he felt in his shoulder area, as well improve his posture dysfunction. My goal as the therapist was both to improve his decreased range of motion (ROM) as well as decrease his experience of headaches.

METHODS

Treatment Summary

The case study followed the progression of the patient's Upper Crossed Syndrome over the course of ten massage treatments. Each massage treatment was 75 minutes in length; this included 10 minutes of assessment, 60 minutes of massage, and 5 minutes of homecare instructions which were mostly adhered to for the duration of the study. The treatments were completed over a 5-week timeframe, typically twice a week or an average of one session every 3-4 days.

Materials needed to complete the study were:

- Massage table
- Massage sheets (1 top sheet, 1 fitted sheet)
- Pillows (1 regular, 2 cervical)
- Massage oil
- Basalt stones (various sizes)
- River stones (various sizes)
- 18-quart roaster filled with hot water at a temperature of 125°C
- Thermometer
- Wooden slated spoon
- Ice cooler with ice cold water and ice

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- Hand towel to dry stones before using on patient
- Dawn dishwashing soap (for cleaning rocks)
- Bleach (for disinfecting rocks)
- Goniometer
- Plumb line
- Measuring tape
- iPhone (for taking before and after photos)
- Tripod
- Visual Analogue Scale (VAS)
- Short-Form McGill Pain Questionnaire
- Present Pain Intensity (PPI) scale

Baseline measurements and assessments were taken at the initial session. These assessments included: active range of motion (AROM), a postural assessment, a pain scale and questionnaire, and a strength testing assessment. Assessments were completed at the start of every treatment, for a total of 10 measurable data points. Reassessments were completed after treatments five and ten. The data points gained at the end of the tenth treatment served as the final result of the case study. Initial and subsequent treatment charting was also completed for each of the treatments.

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Treatment was focused on the upper body, specifically the back, shoulders, scapular and subscapular areas, upper chest and pectorals, neck, head and arms. The position of the patient was typically in both supine and prone, however, on occasion it was only supine or prone when more targeted treatment was required. Techniques used included: diaphragmatic breathing; hydrotherapy - contrast therapy using hot/cold stones; effleurage; petrissage – kneading, compressions, wringing, picking up, skin rolling; reciprocal Inhibition muscle energy technique (MET); pin and stretch; frictions; myofascial release (MFR); and trigger point therapy.

The general goals for homecare included the following:

- Lengthening the postural muscles of the shoulder and arm
- Strengthening the phasic muscles of the shoulder and arm
- Patient education on posture and positions
- ADL changes for at work – ergonomics of desk and chair, getting up from desk frequently (every 30minutes)
- Brugger’s Exercise every 30 minutes (10)
- The patient will follow a strength training regimen called the Comprehensive Corrective Exercise Program (CCEP) for homecare. It

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will include a two-week initial phase, and three-week improvement phase. (2)

Treatment Progression

The treatment protocol was originally developed according to the Upper Crossed Syndrome postural presentation, and modified accordingly throughout the study, dependant on the existing presenting conditions of the treatment day.

Supplementary homecare was given in three parts to target specific issues: posture correction while at work, initial phase stretching of tonic muscles, and improvement phase strengthening of phasic muscles. The initial treatment protocol and supplementary homecare protocol are all outlined in further detail in **Appendix B**.

Assessments

In order to collect quantifiable data, five objective data sources were measured:

1) active range of motion for the cervical spine, 2) active range of motion for both glenohumeral joints, 3) postural assessment, 4) strength testing of the rhomboids, middle trapezius and lower trapezius using manual muscle testing,

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and 5) quantifying patient pain using the Visual Analogue Scale, Short-Form McGill Pain Questionnaire, and Present Pain Intensity scale.

Active range of motion (AROM) is a series of movements that “are actively performed by the patient’s voluntary muscles and have their own special value in that they combine tests of joint range, control, muscle power, and the patient’s willingness to perform the movement.” (11) Active range of motion was performed on the cervical spine (neck) as well as both of the glenohumeral joints (shoulder joints) and was measured using a goniometer. The goniometer was used to measure degrees of flexion, extension, bilateral side flexion, and bilateral rotation from the position of neutral. According to Magee’s Orthopedic Physical Assessment, the use of goniometry “has been shown to have a satisfactory level of intratester reliability.” (11) For reference, the normal range of motion (ROM) of the cervical spine is 80°-90° flexion, 70° extension, 20°-45° side flexion, 70°-90° rotation. The normal ROM of the glenohumeral joints are 160°-180° flexion, 50°-60° extension, 170°-180° abduction, 40° horizontal adduction, 60°-100° horizontal internal rotation, 80°-90° horizontal external rotation. (11) Active ranges of motion for all three joints were assessed at the beginning of each of the 10 treatments and subsequently reassessed at sessions 5 and 10.

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Postural assessment is the view of the patient's relaxed standing posture in four different directional views: front view, back view, left side view, and right side view. Postural assessment was measured and viewed against a plumbline as described in Magee's Orthopedic Physical Assessment. Postural assessment was assessed at the beginning of the initial treatment and then reassessed at end of session 10.

