e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 7, July 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly, Peer Reviewed & Referred Journal|

| Volume 7, Issue 7, July 2024 |

| DOI:10.15680/IJMRSET.2024.0707256 |

Integrating Thoracic Manipulation and Exercise for Shoulder Pain Management: A Case Report on Functional Recovery

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ABSTRACT: The objective of the study was to explore the effects of manipulations to the cervicothoracic junction on clinical outcomes in patients with rotator cuff pathology.

Multiple reports in recent peer-reviewed literature state that manipulative techniques aimed at the thoracic spine used in conjunction with exercise produce superior benefits in patients with shoulder impingement and/or rotator cuff pathology. The quality of evidence in this area is limited and further research is warranted to determine the extent and nature of the relationship between thoracic manipulation and shoulder pain.

F.B, a 58 year-old male, was admitted to physical therapy after a two-month history of shoulder pain. Interventions were aimed at strengthening the periscapular musculature and rotator cuff, improving range of motion, decreasing pain, and returning to a pre-morbid level of injury. Manipulations to the cervicothoracic junction were performed in conjunction with exercise interventions. Outcomes included, changes in the VAS (visual analog pain scale), patient rating of overall improvement, and Quick DASH measurement. At the time of discharge, F.B. was determined to have a successful outcome based on decreased pain to 2/10 on the VAS and reports of 60% overall improvement. These tools are both found to be valid and reliable when used as acute subjective measures.

This case report indicates manipulations directed to the thoracic spine may be a useful adjunct to pragmatic treatment for patients with shoulder pain.

I. INTRODUCTION

Shoulder pain is one of the most common diagnoses seen in a physical therapy setting. Approximately 16% to 20% of the population experiences shoulder pain, making it the second most common musculoskeletal condition following low back pain[1]. Recent discussions in the physical therapy community have been targeted towards addressing the thoracic spine for patients with shoulder impairments, particularly those with signs and symptoms of subacromial impingement. The need for evidence to support these interventions is apparent through the increased use of manual and manipulative therapy by practicing therapists globally. A key notion discussed among research of thoracic manipulations is the concept of regional interdependence. Wainner and colleagues describe regional interdependence as "the concept that seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with, the patient's primary complaint[2]." This perception suggests that interventions targeting adjacent anatomical areas may directly affect the outcomes of the involved joint.

A review of the evidence was performed using the University of Texas Medical Branch's library website, which allows access to a variety of sources. The search began using the PubMed (Medline) database with a topic of "thoracic manipulation," which resulted in 879 results. The search was then narrowed to include "thoracic manipulation and shoulder", which produced 29 results. Of the 29 articles, 5 were reviewed and later included in the annotated bibliography. Additional sources (CINHAL, Cochrane Database) were examined using the same key words (MeSH terms "thorax" and "shoulder") and produced minimal findings as compared to PubMed. A review of shared material on the use of thoracic manipulations for shoulder impairments was performed and additional articles were then reviewed, although later excluded due to inclusion and exclusion factors. After reviewing all of the sources, twelve articles were selected and considered for the report. These articles were analyzed based on the inclusion and/or exclusion of several key factors. Inclusion factors were the mention of thoracic manipulations, higher levels of evidence, published within the last five years, access to full article, and shoulder impingement being the primary diagnosis. Exclusion factors included if the article was published

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greater than five years ago, abstract only, not related to physical therapy, no mention of thoracic manipulation, and the primary diagnosis was not shoulder impingement.

II. CASE DESCRIPTION

Consecutive patients presenting to an outpatient orthopedic clinic with shoulder pain were evaluated for inclusion into the case study. The inclusion criteria used to determine if the patient was suitable for a possible manipulative technique was decreased shoulder ROM, pain with active shoulder movements, positive Neer impingement test, positive Hawkins-Kennedy test, pain with resisted abduction, IR, or ER, and pain with resisted empty can test[2]. "Exclusion criteria included post-surgical patients, previous shoulder rehabilitation for this episode of shoulder pain, a positive Spurling test, traumatic shoulder dislocation or instability within the past 3 months, reproduction of shoulder pain with active or passive cervical range of motion, or a clinical presentation of adhesive capsulitis defined as a loss in passive shoulder range of motion greater than 50% as compared to the uninvolved side in at least 2 shoulder movements[1]." The patient had to meet four of the six inclusion criteria and none of the exclusion criteria in order to qualify for the case study. This resulted in one subject, F.B., a 58 year-old male, presenting to physical therapy with a medical diagnosis of rotator cuff syndrome of his left shoulder.

