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Emad Ahmed, *Sports cupping for supraspinatus tendinosus*
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SPORTS CUPPING FOR SUPRASPINATUS TENDINOSIS: A CASE STUDY

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ABSTRACT

Supraspinatus tendinosis is a common source of shoulder pain. This tendinopathy is in most cases caused by an impingement of the supraspinatus tendon on the acromion as it passes between the acromion and the humeral head. Pain, and a decrease in range of motion, strength and functionality are the main complaints that accompany this injury. Being one of the well-established techniques, Sports wet cupping therapy (WCT) was used to treat a case of Supraspinatus tendinosis in this study. This paper aims to report the improved case of supraspinatus tendinosis using the treatment with sports cupping. We used sports cupping therapy for treatment of this patient. This case is measured and assessed by visual analogue scale (VAS), shoulder range of motion (ROM) and shoulder physical examination. Results show the VAS decreased from 10 to 1 and the patient showed nearly full shoulder range of motion in forward flexion, abduction, extension, internal rotation and external rotation. In addition, the physical examination of shoulder and MRI was improved. Sports cupping treatment with wet cupping therapy is found to be helpful to relieve pain and recover function of shoulder joint.

Keywords: Supraspinatus tendinitis; sports cupping; wet cupping therapy (WCT); dry cupping, frozen shoulder.

ABSTRAK

Tendinosis supraspinatus adalah sumber umum nyeri bahu. Tendinopati ini dalam banyak kasus disebabkan oleh pelampiasan tendon supraspinatus pada akromion saat melewati antara akromion dan kepala humerus. Nyeri, dan penurunan rentang gerak, kekuatan, dan fungsionalitas merupakan keluhan utama yang menyertai cedera ini. Menjadi salah satu teknik yang sudah mapan, terapi bekam basah olahraga (WCT) digunakan untuk mengobati kasus tendinosis Supraspinatus dalam penelitian ini. Tujuan dari makalah ini adalah untuk melaporkan perbaikan kasus tendinosis supraspinatus menggunakan pengobatan dengan bekam olahraga. Metode yang digunakan adalah terapi bekam olahraga untuk pengobatan pasien ini. Kasus ini diukur dan dinilai dengan visual analogue scale (VAS), shoulder range of motion (ROM) dan pemeriksaan fisik bahu. Hasil studi menunjukkan VAS menurun dari 10 menjadi 1 dan pasien menunjukkan rentang gerak bahu yang hampir penuh dalam fleksi ke depan, abduksi, ekstensi, rotasi internal, dan rotasi eksternal. Selain itu, pemeriksaan fisik bahu dan MRI ditingkatkan. Kesimpulan adalah perawatan bekam olahraga dengan terapi bekam basah terbukti membantu meredakan nyeri dan memulihkan fungsi sendi bahu.

Kata kunci: Tendinitis supraspinatus; bekam olahraga; terapi bekam basah (WCT); bekam kering.

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1. INTRODUCTION

The rotator cuff complex is a functional-anatomic unit composed of the supraspinatus, infraspinatus, teres minor, and subscapularis tendons and muscles along with the capsular covering between the supraspinatus and subscapularis known as the rotator interval. (Steinbach, 2010)

The supraspinatus muscle is the most important muscle of the rotator cuff. It provides joint stability and, with the deltoid muscle, adducts the arm at the shoulder by fixing the head of the humerus firmly against the glenoid fossa. The supraspinatus muscle and tendons are susceptible to trauma and to wear and tear from overuse and misuse. (S. D. Waldman, 2016)

Supraspinatus tendon of the rotator cuff is particularly prone to developing tendinitis. The onset of supraspinatus tendinitis is usually acute, occurring after overuse or misuse of the shoulder joint. Exciting factors may include carrying heavy loads in front and away from the body or the vigorous use of exercise equipment. The pain is constant and severe, with sleep disturbance often reported. The patient may attempt to splint the inflamed tendon by elevating the scapula to remove tension from the ligament, giving the patient a "shrugging" appearance. Patients with supraspinatus tendinitis exhibit a positive Dawbarn sign-pain on palpation over the greater tuberosity of the humerus when the arm is hanging down that disappears when the arm is fully abducted. In addition to the previously described pain, patients with supraspinatus tendinitis often experience a gradual decrease in functional ability with decreasing shoulder range of motion, making simple everyday tasks, such as hair combing, fastening a bra or reaching overhead, difficult, with continued disuse, muscle wasting may occur, and a frozen shoulder may develop. A chronic aseptic inflammation is brought on by damage to the shoulder capsule and the peri arthritic soft tissue around it (including ligaments, muscles, tendons, synovial sacs, etc.) (SHARMA, 2021), (Steven D. Waldman, 2022), (Steven D. Waldman, 2020).

