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The Use of Dry Cupping with Active Movement to Increase Functional Mobility and Decrease Pain in a Patient with Cervical Disc Disorder: A Case Report

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The Use of Dry Cupping with Active Movement to Increase Functional Mobility and Decrease Pain in a Patient with Cervical Disc Disorder: A Case Report

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Abstract

Background: Cervical disc disorders are very common in today's population and many physical therapists treat these patients daily with varying interventions, including soft tissue massage, manipulations, stretches and exercises. Another potential intervention is dry cupping, which is a technique that decreases fascial tension under the skin and allows increased blood flow to the area, to promote muscle healing. The purpose of this case study is to describe the successful use of dry cupping with active movement as part of the physical therapy treatment of a patient with cervical disc disorder. **Case Description:** The patient was a 41 year old female who came to physical therapy via direct access due to prolonged bilateral neck pain that extended down her left ribs to her left hip. She also had a long standing history of C4-C5 radiculopathy. The patient presented with decreased and painful cervical range of motion and strength, as well as cervical and upper thoracic hypomobility. **Intervention:** The patient was seen 2 times per week for 10 weeks. The final 6 weeks of treatment included one session each week of cupping with active movement. The dry cupping treatment included 4-5 cups on both the left and right trapezius, rhomboids, and supraspinatus muscles depending on palpation of musculature and restrictions in movement each session. The patient then completed several movements with the cups on her skin. **Outcome Measures:** The outcome measures used were the Upper Extremity Quick-Dash, pain scale, self rated functional improvement, as well as active range of motion measured with goniometry and manual muscle testing. **Discussion:** This case report supports the use of dry cupping with active movement as an intervention to decrease cervical pain and dysfunction in patients with cervical disc disorders, without adverse side effects.

Keywords: Dry cupping; cervical spine; musculoskeletal pain; orthopedics; physical therapy; rehabilitation

BACKGROUND

Cervical disc disorders are common in today's population, likely due to the increase in desk jobs as well as the increased use of technology causing a forward head and rounded shoulder posture. Various treatments have been utilized by physical therapists to decrease patients' neck pain and discomfort, including soft tissue massage, cervical manipulations, exercise progression, postural retraining, and many others [1,2]. An intervention that is not well researched that could potentially aid in the decrease of patients' neck pain and improve their function is cupping.

Cupping is a technique that has been used for centuries in Eastern medicine, but is recently becoming more popular in the physical therapy field in the United States [3]. There are several different cupping techniques, but all include a suctioned cup placed onto skin. Cupping has been dated back as far as 1550 B.C.E. where Egyptian records were found to use the technique to remove foreign matter from the body [3]. It has since been used clinically around the world for various diagnoses and medical conditions.

There are several types of cupping that are used today [4]. These include dry cupping, wet cupping, and massage cupping [5]. Dry cupping is when only suction is used on the skin. Wet cupping is when a therapist or physician makes small incisions on the skin to promote bleeding and then places the suctioned cups over the incisions. Massage cupping is when suction is placed on the skin and the therapist then moves the cup along the surface of the skin while maintaining suction.

Cupping has been found to have mechanical, physiological, and psychological effects on the body. It is an intervention that has been found to increase blood flow, decreased inflammation, decrease fascial and muscular tension, and promote cellular healing [4]. The suction of the cupping increases local blood flow and lymphatic flow [4,5]. This results in localized ecchymosis and a potential decrease in tissue healing time and decrease in pain [4]. Cupping also has been hypothesized to affect all neurophysiological levels, from the performance of the nociceptor in the periphery to the spinal cord, which can diminish pain signals being transmitted to the brain, and decrease a patient's overall pain [3]. It has also been found to induce a deep relaxation for the patient, which aids in decreasing stress [3].

This is a topic of interest because little research has been done in the physical therapy field that includes dry cupping while having the patient complete active movements. Many therapists either complete the dry cupping while the patient is stationary or complete massage cupping. Due to this, dry cupping with active movement is an interesting topic that should be explored further if it can provide beneficial outcomes to patients with various diagnoses.

The purpose of this case report is to describe the successful use of dry cupping with active movement for a patient with cervical disc disorder and consider how it may potentially be beneficial for other diagnoses.

CASE DESCRIPTION

A 41-year old woman presented to an outpatient physical therapy clinic via direct access due to left sided shoulder and neck pain that caused increased stiffness and pain through her left trunk down to her left hip. The patient reported that she had a history of C4-C5 radiculopathy, but her pain and discomfort had increased recently due to her becoming more active.