III. OUTCOME MEASURES

The outcome measures used for this case study included pain according the visual analog scale (VAS), overall rating of change, and the Disabilities of the Arm, Shoulder, and Hand (Quick DASH) questionnaire. Pain intensity was rated using the VAS, which rates pain on a scale from 0 to 10, with 0 being no pain and 10 being very high pain levels. The visual analog scale has been shown to be a reliable and valid tool for assessing immediate changes in pain intensity, with a test-retest reliability of between 0.95-0.97 and the minimally clinically important difference of 12 mm (+/- 3 mm at a 95% CI)[3]. An overall rating of change was measured at discharge by asking the patient to rate their global improvement since beginning physical therapy, as 0% being no improvement and 100% being completely asymptomatic and fully functional. This can be compared to a global rate of change scale, which is considered to be a valid reference for establishing a successful outcome[4]. The final outcome measure used was the Quick DASH questionnaire, which is a measure of overall upper extremity function and can be interpreted by the patient to target the shoulder, elbow, or hand. This questionnaire has been modified from the original 30-question assessment (DASH), and now includes eleven questions targeting disability and symptoms, four optional work –related questions, and four optional performing arts/sports module questions. The Quick DASH score ranges from 0 to 100 points, with 0 reflecting no disability. Correlations between the DASH and the Quick DASH assessments have been reported to be extremely high: 0.97[5] The DASH has been found to be valid for specific shoulder impairments including rotator cuff syndromes[5]and has demonstrated excellent reliability (ICC= 0.92, 0.96) and responsiveness[1].

IV. EXAMINATION

The initial evaluation of F.B. was performed on February 22, 2023, after receiving a prescription by the referring physician on February 14, 2023. The patient was given the Quick DASH measurement prior to beginning the evaluation and completed all required medical history information and intake paperwork. The history portion of the exam was then performed with key emphasis on mechanism of injury, current and most intense pain rating according to the VAS, functional limitations and prior functional status, and patient goals and rehabilitation expectations. F.B. reported that he has experienced a two-month history of posterior shoulder pain that is limiting his functional and recreational activities. The patient also noted that he is currently building an outdoor shower and that overhead activities are increasing his pain. Initial pain ratings are 0/10 currently and 10/10 at worst, which was described as being present with overhead activities. The initial Quick DASH rating of disability was 29/11 or 41% perceived disability score. F.B. stated that his goals were to return to exercise and activities of daily living symptom free and without restrictions or limitations.

Objective measurements included general observation of scapular kinematics with overhead motion, palpation, manual muscle testing of both the left and right upper extremity, active and passive range of motion of the left and right shoulders, cervical clearing exam, and some special tests. There was slight dyskinesia noted with lowering of the left arm indicating some weakness of the scapular stabilizers. Resisted testing and range of motion produced positive findings on the left and can be seen in greater detail in tables 1 and 2 (below)

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respectively. Palpation of the left posterior shoulder capsule and infraspinatus produced moderate pain. The cervical clearing exam was negative, being that it did not reproduce any of the posterior shoulder symptoms. Special tests performed included the Hawkins-Kennedy impingement test, the Neer impingement test and the empty-can test, all of which have been shown to have good reliability and validity. Symptoms were aggravated by the Hawkins-Kennedy procedure but no symptoms were reproduced with the Neer or empty-can tests.