Sports cupping is a cupping technique for athletes using dry cupping, wet cupping, water cupping, massage cupping, and electrical cupping in sports field. It is a method for Warm-up, Rehabilitation process, First aid, and recovery healing. It achieves the best Sports Forms, which aims to healing and relaxation and to restoring vitality and help maintain the strength and flexibility (Saleh, 2010) (النور, 2021).

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History notes:

The practice of cupping is over 5000 years old. The effect has remained the same; only the cups and the technique have changed over these many years. We can find the application of suction cups in the medicine of all "primitive" people, as well as in the oldest civilizations. Reports about the art of cupping could be found in ancient Egyptian medical scriptures, Chinese, Hindu, and Old Greek. (Manz, 2011).

Al-Hijama is the name for cupping therapy in Egypt and other Arabic-speaking countries. It is an intervention by Asian medical systems including Unani, Ayurveda, Chinese, Tibetan, and Oriental Medicine throughout Asia, the Middle East, and Europe. Additionally, Europe is a popular region for cupping therapy. For instance, European monks and traditional healers frequently used cupping therapy up to the 19th century (Hussein, Negm, Shaikh, & Saleh, 2023).

Table 1: Different Types of Chinese Cupping Therapy (components of sports therapy included) (El Sayed, Mahmoud, & Nabo, 2013):

Type of Cupping Therapy	Description
1.Retained cupping (dry cupping therapy):	The most common type of cupping therapy used in Chinese clinics, in which neither blood nor extra vascular fluids containing soluble CPS (cause-related pathogenic substances) are removed.
2. Bleeding cupping (wet cupping) therapy:	It is composed of two steps: making tiny skin incisions and suctioning blood with cups. To cause bleeding, practitioners must touch the bleeding spots strongly and quickly.
3. Moving cupping:	This means a gentle cup movement by the practitioner.
4. Empty cupping therapy:	Here, cups are removed immediately after suctioning.
5. Needle cupping:	It is a mix of cupping and acupuncture needles.
6. Medicinal (herbal) cupping:	Here, bamboo cups are used to boil herbal remedies for 30 minutes, after which suction is applied to specific spots with the cups utilizing released steam rather than fire for fixation on the skin.
7. Water cupping therapy:	Warm water in the bamboo cups is instantly applied to the skin's surface.

Our patient is 28 years old married male patient. He is a tradesman with a thin body and does not practice sports activity. He presented to us with pain in the left shoulder and pain radiating down to Forearm, restricted movement of the left shoulder joint for the last 4 months that

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occurred suddenly and pushed him to seek medical advice. A physician diagnosed the case as a supraspinatus tendinopathy. The doctor prescribed an arm holder due to the complete loss of the ability to move the arm in all directions. Clinically, the patient had swelling at the left shoulder and Grade III tenderness at the glenohumeral joint. The range of movement of the shoulder joint in all directions was very limited, moreover, very tender when trying to move it. The patient did not get relief either in pain or in stiffness of the shoulder joint. In spite that patient received drug therapy together with twelve sessions of physiotherapy, the shoulder pain was still aggravating. Patient then started to lose hope and discontinued drugs and physiotherapy visits. This happened while kept on drug therapy and physiotherapy alone.

History of present illness

There is no history of any trauma or physical injury. The patient was not diabetic, hypertensive nor known to have any cardiac ailment as well.

General physical examination

- Blood pressure = 121/80 mmHg; pulse rate = 80/min.
- Cardiovascular system: S1, S2 audible and normal; chest: Clear no added sounds.
- Central nervous system: Level of consciousness, attention, orientation, memory recall, and speech all are normal.
- Reflexes: Upper limb – present and normal; lower limb – present and normal; ankle Jerk – present; plantar response – flexion.
- Muscle power: 1/5 in the left upper limb, 5/5 in the right upper limb, 5/5 in both lower limbs.
- Muscle tone: Normal.
- Muscular atrophy: Not present.
- Visual Analogue Scale (VAS) left shoulder ranked: up to 10.
- Shoulder joint examination: Right side is normal and Left side is as follows:
    1. Swelling: found.
    2. Tenderness: Present.
    3. Restriction of range of movement: Active ROM (AROM)/passive ROM (PROM) reduced;