Her symptoms included pain and tightness on the left side of her neck and shoulder, which extended down her left ribcage to her left hip. She explained that the pain increased with activity and became worse as the day progressed. The patient reported that she has an active job being a nursery school teacher and yoga instructor, as well as cares for her young children at home, all activities of which can increase her pain. The patient reported that the pain limits her from sleeping, completing household chores, driving short distances, maintaining a seated or standing position, and care giving to her children. The patient did not have any imaging done prior to being seen by physical therapy. She also reported that other than her neck and shoulder pain, she is in excellent health and has no comorbidities that would affect her treatment.

During the initial evaluation, observations showed that the patient demonstrated a forward head posture and increased lumbar lordosis. Through palpation with movement, it was found that the patient

was hypomobile at C4-C5 with flexion, extension, bilateral sidebending, and bilateral rotation. This assessment of movement was found to be valid and reliable according to a study that compared examiner diagnoses of hypomobility to dynamic radiographs and found similar results between the two [6]. She also demonstrated increased muscle guarding and adaptive shortening in her left sternocleidomastoid, left scalenes, left cervical paraspinals, left levator scapula, and left thoracic paraspinals. Adaptive muscle shortening can occur when muscles are not utilized in their full range of motion, which this patient had been avoiding due to pain. She had tenderness with increased tissue tension in all aforementioned muscles, as well as in her left suboccipital myofascia. The patient also demonstrated an elevated left first rib.

The therapist also tested the patient's muscle strength using manual muscle testing and a hand-grip dynamometer. Cervical range of motion was measured using a universal goniometer and recorded as a percentage limited compared to normal cervical range of motion values. The results of the manual muscle testing and range of motion limitations are later discussed in Table 5 and 6 in the "Outcome Measures" section of this case report.

The patient's goal for physical therapy was to be able to increase her upper extremity and neck strength as well as range of motion without pain so she could be more active and be pain free.

INTERVENTION

This patient was seen for physical therapy twice a week for 10 weeks. During the first four weeks of this patient's treatment, cupping with active movement was not utilized. Cervical mobilizations, (including posterior to anterior mobilizations and side gliding grade II), cervical musculature soft tissue mobilization, neuromuscular reeducation exercises, and therapeutic exercises were the focus of her treatment. These interventions were beneficial, giving the patient temporary pain relief and temporary increased neck range of motion, but not giving the patient lasting pain relief with activity. About a month into her treatment, the therapist discussed the potential benefits of cupping to the patient, and with patient consent, incorporated cupping with active movement into her treatment plan at the beginning of one session per week.

For this intervention, the patient was seated with her upper thoracic and cervical spine exposed. The patient was typically wearing a tank top in order for this area to be exposed without restrictions.

The therapist always began by having the patient complete cervical flexion, extension, rotation, and side-bending, as well as shoulder flexion, abduction, horizontal adduction and abduction prior to cupping in order to observe a visual baseline of motion each session. The therapist then asked the patient her pain rating while seated and while completing each of the aforementioned cervical and shoulder movements. The therapist then palpated the musculature in the upper thoracic and cervical region, including the trapezius, rhomboids, deltoids, infraspinatus, and supraspinatus muscles. Wherever the therapist felt increased muscular tone or tension, a mental note was taken in order to later place a cup on that area. Typically, the patient's left supraspinatus and upper trapezius were the main areas of increased tone and pain, which could have been caused by muscle guarding due to the increased pain and discomfort in that area.

Once the palpation was complete, the cupping intervention was utilized. First, the therapist used massage cream over the region where the cups would be placed. Then, the therapist would have the patient remain in a comfortable seated position with proper, upright posture and her arms on her lap. The therapist would then select a plastic cup, re-evaluate the musculature to locate the areas of increased tone, and place the cup over it. Using a suctioning tool, the therapist would then suction the skin into the cup until resistance was felt. The cup was then left there and the therapist continued onto the next area. The patient typically had 4-5 cups on the left and right sides, depending on her tone each session. Smaller cups were used on the supraspinatus, while larger ones were used on the trapezius,

rhomboids, and deltoids. See Figure 1 for a visual representation of the dry cupping technique on the thoracic spine.

After all the cups were placed, the therapist would then instruct the patient on movements she was going to complete with the cups on. The movements chosen each session were those that the patient had the most difficulty with prior to the cups being placed on her skin. See Table 1 for all the movements and exercises the patient completed with the cups on her body. Each movement or exercise was completed for 3 sets of 10-15 repetitions.

