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Stephen A. Cage

The University of Texas at Tyler, acage@uttyler.edu

Diana M. Gallegos

AT Still University, dgallegos@atsu.edu

Brandon J. Warner

Grand Canyon University, brandon.warner@gcu.edu

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Utilization of Cupping Therapy in the Treatment of Vascular Thoracic Outlet Syndrome in a Collegiate Pitcher: A Case Study

Stephen A. Cage, MED, LAT, ATC^{€†}, Diana M. Gallegos MS, LAT, ATC^π, Brandon J. Warner, MED, LAT, ATC^{||†}

The University of Texas at Tyler[€], Grand Canyon University^{||}, AT Still University^π, University of North Carolina; Greensboro[†],

Objective: Present a clinical case detailing the effectiveness of dry cupping therapy in treating thoracic outlet syndrome. The utilization of dry cupping therapy on a 20-year-old collegiate baseball pitcher with diagnosed thoracic outlet syndrome is presented. **Background:** Thoracic outlet syndrome is a relatively rare musculoskeletal condition affecting 1/100,000 patients annually. Dry cupping therapy is an ancient therapeutic modality that utilizes various means of suction with the goal of decompressing myofascial layers. **Treatment:** Following diagnosis, patient was successfully treated in two weeks using dry cupping therapy. Treatment primarily focused on use of dry cupping therapy along the sternocleidomastoid, upper trapezius, clavicular attachment site of the pectoralis major and scalenes for 15 minutes per session. The patient experienced no further incidence of thoracic outlet syndrome symptoms and was able to complete the remainder of his competitive season. **Uniqueness:** The patient's thoracic outlet syndrome was diagnosed at an early stage, leading to the need of clearance from a vascular specialist before returning to competition. Additionally, to the knowledge of authors there are currently no published case reports detailing the use of cupping therapy to treat thoracic outlet syndrome. **Conclusion:** Cupping therapy may be a viable treatment option when seeking to diminish the compression of myofascial structures. Further research needs to be conducted to determine optimal parameters for cupping therapy as a therapeutic modality. **Key Words:** *cupping therapy, thoracic outlet syndrome, myofascial decompression*

INTRODUCTION

Thoracic outlet syndrome (TOS) is a musculoskeletal condition that can affect the neurovascular supply to the arm by compressing one or more of the structures that pass through the thoracic outlet.¹⁻³ Structurally, the thoracic outlet is comprised of three borders: anterior border (clavicle, costoclavicular ligament, subclavius, and anterior scalene muscle), inferior border (first rib), and posterior border (middle scalene muscle).² The primary structures passing through the thoracic outlet are the brachial plexus, subclavian artery and subclavian vein.³ Of these structures, the brachial plexus (90-95%) is the most commonly compressed structure, followed by the subclavian vein (5%) and subclavian artery (1%).² Should one or more of these structures become compressed, symptoms can include: numbness and tingling down the arm, color

and temperature changes in the digits, swelling in the digits and distal arm and worsening symptoms with overhead activities.¹ Compression of the neurovascular structures of the thoracic outlet syndrome can be caused by a variety of mechanisms, including: the presence of a cervical rib, trauma or injury and non-optimal healing following trauma, tight anterior scalene muscle, and postural abnormalities.^{1,3} This condition is rare, affecting 1/100,000 annually.⁴

The suggested course of treatment for thoracic outlet syndrome has commonly included: therapeutic exercise intended to decrease tightness or adhesion of the muscles composing the borders of the thoracic outlet, anti-coagulation medications, surgical resections of structures impinging the

thoracic outlet structures.¹ With the exception of severe cases, surgical intervention is used only when conservative measures have failed to relieve symptoms.