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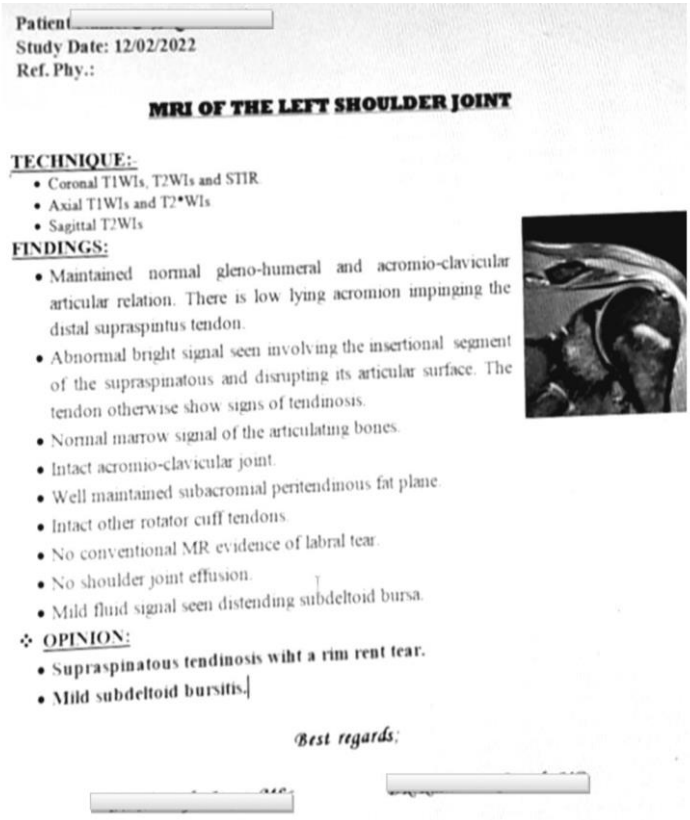
the patient had forward flexion of 0°, abduction of 0°, and extension of 0°, while internal rotation and external rotation were not found.

Investigations

Supraspinatus tendinosis can be accurately identified on MRI. (Sein, 2007). Modern MRI has excellent sensitivity and specificity for detecting rotator cuff tendinopathy, including the assessment of tears. (Kentaro Onishi, 2021). Several examination manoeuvres have been developed to assess for subacromial impingement and supraspinatus tendinopathy (Kentaro Onishi, 2021), such as visual analogue scale score and active range of movement. (Kapadiya, Jain, & Dudhamal, 2022). The clinician should be aware that the empty can test may also be positive in patients who suffer from subacromial bursitis. Magnetic resonance imaging and/or ultrasound testing of the affected shoulder should be performed in patients who are thought to be suffering from supraspinatus tendonitis, to help differentiate these clinically distinct entities as well as to rule out rotator cuff tear. (Steven D. Waldman, 2020). Radiological shows the left shoulder joint MRI revealed supraspinatus tendinosis with a rim rent tear and mild sub deltoid bursitis (December 2022)


Patient
Study Date: 12/02/2022
Ref. Phy.:

MRI OF THE LEFT SHOULDER JOINT

TECHNIQUE:-
- Coronal T1WIs, T2WIs and STIR
- Axial T1WIs and T2*WIs
- Sagittal T2WIs

FINDINGS:
- Maintained normal gleno-humeral and acromio-clavicular articular relation. There is low lying acromion impinging the distal supraspintus tendon.
- Abnormal bright signal seen involving the insertional segment of the supraspinatous and disrupting its articular surface. The tendon otherwise show signs of tendinosis.
- Normal marrow signal of the articulating bones.
- Intact acromio-clavicular joint.
- Well maintained subacromial pertendinous fat plane.
- Intact other rotator cuff tendons.
- No conventional MR evidence of labral tear.
- No shoulder joint effusion.
- Mild fluid signal seen distending subdeltoid bursa.