As the patient was completing the movements, the therapist was observing the cups and seeing which cups “reacted” most to the treatment. The word “reacted” refers to the areas where the cups were placed that had the most increased blood flow. Some areas where the cups were placed demonstrated mild increase in blood flow, with the skin remaining a pinkish color, while other areas demonstrated a severe increase in blood flow, with the skin turning a dark red, purple color. Typically, the areas with severe increased blood flow had more restrictions and tone during the initial palpation examinations and therefore it is theorized that these regions needed more blood flow to increase circulation to that area in order to diminish muscular restrictions and remove toxins created by tensed muscles. In addition to the areas where the cups were placed increasing blood flow, the skin in between the cups began to increase in red pigmentation, indicating that the entire upper thoracic and cervical region was receiving an increase in blood flow to help promote healing.

Once the movements and exercises were completed with the cups remaining on the skin, the therapist began to remove the cups in the order that they were placed on the skin. The therapist would release some of the pressure built inside of the cup, but not all the way so there was still some suction on the skin. From this point, the therapist began to move the cup in circular motion around the region it was originally placed, to help increase the blood flow to the surrounding tissue as well, presumably, still reaching deeper tissues due to the sustained pressure [7]. The therapist then slowly fully released the pressure in the cup and removed the cup from the skin. This method was used on all the cups placed on the skin for that treatment.

After all the cups were removed, the therapist then retested all the cervical and shoulder range of motions that were tested prior to the intervention using a universal goniometer. The therapist also questioned the patient about her pain rating after the intervention compared to prior, as well as when she completed each movement. See Table 2 for an example of the immediate effects of a single cupping treatment on range of motion for this patient. The use of a universal goniometer was found to



Figure 1: Cupping Technique demonstrated on thoracic spine. Photo retrieved from Max Pixel, free of copyright; Creative Commons Zero (CC0). [16]

Table 1: Movements and Exercises Completed with Cups

- Cervical Flexion
- Cervical Extension
- Cervical Bilateral Rotation
- Cervical Bilateral Sidebending
- Shoulder Bilateral Horizontal Adduction
- Shoulder Flexion
- Shoulder Abduction
- Seated Bilateral Book Openers

be a reliable tool when assessing range of motion [8]. While we cannot rule out that the simple act of performing range of motion exercises contributed to the increases in ROM observed, it is possible that the improvements were augmented by the cupping.

After this intervention, the physical therapy treatment would continue with upper thoracic soft tissue massage in an effort to disperse the increase in blood flow to all musculature to promote healing and removal of toxins in the area causing increased stress on the musculature. Then, the patient would complete several exercises that reinforce the pain-free range of motion just gained through dry cupping with active movement. See Table 3 for typical exercises used after dry cupping with movement.

Table 2: Cervical and Shoulder Range of Motion before and after Dry Cupping in Week 9

Range of Motion	Before Cupping (Degrees)	After Cupping with Movement (Degrees)
Cervical Flexion	35	50
Cervical Extension	60	70
Left Cervical Rotation	70	80
Right Cervical Rotation	50	58
Left Cervical Sidebending	30	40
Right Cervical Sidebending	25	30
Left shoulder Abduction	170	180

Between 4-5 exercises were completed each session and patient tolerance was noted through proper form of each exercise and patient feedback.

As the patient session was completed, the patient was reminded that the marks on her back were normal and could last up to a couple days. Each session she was reminded to check her back in order to determine how long the marks lasted. As she began to get dry cupping with movement more frequently, it was noted that the patient reported each session the marks would disappear at a faster rate, which could indicate that her musculature was returning to a healthier state and did not require as much increased blood flow or that her body was adapting to the cupping treatment.

Table 3: Exercises Completed After Dry Cupping

- Push-Up/Push-Up Plus
- Sidelying Book Openers
- TRX Rows
- Wall Angels
- Scapular Clock
- Lattisimus Extension with Cervical Rotation
- Prone, Quadruped, or Standing I's, T's, and Y's
- Chin Tucks
- Cat/Camel
- Incline Plank Twists

SAFETY

Cupping is a relatively safe intervention that can be used on the majority of patients. However, cupping should not be used on those who have a bleeding disorder or bleed easily, pregnant women, menstruating women, those with metastatic cancer, or on a fractured bone [5,7]. Cupping is also contraindicated for those with deep vein thrombosis and those with an active infection or open wound [7].