Cupping therapy is an ancient therapeutic modality that has been used for centuries in Arabian, Chinese and European traditional and alternative medicine.⁵ The principle mechanism of action is theorized to be the myofascial and subcutaneous decompression caused by the vacuum created within the cup.⁵ Potential therapeutic effects of cupping include: decrease in pain, increase in local circulation, decrease in muscle spasm and increase in muscle relaxation.⁵⁻⁸

While applying cupping therapy, there are numerous techniques used to achieve desired therapeutic effects. Common application methods include: dry cupping, wet cupping, flash cupping and moving cups.⁷ Each technique has a specific therapeutic purpose and should be selected based on the patient's plan of care, availability of cupping supplies, and clinician preference. Based off clinician survey, the most commonly utilized technique is dry cupping, which is, the application of cups using manual suction or flame to generate suction.⁷

The purpose of this case report is to document the outcome for a patient suffering from vascular thoracic outlet syndrome caused by overdevelopment of surrounding musculature. The patient was treated using dry cupping therapy, which has not been documented as a treatment for thoracic outlet syndrome. This case includes background information on thoracic outlet syndrome, descriptions of the employed therapeutic modality, and the subsequent rehabilitation that accompanied treatment leading to the successful return to participation.

CASE REPORT

A 20-year-old collegiate baseball long-relief pitcher reported to the medical staff following an extended long toss session. The patient complained of swelling in the fingers of his

right hand. The patient was evaluated by the team physician immediately, who concluded that the patient was suffering from thoracic outlet syndrome.

Upon evaluation the patient did not report any pain or demonstrate a loss of strength, but did note numbness in the swollen extremities. During evaluation, the patient reported experiencing numbness in his hand while pitching in the 8th grade that resolved on its own after a period of six months. At the time of this previous episode, the team physician did not deem it necessary for vascular diagnostic imaging due to the lack of overall symptoms. The patient was withheld from pitching off of a mound until further evaluation, but was allowed to continue his throwing program to monitor symptoms.

The following day, the patient experienced the sensation of swelling in his fingers following completion of his daily throwing program. No appreciable swelling was observed and the sensation of swelling subsided within 30 minutes. Two days later, the patient presented with 5 mm of swelling measured bilaterally at the proximal third phalanx. Once again, swelling resolved within 30 minutes, and patient was referred to the team physician who ordered a diagnostic ultrasound to evaluate for a blood clot in the subclavian blood vessels. The diagnostic ultrasound did not reveal a blood clot, but did note an increase in subclavian artery blood flow velocity when in glenohumeral abduction and external rotation. These findings were deemed to be consistent with vascular thoracic outlet syndrome, and the patient was referred to a vascular specialist who confirmed diagnosis.

Following the diagnosis and absence of a thrombus, the patient began undergoing stationary dry cupping therapy via pneumatic cups along the sternocleidomastoid, upper trapezius, clavicular attachment site of the pectoralis major and scalenes for 15 minutes per session (Figure 1). This treatment was repeated at these sites every other day.

Cupping therapy was selected for use to relax and decrease the tightness of the muscles that commonly contribute to thoracic outlet syndrome. A week from initial diagnosis, the patient received diagnostic imaging (X-rays) to rule out the presence of a cervical rib. Two days post imaging, the patient continued to present with swelling at the proximal third phalanx after completion of his long toss program, with symptoms resolving within 30 minutes.



Figure 1. Therapeutic cupping array utilizing pneumatic cups along the subclavian muscles and upper trapezius.

Over the next week, the patient continued to undergo the previously described dry cupping therapy treatments on alternating days to reduce the risk of muscular soreness. Clinicians began to integrate the use of moving cupping therapy along the sternocleidomastoid and scalenes (Figure 2). Following two weeks of treatment, the patient's vascular specialist cleared him to return to full activities while continuing treatment.

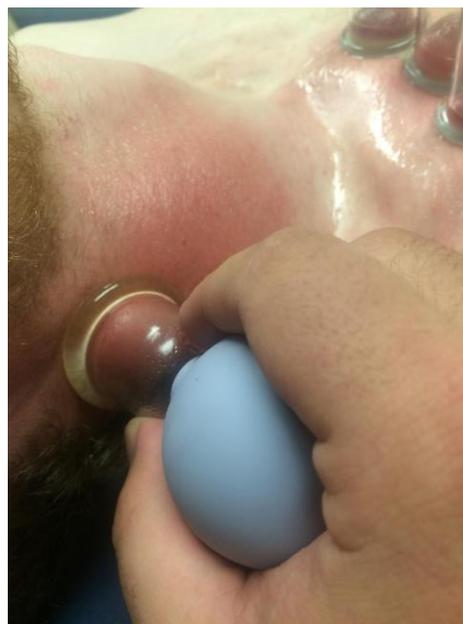


Figure 2. Utilization of glass bulbed cup to perform moving cupping along the sternocleidomastoid.