❖ OPINION:
- **Supraspinatous tendinosis wiht a rim rent tear.**
- **Mild subdeltoid bursitis.**

Best regards;

Diagram 1. MRI Left Shoulder

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II. METHODS

The patient was advised to try cupping therapy as an alternative approach. He attended then to Sports Hijama clinic. The necessary procedure was taken for the patient and the verbal consent for hijama and publishing the case result were established. Cups: Cups are the primary equipment used in cupping therapy. They are available in different materials such as glass, silicone, plastic, or bamboo. Glass cups are most commonly used in traditional cupping therapy, while silicone and plastic cups are popular in modern practice due to their flexibility and ease of use. Bamboo cups are less common but can be used in certain traditional cupping techniques. Cups come in various sizes, allowing practitioners to select the appropriate size for different treatment areas. (M. L. Zhang, 2023).(Table 2)

Table 2. Sports Hijama (Cupping) Therapy Plan

Type	Cups Size	Cups Use	Sessions time	Point selection
Wet cupping therapy	S,M,L,XL,XXL	Single use	10 – 15 day	Muscle origins and insertions, ache point, Local acupoint around shoulder, chest, scapula.
Bamboo cupping	S,M,L,XL,XXL	Sterilization	2 in week	
Silicone cupping	S,M,L,XL	Sterilization	2 in week	

The plan started with two cupping sessions per week, the first is wet cupping therapy (Figure 1) and the second session is dry bamboo cupping (Figure 2).

Figure 1. Wet cupping session, cups are in place.

Figure 2. Bamboo cups in place.

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In the beginning, the skin marks of the cups showed local congestion and ecchymosis with occasional blister formation (Figure 3). With the progress sessions, skin marks got better, with less congestion (Figure 4).

Figure 3. Skin marks after session prove pathology.

Figure 4. Skin marks with less congestion.

Then we used the flexible silicon cups (Figure 5) on the joint and around while the limb was moved for passive exercise in the main axes of shoulder movement. After ten days wet cupping therapy was usually planned.

Figure 5. Elastic silicon cups in place.

Figure 7. Movement limitation and pain was relieved totally by the end of the course.

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Anatomically, the cups were put on the skin over the muscle fibres and tendons of trapezius, supraspinatus, infraspinatus, deltoid, serratus, pectoralis major, minor and biceps muscles. We sought the points at the origin, belly, and insertion of every muscle through an alternating manner.

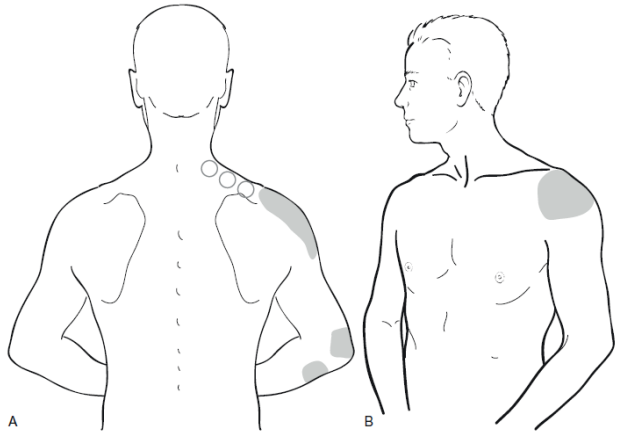

Figure (A) Supraspinatus muscle trigger points (B) Supraspinatus muscle trigger points. (Chirali, 2014).

In the beginning of the second week, the patient could elevate his arm in the anterior and lateral directions up to 80 degrees. In the second month we started assisted active movement while cupping (sports cupping), then against resistance in the form of light weight, elastic bandage, and exercise stick. That was the same in the third month, together with wet cupping every fifteen days and exercise against active resistance. By the end of the third month, the patient came totally free of pain and range of movement limitation in all directions (Figure 6). The patient was told to discontinue treatment and come only every month for follow up. The second MRI came completely freeNormal MRI after treatment with sports cupping therapy (July 2023). Measurement of VAS before and after each session with follow-up for a full year after the end of the rehabilitation program clinical examination and MRI assessment all ensured the cure.