The strength of the inhibited rhomboids, middle trapezius and lower trapezius were tested using Manual Muscle Testing (MMT) as outlined in Kendall and McCreary's book *Muscles: Testing and Function with Posture and Pain*. Manual Muscle Testing is a strength test "used to determine the capability of muscles or muscle groups to function in movement and their ability to provide stability and support." (12) Muscles are graded on a scale of 0-5; 0/Absent - no contracture felt or seen; 1/Trace – trace amounts of movement; 2/Poor – gravity assisted movement; 3/Fair – movement can be completed against gravity without applied pressure by the therapist; 4/Good – test position can be held against mild/moderate pressure applied by the therapist but breaks against strong pressure; 5/Normal – test position can be held against strong pressure applied by the therapist. (12) The Alternate Rhomboid MMT tests the rhomboids. It is performed with the patient lying in prone, and the muscle is bilaterally tested,

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one at a time. To test the rhomboids, the patient's shoulder is placed in 90° abduction and medially rotated with the thumb facing downward. Pressure against the patient's forearm by the therapist is applied in a downward motion for a count of five seconds, while the patient resists. The rhomboid muscle is then graded according to the MMT scale. The Middle Trapezius MMT tests the middle trapezius. It is performed with the patient lying in prone, and the muscle is bilaterally tested, one at a time. To test the middle trapezius, the patient's shoulder is placed in 90° abduction and laterally rotated with the thumb facing upward. Pressure against the patient's forearm by the therapist is applied in a downward motion for a count of five seconds, while the patient resists. The middle trapezius muscle is then graded according to the MMT scale. The Lower Trapezius MMT test the lower trapezius. It is performed with the patient lying in prone, and the muscle is bilaterally tested, one at a time. To test the lower trapezius, the patient's shoulder is placed in approximately 160° abduction to place the arm in line with the lower fibers of the trapezius. The arm is then laterally rotated with the thumb facing upward. Pressure against the patient's forearm by the therapist is applied in a downward motion for a count of five seconds, while the patient resists. (12) The lower trapezius is then graded according to the MMT scale. Manual Muscle Testing for all three muscles were

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assessed at the beginning of each of the 10 treatments and reassessed at sessions 5 and 10.

The measurement of pain was quantified by using the Visual Analogue Scale, Short-Form McGill Pain Questionnaire, and Present Pain Intensity scale found in Magee's Orthopedic Physical Assessment. The patient's pain was assessed at the beginning of each of the 10 treatments and reassessed at sessions 5 and 10.

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RESULTS

Quantitative Data

At the end of the 5-week, 10 treatment protocol, final results demonstrated a net positive impact. All planes of movement increased significantly. A complete full restoration of range of motion or a range of motion within normal limits was achieved in both the cervical spine as well as the bilateral glenohumeral joints. Additionally, an overall decrease in pain and patient perceived stretch or tension was also achieved in accordance with the Visual Analogue Scale, Short-Form McGill Pain Questionnaire, and the Present Pain Intensity scale. A comparison of sessions one and ten can be seen in Figures 2-8.

ASSESSMENT	DATE COMPARISON OF ASSESSMENT RESULTS		CHANGES
	SEPT 25, 2020 (Session #1)	OCT 28, 2020 (Session #10 - POST)	
SHORT-FORM MCGILL PAIN QUESTIONNAIRE 1 = mild 2 = moderate 3 = severe	Throbbing – 1 (neck/shoulders) Stabbing – 1 (neck/shoulders) Sharp – 1 (neck/shoulders) Aching – 2 (neck/shoulders) Tender – 2 (neck/shoulders)	Throbbing - 0 Stabbing – 0 Sharp - 1 Aching – 1 Tender - 0	Throbbing pain eliminated Stabbing pain eliminated Sharp pain – no change ↓ aching from moderate to mild Tender pain eliminated
VISUAL ANALOGUE SCALE (VAS)	3.7/10	1/10	↓ by 2.7 points
PRESENT PAIN INTENSITY (PPI)	2 - Discomforting	1 - Mild	↓ in pain intensity by 1 point

Figure 2 – Comparison of patient perceived pain between sessions 1 and 10

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C-SPINE JOINT	NORMAL AROM	DATE COMPARISON OF DEGREES OF AROM & PERCEIVED PAIN		CHANGES
		SEPT 25, 2020 (Session #1)	OCT 28, 2020 (Session #10 – POST massage)	
FLEX	80-90°	55° - chin rotates to right; Pt reports “stretch” at posterior of neck	69° - FULL ROM, chin touches chest	↑ROM by 14°; ↓ “stretch” & chin rotation; FULL ROM
EXT	70°	50° - pain at right posterior neck	70° - decreased pain at right posterior neck	↑ROM by 20°; ↓ pain; FULL ROM
L SB	20-45°	27° - Pt reports “radiating/tension” in lateral right shoulder	45° - FULL ROM	↑ROM by 18°; ↓ “radiating/tension”; FULL ROM
R SB	20-45°	23° - Pt reports “stretch” in contralateral neck	45° - FULL ROM	↑ROM by 22°; ↓ “stretch”; FULL ROM
L ROT	70-90°	79°	86°	↑ROM by 7°; within normal limits
R ROT	70-90°	61°	84°	↑ROM by 23°; within normal limits

Figure 3 – Comparison of active range of motion and patient perceived pain or tension in the cervical spine, between sessions 1 and 10