Table 1

MMT	Left	Right
Scapular Elevation	5/5	5/5
Shoulder Abduction	4/5	5/5
Shoulder Adduction	4/5	5/5
Shoulder ER	4/5	4+/5
Shoulder IR	4/5	4+/5
Elbow Extension	5/5	5/5
Elbow Flexion	5/5	5/5

Table 2

ROM (in degrees)	Left AROM	Right AROM	Left PROM	Right PROM
Flexion	150	180	150	180
Abduction	125	180	125	180
ER -45	50	60	60	75

V. INTERVENTIONS

The plan of care was created targeting the impairments of poor muscle strength and performance, decreased functional status, pain, and decreased range of motion. F.B. was given a good prognosis and the expected length of therapy was 2 visits per week for 6 weeks. The intervention program consisted of periscapular strengthening, general upper extremity strengthening, active-assisted range of motion exercises, modalities as need for pain, open and closed chain rotator cuff strengthening, proprioceptive neuromuscular facilitation (PNF) techniques, manipulations targeting the cervicothoracic junction, and patient education. F.B. attended a total of nine therapy sessions. The exercise regimen was divided into three phases, with the initial phase focusing on strengthening the surrounding musculature and normalizing pain levels, the second phase included strengthening targeting the rotator cuff directly and the third phase which included manual PNF techniques targeting end-range activation of the rotator cuff and higher-level closed-chain exercise activities, such as push-ups.

The initial treatment sessions (1-3) began with heat to aid in pain management, active-assisted exercises including the use of a wand and rope and pulley for flexion and external rotation motions, and periscapular and general upper extremity strengthening. The second phase was initiated on visit four and included theraband (level blue resistance) exercises targeting the rotator cuff directly and some closed chain scapular strengthening. This progression was continued and the intensity increased for the remainder of this phase from visits 4-7. The final stage of rehabilitation included the initiation of PNF manual techniques in supine targeting end-range internal and external rotation. Additional advancements included the re-introduction of pre-injury strengthening exercises such as push-ups and weighted overhead activities.

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The manual therapy technique of manipulation to the cervicothoracic junction was performed at visits four and seven. The technique included two possible patient positions, one in prone and the other in supine. Two attempts were allotted in each position and if cavitations were not produced after those four attempts the treatment was discontinued for that session. A joint assessment of the cervical and thoracic spine was performed prior to each manipulation. The patient was informed of the possible outcomes, including cavitations, prior to the execution of each manipulation. Patient education included the predicted benefits of the manipulative technique and its outcomes. According to Tate et al[1], "manual therapy has been used in conjunction with an exercise program, and superior outcomes have been reported in comparison to the use of an exercise program alone." The manipulative technique produced cavitations on the initial attempt, at visit four, but did not produce cavitations at the seventh visit.

VI. RESULTS

Initially F.B. presented with no reported change in symptoms, which continued to present as posterior shoulder pain with overhead movements. At visit four, the patient presented with a new symptom of left forearm pain that was constant. This was addressed with a manipulation to the cervicothoracic junction. The following visit, F.B. reported short-term relief of both forearm and posterior shoulder pain after manipulation but indicated that this relief had since subsided and that pain levels had returned. During the six and seventh visit, the patient reported no forearm pain but continued to experience posterior shoulder pain with end-range overhead movements. At the seventh visit an additional manipulation to the cervicothoracic junction was attempted and, when presenting to the eighth treatment session, F.B. reported decreased pain in the posterior shoulder and an ability to tolerate one hour of intense exercise at home. In the final treatment session, F.B. subjectively reported no pain with any overhead activity and an ability to tolerate push-ups for the first time since injury.

The Quick DASH was not completed at the final treatment session as the patient was expected to return for an additional six therapy sessions after his follow-up appointment with the referring physician but did not return and chose to self-discharge from therapy. The latest assessment was taken at the seventh therapy session and at that time F.B. reported a perceived disability score of 34% (26/11), which is 7% lower than the initial assessment (Table 3).