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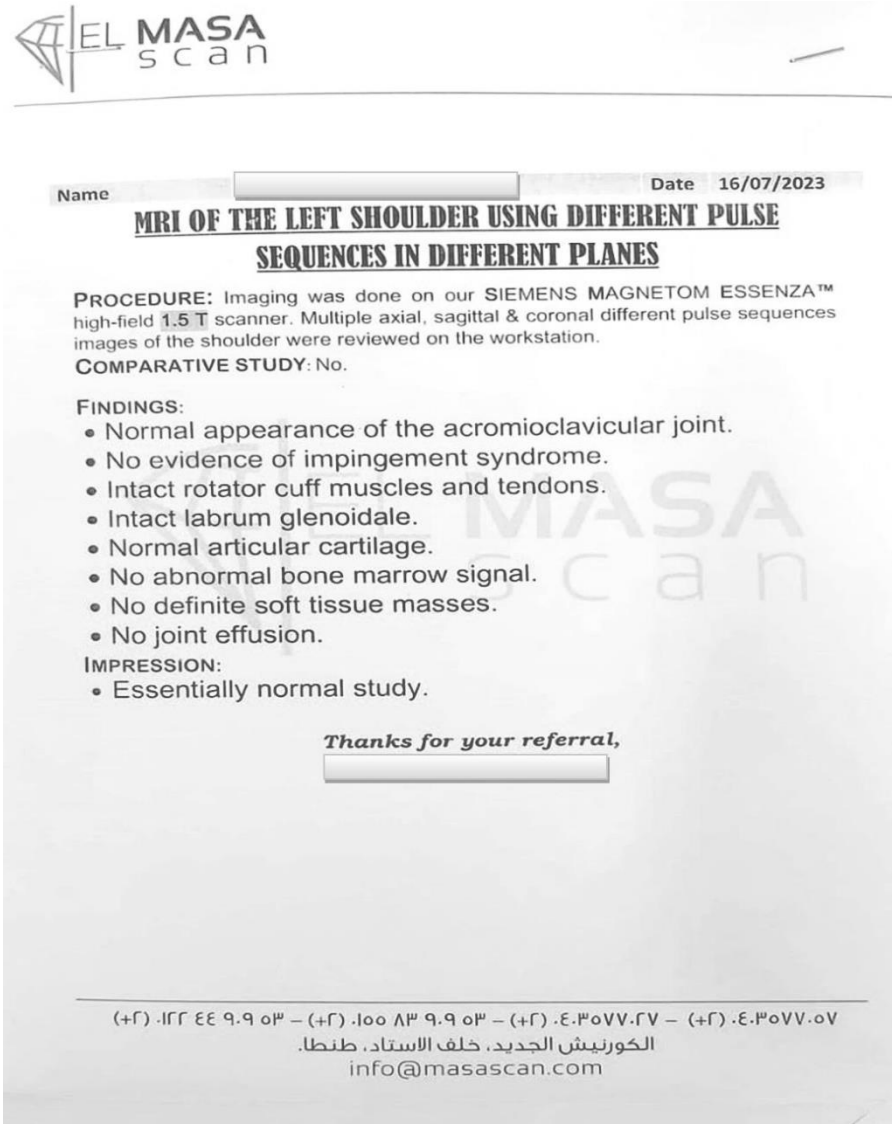

EL MASA scan

Name [redacted] Date 16/07/2023

MRI OF THE LEFT SHOULDER USING DIFFERENT PULSE SEQUENCES IN DIFFERENT PLANES

PROCEDURE: Imaging was done on our SIEMENS MAGNETOM ESSENZA™ high-field 1.5 T scanner. Multiple axial, sagittal & coronal different pulse sequences images of the shoulder were reviewed on the workstation.

COMPARATIVE STUDY: No.

FINDINGS:

- Normal appearance of the acromioclavicular joint.
- No evidence of impingement syndrome.
- Intact rotator cuff muscles and tendons.
- Intact labrum glenoidale.
- Normal articular cartilage.
- No abnormal bone marrow signal.
- No definite soft tissue masses.
- No joint effusion.

IMPRESSION:

- Essentially normal study.

Thanks for your referral,

[redacted]

(+٢) ٠١٢٢ ٤٤ ٩٠٩ ٥٣ – (+٢) ٠١٥٥ ٨٣ ٩٠٩ ٥٣ – (+٢) ٠٤٠٣٥٧٧٠٢٧ – (+٢) ٠٤٠٣٥٧٧٠٥٧

الكورنيش الجديد، خلف الاستاد، طنطا.

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Diagram 2. Normal MRI after treatment with sports cupping therapy (July 2023).

III. DISCUSSION

This study provides evidence showing the main effect of the of cupping therapy and it's interaction on the Supraspinatus tendinosis and shoulder joint dynamic responses, including decrease pain, restore ROM, AROM. Our results demonstrated that there is a significant interaction effect. Cupping, massage, acupuncture, and moxibustion are often used for preventive treatment of disease to prevent sports injuries, this purpose. Massage and cupping are commonly used in sporting events such as the Olympics to improve physical condition, enhance the ligament and joint flexibility, increase muscle strength, improve an athlete's action

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response and self-control ability, form a positive psychological state, and improve human body functions to prevent sports injuries. It has been proven that cupping, massage, acupuncture, and moxibustion are convenient and economical medical means to prevent and treat acute and chronic sports injuries with a short course and immediate curative effect. (H. Zhang, Zhao, M., Wu, Z., Wang, X., Jiang, Y., Liang, J., & Chen, H., 2022).