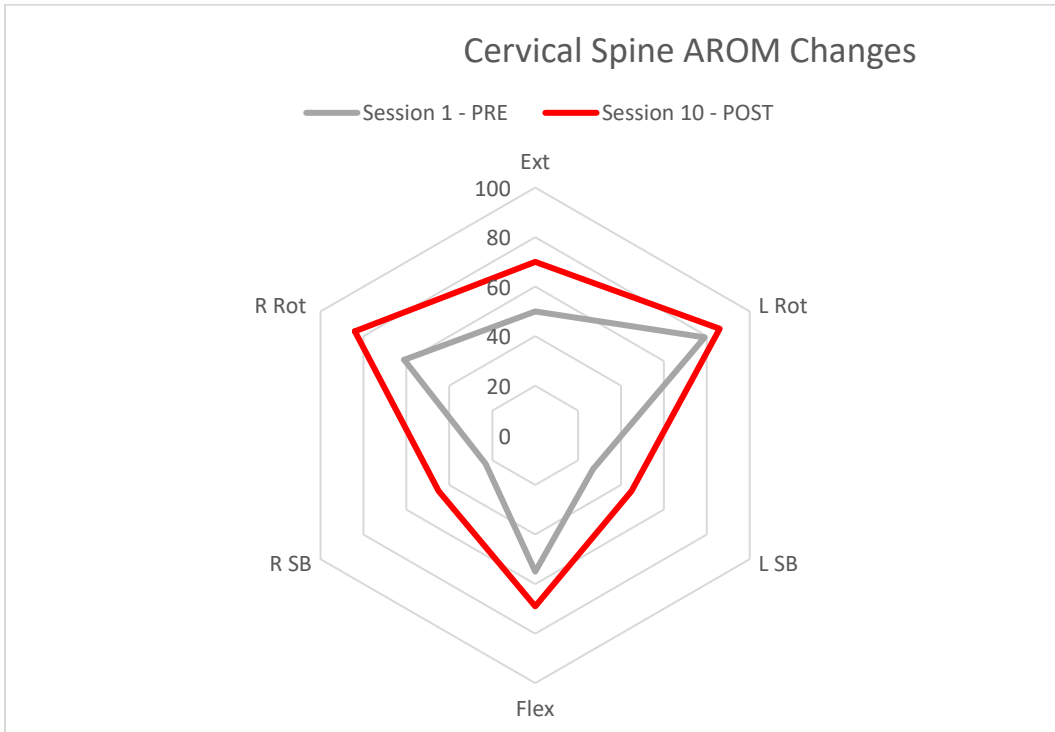


Figure 4 – Comparison of active range of motion changes in the cervical spine, between sessions 1 and 10

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LEFT GH JOINT	NORMAL AROM	DATE COMPARISON OF DEGREES OF AROM & PERCEIVED PAIN		CHANGES
		SEPT 25, 2020 (Session #1)	OCT 28, 2020 (Session #10 – POST massage)	
FLEX	160-180°	162° - Pt reports “tightness” around infraspinatus	180° - FULL ROM	↑ROM by 18°; ↓ “tightness”; FULL ROM
EXT	50-60°	50° - Pt reports “tension” in biceps area	64° - FULL ROM	↑ROM by 14°; ↓ “tension”; FULL ROM, slight hyperextension
ABD	170-180°	144° - Pt reports painful arc, “stretch” in biceps & pain in infraspinatus	180° - FULL ROM	↑ROM by 36°; ↓ painful arc & “stretch”; FULL ROM
H ADD	40°	25°	45° - FULL ROM	↑ROM by 20°; FULL ROM, slight hyperadduction
H IR	60-100°	55° - Pt reports “stretch/pain” in anterior deltoid area	60°	↑ROM by 5°; ROM within normal limits
H ER	80-90°	53°	78°	↑ROM by 25°

Figure 5 – Comparison of active range of motion and patient perceived pain or tension in the left glenohumeral joint, between sessions 1 and 10

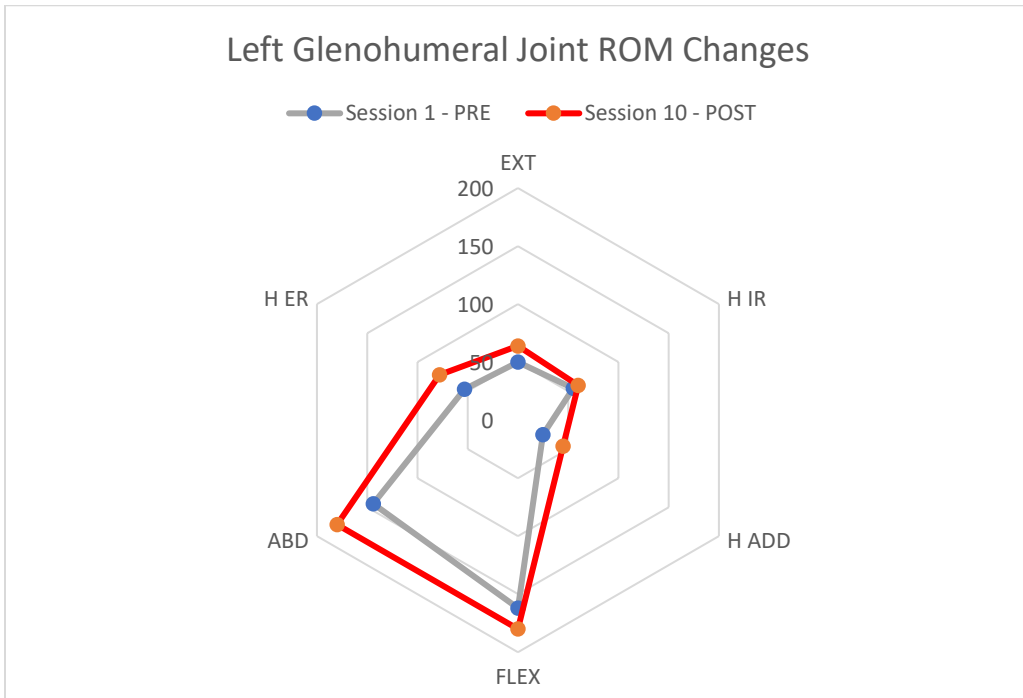


Figure 6 – Comparison of active range of motion changes in the left glenohumeral joint, between sessions 1 and 10