Three weeks after initial diagnosis, the patient pitched two innings over the course of three days with no recurrence of swelling. A treatment plan was put in place to continue cupping therapy at the previously described sites on alternating days, while also initiating shoulder range of motion and scapular stabilizing exercises. This protocol required the patient to complete three sets, utilizing multiple exercises, of theraband exercises, dumbbell stability exercises, eccentric pushups and 3-4 bouts of general shoulder stretching.

Throughout the course of the season, the patient was able to progress into a starting role, throwing a total of 39 innings following initial diagnosis of thoracic outlet syndrome. During this time, patient reported no recurrence of swelling in his digits, and noted that he felt that his range of motion while pitching had improved. Upon conclusion of the season, the patient was given a range of motion and scapular stabilization home program to complete over the summer prior the beginning of the non-traditional season in the fall.

DISCUSSION

Thoracic outlet syndrome is a relatively uncommon condition, with only 1 in 100,000 people suffering from the condition annually.⁴ Vascular thoracic outlet syndrome accounts for only 5-10% of all cases of thoracic outlet syndrome.² Given the rarity of vascular thoracic outlet syndrome this case describes an uncommon condition being treated with an alternative form of soft tissue mobilization.

Cupping therapy is an ancient therapeutic modality that has been used in eastern medicine for centuries to achieve decompression of myofascial and subcutaneous tissues.⁶⁻⁸ At present, there are very few quality studies that evaluate the specific effects and mechanisms of cupping therapy.⁶ However, a systematic review of the available randomized control trials found that cupping therapy had the ability to decrease pain and improve quality of life.⁷ A more recent randomized control trial evaluated the effect of cupping therapy on chronic neck and shoulder pain, and found significant decreases in neck pain intensity ($p < 0.001$).⁸ To date, no studies have examined the use of cupping therapy to treat the causes of thoracic outlet syndrome. In this case, the presence of a cervical rib and blood clot were ruled out using diagnostic imaging. The presence of an increase in arterial blood flow velocity when the glenohumeral joint was placed in abduction and external rotation led to the diagnosis of vascular thoracic outlet syndrome due to compression from the anterior scalene.

This case report describes the diagnosis, and treatment using dry cupping therapy of a patient suffering from vascular thoracic outlet syndrome. It appears that the patient experienced relief from both the signs and symptoms of thoracic outlet syndrome following a two-week course of treatment utilizing exclusively the specified cupping techniques. Within the current body of literature, there is absence of documentation

for the use of cupping therapy to treat thoracic outlet syndrome.

This patient was withheld from competition for only a total of three weeks following initial diagnosis, in part due to the time it took for the vascular specialist to schedule him for a consultation. This return to play time is in contrast with previously reported timelines, in which return to play was stated to have taken anywhere from five to 12 weeks.^{9, 10} Upon returning to competition, the patient experienced a lack of exacerbation of the previously reported symptoms. His progress was deemed significant, and he was able to perform at such a level to earn a position in the starting pitching rotation.

CONCLUSION

The therapeutic interventions used in physical rehabilitation continually evolve as knowledge becomes available and through clinical experiences. Within this report, the patient apparently recovered from thoracic outlet syndrome sufficiently to return to competitive baseball pitching. This report argues by clinical experience that cupping therapy may prove to be a useful technique when treating vascular thoracic outlet syndrome. Practitioners who choose to incorporate cupping therapy into their practice should be sufficiently familiar with the therapeutic technique and review the pertinent literature that guides the application of the techniques.

While in this case, the patient received optimal clinical and functional outcomes, it is important to note that further research needs to be conducted to evaluate the specific mechanisms and effects of cupping therapy. In the interim, with the knowledge that there are minimal incidents for site morbidity or adverse reactions, cupping therapy is a safe therapeutic modality to employ in rehabilitative medicine.⁶ Further research is needed to determine best practices for treatment parameters for cupping therapy, as

well as the optimal phase of healing during which to initiate treatment.

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