The most common side effects of cupping include red marks, bruising and swelling of application site [7,9]. There are a variety of color changes that can occur on a patient's skin after cupping, ranging from light pink discoloration to dark red/purple. These marks usually fade within one week of treatment. The patient may also experience sweating, dizziness, or lightheadedness due to increase sympathetic response to the intervention [7,9]. In rare occasions keloids or blisters could form on areas where the cups were left for too long [10,9]. In addition, wet cupping carries potential risk of

infection due to the breaking of skin and causing active bleeding [7]. Dry cupping can also have potential for infection if the cups being used are not clean, but this is a very rare and easily preventable situation [9].

Monitoring the cupping sites is important after a treatment session in order to prevent any adverse side effects and to track how long the marks and/or bruises remain on the skin to report to the therapist or physician the following session.

OUTCOME MEASURES

The outcome measures used in this case report include the Upper Extremity Quick-Dash, pain scale, self rated functional improvement, as well as active range of motion measured with goniometer, and manual muscle testing measured by therapist and the use of a hand grip dynamometer. For Tables 4,5, and 6, the initial evaluation was the start of care, the progress note was week 6 of physical therapy and 2 weeks into utilizing the active cupping treatment, and the final re-examination was 10 weeks of physical therapy and 6 weeks into the active cupping treatment.

Over 10 weeks of treatment, from initial evaluation to final re-examination, the patient's Upper Extremity Quick-Dash score did not change. According to research, the Upper Extremity Quick-Dash has excellent test re-test reliability and moderate validity [11]. In addition, the minimally clinically important difference(MCID) is 10 points for the Quick-Dash [11]. The patient verbally reported that she was able to do more functional activities, both at work and when exercising, but this verbal improvement did not transfer to her Quick-Dash survey. It is possible that another outcome measure, like the Neck Disability Index(NDI) could have been more useful to use in this case in conjunction with the Quick-Dash in order to see both neck and shoulder improvement, but the NDI was not utilized at the initial evaluation, so therefore was not used for the reassessments. The patient's overall pain rating decreased from 5/10 to 2/10 from initial examination to final re-examination and she self rated her functional improvement as excellent beginning from her reassessment after cupping with active movement was utilized and continuing throughout her plan of care. See Table 4 for outcome measure data.

Table 4: Outcome Measures Throughout Plan of Care

Outcome Measures	Initial Examination (Week #1)	Progress Note (Week #6)	Final Re-Examination (Week #10)
Quick Dash	16/100	16/100	16/100
Pain Scale (Worst)	5/10	3/10	2/10
Pain Scale (Best)	2/10	0/10	0/10
Self-Rated Functional Improvement	N/A	Excellent	Excellent

Active range of motion improved throughout the patient's plan of care. Although she continued to have pain at end range, her overall movement greatly increased, increasing her function. See Table 5 for percentage of limitations with movements. Lastly, the patient's left sided strength improved from initial examination to final re-examination. She was not yet symmetrical with strength bilaterally, but very close to being so. See Table 6 for manual muscle strength testing scores.

Table 5: Cervical Active Range of Motion Throughout Plan of Care

Cervical Range of Motion	Initial Examination (Week #1)	Progress Note (Week #6)	Final Re-Examination (Week #10)
Flexion	50% limited (p!)	20% limited (p!)	15% limited (p!)
Extension	50% limited (p!)	30% limited (p!)	25% limited (p!)
Right Sidebending	75% limited (p!)	50% limited (p!)	45% limited (p!)
Left Sidebending	50% limited (p!)	25% limited (p!)	20% limited (p!)
Right Rotation	75% limited (p!)	50% limited (p!)	45% limited (p!)
Left Rotation	50% limited (p!)	25% limited (p!)	20% limited (p!)

**(p!) indicates pain at end range of motion*

Table 6: Upper Extremity Manual Muscle Testing Throughout Plan of Care

Strength	Initial Examination (Week #1)		Progress Note (Week #6)		Final Re-Examination (Week #10)	
	R	L	R	L	R	L
Shoulder Flexion	4+/5	3/5	4+/5	4-/5	4+/5	4/5
Shoulder Abduction	4+/5	3/5	4+/5	4-/5	4+/5	4/5
Shoulder ER	4+/5	3/5	4+/5	3+/5	4+/5	4-/5
Shoulder IR	4+/5	3/5	4+/5	3+/5	4+/5	4-/5
Elbow Flexion	4+/5	3/5	4+/5	3+/5	4+/5	3+/5
Grip strength	30lbs	20lbs	30lbs	20lbs	40lbs	25lbs