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RIGHT GH JOINT	NORMAL AROM	DATE COMPARISON OF DEGREES OF AROM & PERCEIVED PAIN		CHANGES
		SEPT 25, 2020 (Session #1)	OCT 28, 2020 (Session #10 – POST massage)	
FLEX	160-180°	142° - Pt reports pain at end range between shoulder blade and spine	180° - FULL ROM	↑ROM by 38°; ↓ pain; FULL ROM
EXT	50-60°	48° - Pt reports “stretch/pain” at anterior elbow complex	65° - FULL ROM	↑ROM by 17°; ↓ “stretch/pain”; FULL ROM, slight hyperextension
ABD	170-180°	145° - Pt reports painful arc and “stretch” in right pectorals	180° - FULL ROM	↑ROM by 35°; ↓ painful arc & “stretch”; FULL ROM
H ADD	40°	28° - no pain	48° - FULL ROM	↑ROM by 20°; FULL ROM, slight hyperadduction
H IR	60-100°	45° - pain in anterior deltoid area	56°	↑ROM by 11°; ↓ pain
H ER	80-90°	45° - Pt reports “tension/pain” behind shoulder blade and upper arm	90° - FULL ROM	↑ROM by 45°; ↓ “tension/pain”; FULL ROM

Figure 7 – Comparison of active range of motion and patient perceived pain or tension in the right glenohumeral joint, between sessions 1 and 10

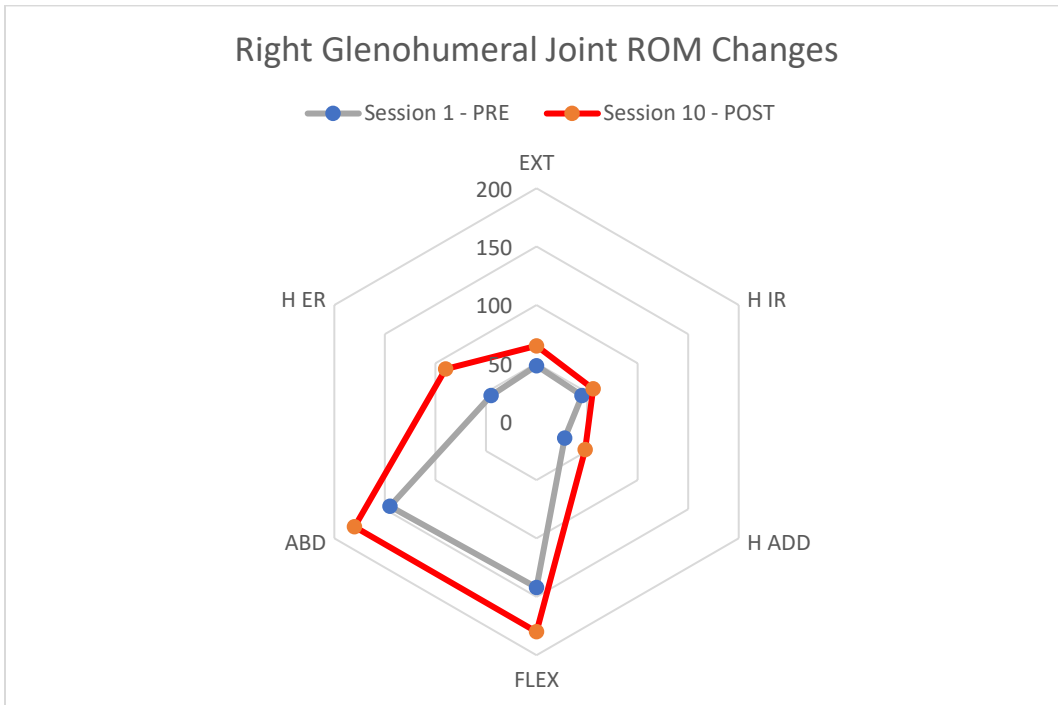


Figure 8 – Comparison of active range of motion changes in the left glenohumeral joint, between sessions 1 and 10

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Additionally, the manual muscle tests for the rhomboids, middle trapezius, and lower trapezius all resulted in bilateral grade 4 good on the MMT grade scale during the initial assessment. After session ten, all muscles had progressed to bilateral grade 5 normal.

Finally, at the end of the case study, the patient reported that he noticed a significant decrease in the frequency of his headaches, which he attributed to the treatments.

Relation of Data to Current Research

Current research suggests that hydrotherapy (both heat and cryotherapy), can be effective in posture correction as suggested in both **Abstract 1** and **Abstract 2**. Although the methods of transference or deliverance of that hydrotherapy was different than what was tested in this study, the result was the same. All three experiments result in a positive net impact.

Abstract 2 also denoted that the treatment of UCS would decrease the frequency of headaches, which was similar to what was also found in this case study. The implementation of treatment was quite different, but the results were still the same, a positive net impact.

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Additionally, **Abstract 3** concluded that the strengthening of the middle and lower trapezius muscles was effective in the treatment of UCS, much the same as in this case study. The methodology of the testing was different, but the results remained the same, a positive net impact.

DISCUSSION

Implications & Interpretation of Data

The implication that can be drawn from this study is that indeed massage therapy and Hot/Cold Therapeutic Stone Massage when used together will improve the postural dysfunction, decrease associated pain, and increase pain-free range of motion of an individual with Upper Crossed Syndrome within 10 massage sessions. In fact, most ranges of motion improved by at least a 15-20° difference, and as high as 45° difference. This is clinically important because it means that UCS can be treated in an efficient and effective manner that doesn't need to be costly and drawn out over months. Further research is needed in the longevity of the results.

Relevance to RMT's

My research is significant to both RMT's and other health professionals alike, because the issue of Upper Crossed Syndrome is both a common one and a chronic one. If this upper crossed syndrome presentation is such a common problem and such a rising issue in society, then it would be important for the

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health professional to know and learn how to effectively and efficiently correct it in a timely manner to be able to increase to quality of life of those it affects.