A re-evaluation was performed at the ninth therapy session and, due to self-discharge, these measured were used to assess outcomes of the intervention techniques. The overall rating of improvement was reported by the patient as being at 60% of full function and recovery (Table 3). F.B. reported improved tolerance for ADL activities (recreational, self care and home management) to slight symptoms, which is an improvement from moderate to severe symptom reports at the time of the initial evaluation. Objective measurements taken at the time of re-evaluation demonstrate improved muscle strength of all shoulder musculature, excluding the external rotators 4+/5. The external rotators improved but were graded as 4/5. Full and pain free motion was obtained and all special tests, including Hawkins-Kennedy were negative for reproduction of any symptoms. Positive findings included moderate tenderness over posterior infraspinatus and mild pain with resisted abduction and external rotation. Pain, according to the VAS, was reported as being 0/10 at the time of the re-evaluation and 2/10 at worst, representing an improvement of 8 points from the initial evaluation (Table 3).

A successful outcome was defined as being greater than 50% improvement on the Quick DASH questionnaire, a pain rating of 3/10 on the VAS, and a perceived overall improvement score of 50%. According to these criteria, F.B. was moderately successful in satisfying two of the three criteria and, considering self-discharge, did not meet the desired outcome for the Quick DASH questionnaire.

Table 3

	Initial	Final
Quick DASH	41%	34%
Pain (VAS)	0/10 current 10/10 worst	0/10 current 2/10 w

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Overall rate of improvement 60%

VII. DISCUSSION

At the time of discharge from therapy, F.B. was considered a moderately successful outcome according to the proposed definition of a successful outcome. This positive outcome suggests that there may be a proposed benefit for the use of thoracic manipulations in cases of shoulder impingement and/or rotator cuff pathology. The need for additional research targeting this area is apparent in the lack of high-level evidence available for a review of literature. It is stated by Walser et al[6], "there is limited evidence to support the use of thoracic spine manipulation (TSM) for shoulder conditions, but there is enough evidence to encourage the pursuit of additional research to determine if TSM is effective for such treatment[6]." Additionally, Strunce et al discuss their findings as lacking the ability to conquer a cause and effect relationship due to the "lack of researcher blinding, control group usage and randomization, and longer follow-up intervals[3]," all of which are close to impossible with research targeting a manual therapy technique.

It is suggested by Milanese[7] that the current hierarchy of evidence is not directly applicable to research discussing manual therapy techniques. The author suggests that the three features of a randomized control trial; control group, random allocation of subjects and the blinding of patients, therapists and outcomes; are not achievable in manual therapy. It is argued that a standardization of intervention in manual therapy is impossible due to the need for clinical reasoning and complexity of interventions (cannot be determined prior to pt. assessment), randomization may lead to poorer therapeutic effects and pre-disposing patient characteristics cannot be controlled, and that therapist blinding is impossible as manual therapy techniques are active interventions. Milanese[7] suggests that, considering this additional challenge, a lower level of evidence (i.e. a case-control study) may be more applicable and useful for research aimed at manual therapy techniques[7].

It is imperative that we consider additional factors that may have attributed to a moderately successful outcome. These factors include, but are not limited to, the initiation of PNF techniques for added strength at end-ranges, increases in rotator cuff strength, natural healing time, activity modification by the patient, and patient education of the healing and rehabilitation process. All of these factors need to be considered as participants in the overall improvement seen in the patient's function and pain levels. Additional considerations should be taken for the contributions that patient preparation and expectations of the manipulative technique may play. It has been demonstrated that when a patient is told that a technique may be beneficial and is prepared for a certain expectation or outcome that the likelihood of that intervention being successful is increased.

The need for additional research in this area of physical therapy is observed throughout the literature. Each author states that higher-level evidence and more focus on this topic are warranted. In order to provide a more thorough investigation, it would be beneficial to perform a case-control study which would include two patients, one receiving exercise alone and one receiving both exercise and manual interventions. This would allow for a more definite theory of the importance and benefit of manipulative techniques and would create a stronger argument for the need for further research. Although this would be a higher quality of study, a true cause and effect could still not be determined as co-morbidities, patient characteristics, pre-morbid status, and other variables would continue to play an important factor.