DISCUSSION

This report describes the beneficial outcomes for one patient with cervical disc disorder after the use of dry cupping with active movement. This intervention provided immediate pain relief and increase in range of motion for the patient that allowed her to complete more advanced strengthening exercises in a greater pain-free range of motion during the remainder of her physical therapy session. The immediate results of the dry cupping with movement lasted between sessions for the most part with the patient reporting an increase in her pain rating and neck stiffness between 5-6 days post treatment after the first several treatments. As the plan of care progressed, the effects of the treatment lasted longer and the patient was able to remain at a pain level between 0/10-2/10 for an entire week, while exercising independently, taking care of her kids, and completing her job. Overall, this patient had improved cervical and shoulder range of motion, increased shoulder strength, and decreased her self-reported pain from initial evaluation to final re-evaluation. These improvements allowed her to return to exercising more frequently and at a higher level than prior. She was also able to better complete her job being a nursery school teacher and taking care of children without discomfort and pain throughout her day. Although this patient's Quick-Dash score did not change throughout her plan of care, her initial score only demonstrated a mild disability, being 16%. In addition, the patient reported to the therapist at every visit that she was less limited in her daily activities, recreational activities, and job duties. She also reported that she was able to sleep without pain and drive for longer periods of time, which used to cause subsequent days of shoulder stiffness and neck pain. Therefore, although her Quick-Dash score did not change, it was evident that her overall everyday function was noticeably improved.

Many outpatient physical therapists treat people with cervical disc disorders or complaints of neck pain very frequently. Each therapist has a different approach to treating these patients and research on treatments span a variety of interventions, including cervical manipulations and

mobilizations, soft tissue massage, dry needling, stretching, progressive exercises, postural education, etc. [1,2,12]. Since cupping is a relatively new intervention in the physical therapy profession and there has not been ample research done to test its reliability in decreasing pain and improving function after various injuries, not every therapist is knowledgeable of the potential benefits and do not utilize this method.

In a literature review, several papers researching cupping and musculoskeletal pain were discussed which demonstrated an overall theme of decreased pain with the intervention of cupping [3]. Another review concluded that cupping may be beneficial for pain related conditions, including low back, cervical, and knee pain [13]. In addition, cupping can diminish headaches, improve carpal tunnel syndrome, and reduce rheumatoid arthritis pain [13]. Therefore, in addition to neck pain, the use of cupping with active movement could be further researched to test the benefits on other body parts and injuries. One systematic review found that cupping was more beneficial in decreasing patient pain and improving function when compared to an active control group [14]. This is an interesting finding because it can be expanded to this case study and further researched including a group with both cupping and active movement. Since both active movement and cupping were of benefit to the patient, it is easy to think that the two interventions combined would provide an even more profound effect. Another article found decrease in cervical pain and increase in function for desk workers after cupping therapy [15]. In today's modern world where more people have desk jobs, which can cause less than ideal posture and a possible increase in neck pain, cupping with active movement could be a treatment that would be easy to complete with potentially great results for the population. Cupping has therefore been shown to have many beneficial effects, which should be further researched, especially if there are more benefits that are still unknown. Since cupping can easily be taught to physical therapists and be implemented in a short amount of time, it could be of great use to the field and help many patients return to their prior level of function without pain or discomfort.

There is no current research on the affects of dry cupping with active movement completed by the patient to aid in better functional abilities as well as decrease in pain and discomfort after either traumatic injury or a chronic pain disorder. Since there is current research demonstrating the benefits of static dry cupping, as well as massage cupping, in improving patient function and mobility, research now has to extend to include active movement with cupping to explore a potentially more beneficial intervention for physical therapists.

CONCLUSION

In conclusion, this patient demonstrated improved functional abilities after incorporating dry cupping with active movement into her physical therapy treatment plan. Although this patient did not demonstrate an improved Quick-Dash score, her cervical range of motion increased with pain only being experienced at end range, she was able to complete more advanced strengthening cervical and upper extremity exercises and activities without pain, and she was able to complete her job and activities of daily living without increased discomfort. Although this patient had success with dry cupping with active movement to improve her neck and shoulder pain, this intervention cannot be generalized to all patients with neck and shoulder pain or other cervical diagnoses. More research in this topic area needs to be completed in order to provide valid evidence for this intervention's benefits for the general population.

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