Contributing to the condition is the extended and frequent use of computers.

“Since 1997 computer use has grown at a rate of 5.3% on an annualized basis.

Internet use has grown at a rate of 20 percent a year since 1998.” (13)

Considering that the usage of the internet and computers is not bound by age, gender nor socioeconomic status, the physiological effects from usage affects all equally. With the shift of increasing technology use over the last two decades more people are in front of a screen more often; whether that be sitting at a desk with a computer, sitting watching television, or on a handheld device (such as a smart phone or tablet). Along with the rise in use of technology is the rise in postural dysfunction, most notably, head forward posture. Over time, this head forward posture “may cause musculoskeletal disorders such as ‘upper crossed syndrome’.” (14)

Due to the increasing activity of computer usage, I believe that RMT’s will undoubtedly and invariably encounter the condition of Upper Crossed Syndrome very frequently over the span of their career. The relevance of the study to RMT’s, is that they will have an effective tool to manage, treat, and fully reverse

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their patient's condition of upper crossed syndrome in a timely and effective manner.

I also believe that this topic/condition will be of interest to medical doctors because it offers them the possibility to prescribe a more effective and natural treatment option to help their ailing patients that differs from the traditionally prescribed pain medication.

This condition will also be of interest to other health care professionals as well, as these professionals would be able to refer their patients to a skilled RMT who offers this specific treatment modality, knowing that their patient will be supported in their treatment goals of successfully correcting the Upper Crossed Syndrome in a timely and efficient manner so that they can continue focusing on the patient's other health goals with that health care professional.

Limitations

While this study provides a valuable framework of evidence towards the effectiveness and efficiency of treatment of Upper Crossed Syndrome, it did have some limitations or weaknesses in the study design. The chief limitation was that there was only one participant. A stronger case would be to test a

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broader range of participants from a variety of age groups. The second notable limitation was the timeframe in which to complete the study. It would have been beneficial to observe the study over a longer period of time to both allow the body to build strength, as well as to see if the posture correction was lasting in duration. The third limitation was in the homecare protocol. The original intensity of the strengthening portion of the homecare protocol had to be modified, and therefore the improvement phase would have needed more time before stabilization would have occurred.

Conclusions

Overall, it appears that combining massage and therapeutic hot/cold stone therapy for the treatment of Upper Crossed Syndrome is both efficient and effective. Over the course of the study, the restoration of range of motion was restored to normal function for the cervical spine as well as both glenohumeral joints.

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APPENDIX A: ABSTRACTS OF REFERENCE ARTICLES

ABSTRACT 1:

“Effects of Hydrotherapy on Postural Control of Women with Fibromyalgia

Syndrome: A Single Arm Study

Objective: To evaluate the effects of a 16-week program of hydrotherapy on postural control and pain of women with fibromyalgia syndrome [FMS].

Methods: Seventeen women with FMS performed three evaluation sessions, one before, one in the middle and one at the end of a 16-week hydrotherapy treatment program. The outcome measure was postural control of the body during quiet erect posture on upright stance [eyes opened and closed] and right and left tandem on a force platform. Pain was evaluated with the Visual Analogue Scale [VAS] and function with the Fibromyalgia Impact Questionnaire [FIQ]. Statistical analysis was performed with Friedman’s ANOVA and Wilcoxon’s matched pairs test. Effect sizes were measured with Cohen’s d coefficient. For all variables, a level of 5% of significance was adopted.

Results: Postural control showed decreased variables, especially for the right and left tandem positions with eyes closed and opened. Pain and function also showed improvement after 8 and 16 weeks of hydrotherapy treatment.

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Conclusions: Hydrotherapy was effective in improving postural control, pain and function in women with FMS.“ (6)

ABSTRACT 2:

“Upper Crossed Syndrome and Its Relationship to Cervicogenic Headache

Objective: To discuss the management of upper crossed syndrome and cervicogenic headache with chiropractic care, myofascial release, and exercise.

Clinical features: A 56-year-old male writer had been having constant 1-sided headaches radiating into the right eye twice weekly for the past 5 years. Tenderness to palpation was elicited from the occiput to T4 bilaterally. Trigger points were palpated in the pectoralis major, levator scapulae, upper trapezius, and supraspinatus muscles bilaterally. Range of motion in the cervical region was decreased in all ranges and was painful. Visual examination demonstrated severe forward translation of the head, rounded shoulders, and right cervical translation.

Intervention and outcome: The patient was adjusted using high-velocity, short-lever arm manipulation procedures (diversified technique) and was given interferential myofascial release and cryotherapy 3 times weekly for 2 weeks. He progressed to stretching and isometric exercise, McKenzie retraction exercises, and physio ball for proprioception, among other therapies. The patient's initial headache lasted 4 days. He had a second headache for 1.5 days during his exercise training. During the next 7 months while returning to the clinic twice

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monthly for an elective chiropractic maintenance program, his headaches did not recur. He also had improvement on radiograph.

Conclusion: The principles of upper crossed syndrome and the use of exercise, chiropractic care, and myofascial release in the treatment of cervicogenic headache are discussed. A review of the literature indicates that analyzing muscle imbalance as well as vertebral subluxation may increase the effectiveness of chiropractic treatment for cervicogenic headache.” (8)

ABSTRACT 3:

“The Effect of Middle and Lower Trapezius Strength Exercises and Levator Scapulae and Upper Trapezius Stretching Exercises In Upper Crossed Syndrome

[Purpose] The purpose of this study was to determine the effectiveness of strength and stretching exercises on upper crossed syndrome. **[Subjects and Methods]** After measuring cervical alignment using the Global Posture System, 30 students with forward head posture were selected and divided into two groups. The experimental group (n=15) participated in strength and stretching exercises, three times per week for 4 weeks. The control group (n=15) did not participate in the exercises. The exercise program comprised middle and lower trapezius strength exercises and levator scapulae and upper trapezius stretching exercises. The temperature of the posterior neck was then measured using digital infrared thermographic imaging. **[Results]** There was a significant difference between the pretest and posttest results in the experimental group, and a significant difference in posterior neck temperature between the two groups. **[Conclusion]** This study showed that middle and lower trapezius strength exercises and levator scapulae and upper trapezius stretching exercises are more effective for upper crossed syndrome.” (9)

APPENDIX B: TREATMENT PROTOCOL AND SUPPLEMENTARY HOMECARE

The proposed in-session treatment plan will be the same for each of the 10 sessions. The homecare will be modified and increased in intensity every week.