The overall findings seen through this case report demonstrate the benefit of using thoracic manipulations as an additional treatment technique and how this may help to broaden a physical therapist's scope of practice. The evolution of physical therapy towards an evidence-based treatment approach has allowed for increased quality of care and overall knowledge. The information and results seen in this case report highlight the use of thoracic manipulations in patients presenting with certain characteristics, including: decreased shoulder range of motion, pain with resisted abduction, internal rotation and/or external rotation, positive Neer and/or Hawkins-Kennedy test, and a positive empty-can test; and the possible benefits that may be seen within this population. When treating patients presenting with these characteristics, the physical therapist may consider the use of thoracic manipulations as an adjunct treatment to a general exercise program, considering its perceived benefits and low-risk. Additionally, this case report created additional motivation and stimulus for the need for further research to fully support and conclude a true cause and effect relationship.

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VIII. CONCLUSION

This case report describes the individual outcomes of a 58 year-old male patient presenting to therapy with a two-month history of shoulder pain. Interventions were targeted towards decreasing pain, improving function, improving the strength of the rotator cuff and periscapular musculature and increasing range of motion. The therapist's rationale for choosing a manipulative technique included pain with resisted abduction, decreased shoulder range of motion of the involved upper extremity, high pain levels with overhead motion, plateau of progression with exercise interventions alone, and a positive Hawkins-Kennedy test. The final result of all the interventions was a successful outcome demonstrated by a pain rating of ≤ 2/10 on the VAS and a perceived overall improvement of 50%. F.B. reported 2/10 pain, at worst, as measured by the VAS, at the time of re-evaluation and 60% overall improvement.

The success denoted through this case study supports the current evidence in that there is ample low-level evidence to support the use of manipulations to the cervicothoracic junction for patients presenting with shoulder impairments and the need for higher-level research studies is warranted. The term regional interdependence is defined as "the concept that seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with, the patient's primary complaint[3]". This concept is continuously supported throughout the literature and applied in cases of shoulder impingement and thoracic manipulations.
Benefits of this form of research include the ability to use an evidence-based approach of treatment and broaden one's scope of practice. Physical therapy is shifting towards the use of evidence-based intervention techniques and this case study helps to demonstrate the potential benefits of additional treatment techniques in patient management. Manipulative therapy techniques are an important adjunct to an exercise program and the use of certain thrust manipulations for shoulder patients is being supported throughout the evidence and will be an area of further research and focus.

REFERENCES

1. Tate AR, McClure PW, Young IA, Salvatori R, Michener LA. Comprehensive impairment-based exercise and manual therapy intervention for patients with subacromial impingement syndrome: A case series. Journal of Orthopaedic & Sports Physical Therapy. 2010; 40(8): 474-493.
2. Boyles RE, Ritland BM, Miracle BM, Barclay DM, Faul MS, Moora JH, Koppenhaver SL, Wainner RS. The short-term effects of thoracic spine thrust manipulation on patients with shoulder impingement syndrome. Manual Therapy. 2009; 14: 375-380.
3. Strunce JB, Walker MJ, Boyles RE, Young BA. The immediate effects of thoracic spine and rib manipulation on subjects with primary complaints of shoulder pain. The Journal of Manual & Manipulative Therapy. 2009; 17(4): 230-236.
4. Mintken PE, Cleland JA, Carpenter KJ, Bieniek ML, Keirns M, Whitman JM. Some factors predict successful short-term outcomes in individuals with shoulder pain receiving cervicothoracic manipulation: A single-arm trial. Physical Therapy. 2010; 90(1): 26-42.
5. Wright RW, Baumgarten KM. Shoulder outcomes measures. Journal of the American Academy of Orthopaedic Surgeons. 2010; 18: 436-444.
6. Walser RF, Meserve BB, Boucher TR. The effectiveness of thoracic spine manipulation for the management of musculoskeletal conditions: A systematic review and meta-analysis of randomized control trials. The Journal of Manual & Manipulative Therapy. 2009; 17(4): 237-246.
7. Milanese S. The use of RCT's in manual therapy-Are we trying to fit a round peg into a square hole? Manual Therapy. 2011; 1-3

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