A. SUPINE

1. **Chest & Arm flexors** (pectoralis major/minor, anterior deltoid, biceps brachii, coracobrachialis) – *STRONG/TONIC*

- i. **Contrast therapy – hot/cold stone**

- a) Scrub w/ 2 hot stones (to all muscles listed above)
 - b) Contrast w/1 cold & 1 hot stone (to pectoral group, as needed)
 - c) Scrub w/1 hot stone (to pectoral group)

- ii. **Soft Tissue Manipulation Techniques** – applied to all muscles listed above in A1.

- a) Effleurage
 - b) Stroking
 - c) Petrissage – kneading (palmar, thumb, fingertip, knuckle), picking up, muscle compressions

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d) Myofascial Techniques – shearing, stripping, rolling

e) Musculotendinous Release - Origin & Insertion

Technique

iii. Stretch

a) Pin & Stretch w/heat or Reciprocal Inhibition MET (to
pectoral group and/or latissimus dorsi)

2. **Neck flexors & extensors** (SCM, upper trapezius, levator scapulae,
suboccipitals, scalenes) – *STRONG/TONIC*

i. Heat therapy – hot stone

a) Scrub w/ 2 hot stones (to all muscles listed above)

ii. Soft Tissue Manipulation Techniques – applied to all muscles

listed above in A2

a) Effleurage

b) Stroking

c) Petrissage – kneading (palmar, thumb, fingertip,
knuckle, open-c), picking up

d) Myofascial Techniques – stripping,

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e) Trigger Point Therapy

f) Musculotendinous Release - Origin & Insertion
Technique

iii. Stretch

a) Pin & Stretch w/heat or Reciprocal Inhibition MET
(applied to all muscles listed above in A2)

B. PRONE

1. **Back & Neck** (Upper Trapezius, levator scapulae, suboccipitals,
subscapularis, teres major, latissimus dorsi) – *STRONG/TONIC*

i. Contrast therapy – hot/cold stone –

a) Scrub w/ 2 hot stones (to all muscles listed above)

b) Contrast w/1 cold & 1 hot stone (applied to painful
area around levator scapulae insertion point, as
needed)

c) Scrub w/1 hot stone (applied to area where cold stone
treatment took place)

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ii. Soft Tissue Manipulation Techniques – applied to all muscles

listed above in B1

- a) Effleurage
- b) Stroking
- c) Petrissage – wringing, kneading (palmar, thumb, fingertip, knuckle, open-c), picking up, skin rolling, muscle compressions
- d) Myofascial Techniques – shearing, stripping, rolling
- e) Trigger Point Therapy
- f) Musculotendinous Release - Origin & Insertion Technique

iii. Stretch

- a) Pin & Stretch w/heat or Reciprocal Inhibition MET
(applied to subscapularis, teres major, latissimus dorsi)

2. **Back & Neck** (lower & middle trapezius, serratus anterior, rhomboid major/minor, posterior cervicothoracic region, posterior rotator cuff musculature) – *WEAK/PHASIC*

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i. Heat therapy – hot stone

- a) Scrub w/ 2 hot stones (to all muscles listed above)

ii. Soft Tissue Manipulation Techniques – applied to all muscles
listed above in B2

1. Effleurage
2. Stroking
3. Petrissage – wringing, kneading (palmar, thumb, fingertip, knuckle, open-c), picking up, skin rolling, muscle compressions
4. Myofascial Techniques – shearing, stripping, rolling

iii. Strengthen

- a) Resisted Isotonic concentric contraction (applied to rhomboid group, middle and lower trapezius)

3. Arm extensors (posterior deltoid, triceps brachii, forearm extensors)
– *WEAK/PHASIC*

i. Heat therapy – hot stone

- a) Scrub w/ 2 hot stones (to all muscles listed above)

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ii. Soft Tissue Manipulation - techniques

- a) Effleurage
- b) Stroking
- c) Petrissage – kneading (palmar, thumb, fingertip, knuckle, open-c), picking up, muscle compressions
- d) Myofascial Techniques – stripping

iii. Strengthen

- a) Resisted Isotonic concentric contraction (applied to triceps brachii, forearm extensors)

HEMOCARE PROTOCOL

A. ADL changes for at work and home:

1. Get a desk and chair that is more appropriate to support proper ergonomic function

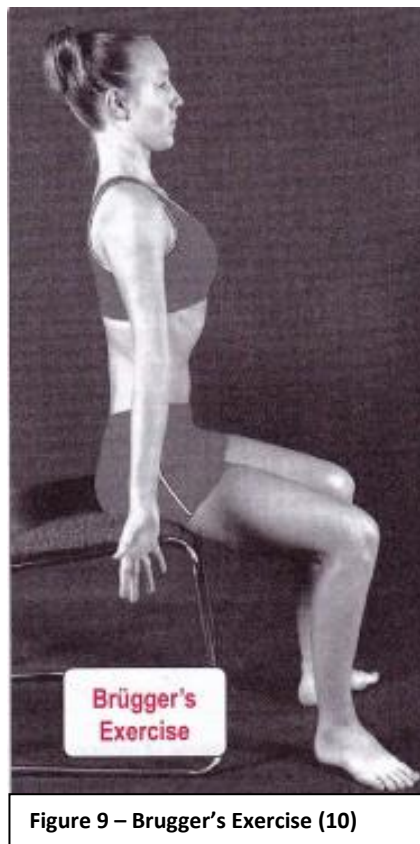
B. Stretching and posture rehabilitation:

a. ***Brugger's Exercise:***

- i. every 30 minutes during workday hours 7am-2pm, while sitting at a desk
- ii. 30-60sec hold
- iii. Completed Monday-Friday until end of 5-week program
- iv. Simultaneously stretches strong/tonic muscles and activates weak/phasic muscles associated with Upper Crossed Syndrome
- v. Application of Brugger's Exercise (10)
 1. While sitting at their workstation, the patient will push away from their desk and sit on the edge of their chair.

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2. Feet should be spaced slightly wider than hip-width apart, and feet should be slightly turned outwards.
3. Imagine there is a string from the top of the head to the ceiling, lifting you upward.
4. Slight chin tuck and start diaphragmatic breathing.
5. With arms hanging at the sides of the body, laterally rotate arms outwards, and splay fingers.
6. Lift the sternum. Retract shoulder blades.



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C. Strengthening: Comprehensive Corrective Exercise Program (CCEP): (2)

1. Initial Phase (Weeks 1 & 2) – Week #1: 7 sets of 10sec holds; Week

#2: 10 sets of 15sec holds

- i. laying supine on a foam roll in three different arm abduction angles (exercise 1A–C)
- ii. side-lying external rotation (exercise 2)
- iii. side-lying forward flexion (exercise 3)
- iv. standing diagonal flexion (exercise 4)
- v. military press (exercise 5)

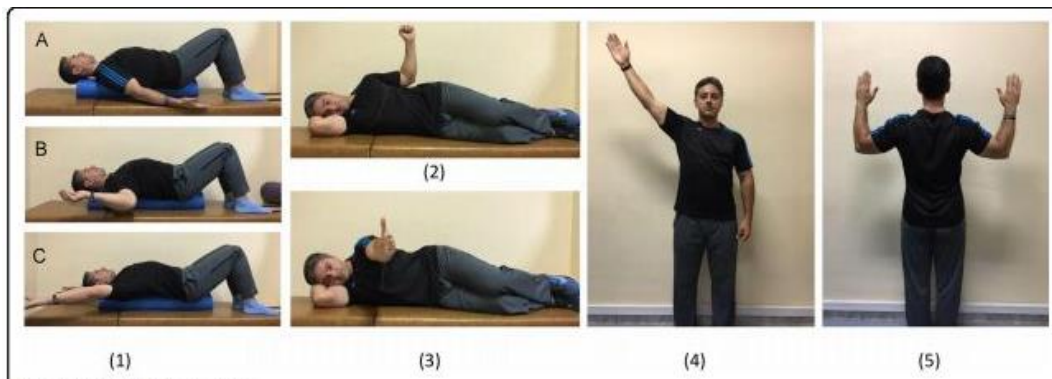


Figure 10 – Comprehensive Corrective Exercise Program (CCEP): Initial Phase (2)

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2. Improvement Phase (Weeks 3-5) – Week #3: 5 sets of 10reps; Week

#4-5: 6 sets of 15reps

- i. side-lying external rotation with a dumbbell (exercise 6)
- ii. side-lying forward flexion with a dumbbell (exercise 7)
- iii. standing diagonal flexion with a dumbbell (exercise 8)
- iv. standing external rotation with Thera-band (exercise 9)
- v. standing diagonal flexion with Thera-band (exercise 10)
- vi. abduction in sitting on a training ball (exercise 11)
- vii. lying prone V, T, and W exercises (exercise 12)
- viii. and abduction in standing on a balance board (exercise 13)

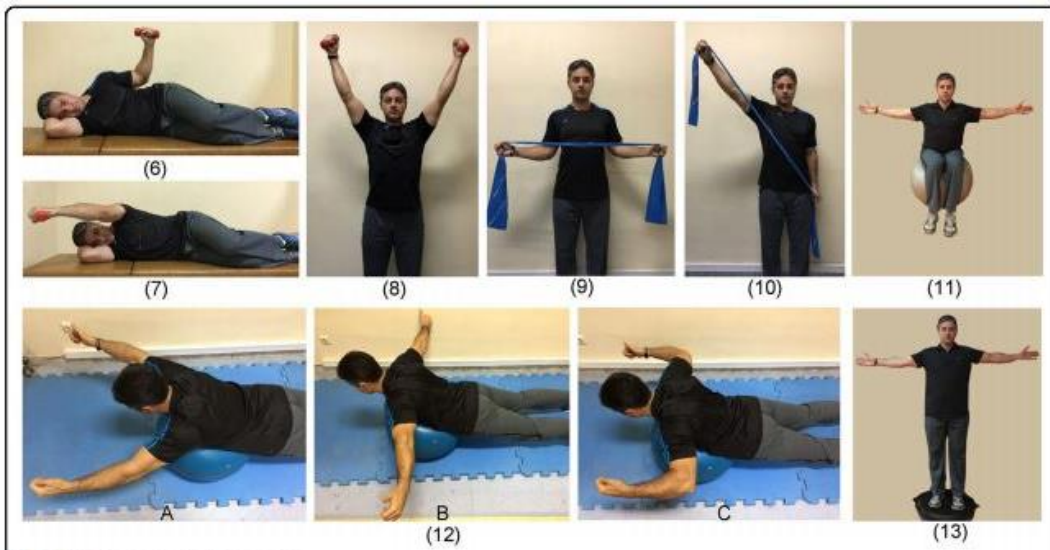


Figure 11 – Comprehensive Corrective Exercise Program (CCEP): Improvement Phase (2)

APPENDIX C: GLOSSARY OF TERMS USED WITHIN THIS CASE STUDY

○ Action definitions:

- i. **Abduction** – “movement away from the midline of the body; sideways direction” (12)
- ii. **Adduction** – “movement towards the midline of the body; sideways direction”(12)
- iii. **Extension** – “straightening“(12)
- iv. **Flexion** – “bending“(12)
- v. **External rotation** – “also known as lateral rotation; turning the anterior surface of the extremity away from the midline of the body“(12)
- vi. **Internal rotation** – “also known as medial rotation; Turning the anterior surface of the extremity toward the midline of the body. “ (12)

○ Directional definitions:

- i. **Anterior** – “toward the front“(12)
- ii. **Inferior** – below
- iii. **Posterior** – “toward the back“(12)
- iv. **Superior** – above

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○ Positional definitions:

- i. **Prone** – “lying face downward; face-lying“(12)
- ii. **Supine** – “lying face upward; back-lying“(12)

○ Massage technique definitions:

- **Diaphragmatic breathing** - “a type of breathing exercise that helps strengthen your diaphragm“(15)
- **Effleurage** – “a continuous gliding motion applied to the body with the palmar surface of the hands in constant contact with the body. Pressure applied evenly on the “up-stroke” with light pressure on the “return-stroke.” (10)
- **Frictions** – “frictions are small longitudinal, transverse or circular movements that involve moving a specific segment of tissue against the underlying structure. No gliding takes place over the skin. The pressure is directed towards the underlying structures. “(10)
- **Hydrotherapy** – “use of water for the treatment of disease or discomfort“(10)
- **Muscle Energy Technique (MET)** - “a form of a manual therapy which uses a muscle’s own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition and lengthen the muscle. “(15)

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- **Myofascial Release (MFR)** – “therapeutic stretching and loosening of tight fascial layers surrounding muscle and functional groups“(10)
 - **Petrissage** – “alternate pressure and release of soft tissue applied with compressing towards underlying structures or by lifting soft tissues, there are 5 main types of petrissage: kneading, compressions, wringing, picking up, skin rolling“(10)
 - **Pin and stretch** – “clinician places muscle in shortened position and pins specific myofascial fibers with other hand; patient is then passively moved to lengthen muscle while pinning force is maintained; hold at tension for approximately 10 seconds or until myofascial release is felt.“ (10)
 - **Reciprocal Inhibition MET** - “a submaximal contraction of a muscle is followed by stretching of the opposite muscle.“ (15)
 - **Trigger Point Therapy** – “Treatment of hyper-irritable spots within taut bands of muscle or muscle’s fascia“(10)
- Other definitions:
- **Bilateral** – both sides
 - **Concentric** – “a shortening contraction; an isotonic contraction“(12)
 - **C-spine** – cervical spine; vertebrae C1-C7

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- **Eccentric** - “A lengthening contraction“(12)
- **Glenohumeral (GH) joint** - “The glenohumeral (GH) joint is a true synovial ball-and-socket style diarthrodial joint that is responsible for connecting the upper extremity to the trunk. It is one of four joints that comprise the shoulder complex. This joint is formed from the combination of the humeral head and the glenoid fossa of the scapula. This joint is considered to be the most mobile and least stable joint in the body, and is the most commonly dislocated diarthrodial joint“(15)
- **Goniometer** - “An instrument for measuring angles and determining range of joint motion“(12)
- **Hypertonic (HT)** – “resistance to passive movement, it is not dependent on velocity, can be with or without spasticity“(15)
- **Isometric contraction** – “Increase in tension without change in muscle length“(12)
- **Isotonic contraction** - “Increase in tension with change in muscle length (in the direction of shortening); concentric contraction“(12)
- **Manual Muscle Test (MMT)** – a special test that tests the strength of a specific muscle; Graded between 1-5
- **Postural Scan** – viewing the posture of the patient in each direction

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- **Quality of life** – “a multidimensional concept that measures a person’s wellbeing; an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment“ (15)
- **Range of Motion (Types: AROM, PROM, RROM)** - “The range, usually expressed in degrees, through which a joint can move or be moved.“ (12) There are four main types:
 - a. **Active Range of Motion (AROM)**
 - b. **Passive Range of Motion (PROM)**
 - c. **Resisted Range of Motion (RROM)**
- **Thermophore** – deep moist heat therapy pack
- **Thermotherapy** - “consists of application of heat or cold (cryotherapy) for the purpose of changing the cutaneous, intra-articular and core temperature of soft tissue with the intention of improving the symptoms of certain conditions. Cryotherapy and thermotherapy are useful adjuncts for the treatment of musculoskeletal injuries and soft

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tissue injuries. Using ice or heat as a therapeutic intervention decreases pain in joint and muscle as well as soft tissues and they have opposite effects on tissue metabolism, blood flow, inflammation, edema and connective tissue extensibility. “(15)

- **Upper Crossed Syndrome (UCS)** – “tightness of the upper trapezius and levator scapula on the dorsal side crosses with tightness of the pectoralis major and minor. Weakness of the deep cervical flexors, ventrally, crosses with weakness of the middle and lower trapezius. This pattern of imbalance creates joint dysfunction, particularly at the atlanto-occipital joint, C4-C5 segment, cervicothoracic joint, glenohumeral joint, and T4-T5 segment. “(12)
- **Visual Analogue Scale (VAS)** - “is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. “(12)