In this study, we used mainly two types of cupping therapy, so we need to differentiate between them, to see how effective that mode of combined approach in sports cupping was. (Table 2) (El Sayed et al., 2013).

Table 2: Differences between Dry Cupping Therapy and Wet Cupping Therapy:

	Dry cupping therapy	**Wet cupping therapy**
Distribution	China's most popular form of cupping therapy. Widely used throughout the world.	Most popular form of cupping therapy in the Arabic and Islamic worlds, for example, Saudi Arabia prefers the CPC (cupping – puncture – cupping) method whereas China and many other countries prefer the PC (puncture – cupping) method.
Types	One kind.	2 kinds: CPC method and PC method.
Dry cupping therapy	Possibly performed as a single treatment	Included in the CPC technique of wet cupping therapy as the first component but left out of the PC method's methodology.
Skin puncturing	Not included.	Included.
Number of technical steps	One action (only cupping).	There are two steps in the PC method (puncturing and cupping) and three steps in the CPC method (cupping, puncturing, and cupping).

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Excretion of excess fluids and wastes	Not done i.e., retention of fluids and wastes. Only dilution and redistribution of poisonous soluble chemicals are allowed to take place far from pain receptors and sensitive structures.	Done, that is, fluid and waste excretion after being diluted and disseminated in fluids collected inside skin up liftings (better in the CPC than in the PC method).
As a prophetic medicine recommendation	In the time of the prophet Muhammad PBUH, dry cupping therapy was not used as a sole form of treatment. Done as the initial stage of the prophetic medicine-recommended wet cupping therapy (CPC method=Al-hijamah).	The CPC technique (Al-hijamah) was advocated and practiced at the time of the prophet and is still used today in Saudi Arabia and other Islamic nations.
Treating pathological causes	Palliative (as causative excess fluids with soluble CPS are not excreted).	When carried out appropriately, curative (CPC method better than PC method)
Other names	Retained cupping therapy.	Al-bleeding-cupping, Hijamah therapy.

Supraspinatus tendonitis can cause a painful shoulder problem that is either acute or persistent. After overusing or mistreating the shoulder joint, acute supraspinatus tendonitis typically develops in younger people. Carrying heavy loads in front of and away from the body, injuries from throwing, or aggressive usage of exercise equipment can all be triggering factors. Older people are more likely to develop chronic supraspinatus tendinitis, and it typically manifests more gradually or subtly without any identifiable preceding trauma. Supraspinatus tendonitis causes intense, ongoing pain that frequently interferes with sleep.

To relieve tension on the ligament, a patient with supraspinatus tendinitis may attempt to splint the inflamed tendon by raising the scapula, giving the patient a "shrugging" appearance. Over the larger tuberosity, point pain is frequently noticeable. The humeral head is impinging on the supraspinatus tendon in the middle of the patient's uncomfortable abduction arc, and the patient complains of a catch or sudden onset of discomfort there.

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Nonsteroidal anti-inflammatory medications (NSAIDs) or cyclooxygenase-2 (COX-2) inhibitors and physical therapy should be used in combination as the initial treatments for the pain and functional disability brought on by rotator cuff tears. The use of heat and cold locally may also be advantageous. The following injectable approach may be a viable alternative for patients who do not respond to current therapy techniques. A few days after the patient receives this injection method for shoulder pain, physical therapy should be started, including modest range-of-motion exercises. Exercises that are strenuous should be avoided because they will make the symptoms worse (Steven D Waldman, 2019).

Numerous theories have been put up to explain the many impacts of cupping therapy as well as how it works. Numerous research proposed mechanical and biological cupping session techniques. For instance, the "Pain-Gate Theory" (PGT), "Diffuse Noxious Inhibitory Controls" (DNICs), and "Reflex Zone Theory" (RZT) all propose that changes in the biomechanical features of the skin may reduce pain.

The "Nitric Oxide Theory" could be used to explain muscle relaxation, particular alterations in local tissue structures, and an increase in blood circulation. The "Activation of Immune System Theory" may be to blame for the immunomodulatory effects of cupping therapy (AIST). The "Blood Detoxification Theory" (BDT) may be responsible for the release of toxins and the removal of waste and heavy metals.

The therapeutic effects of cupping in treating patients with various ailments and boosting wellness in healthy people may have resulted from these theories working in harmony (Figure 8). (Al-Bedah et al., 2019)

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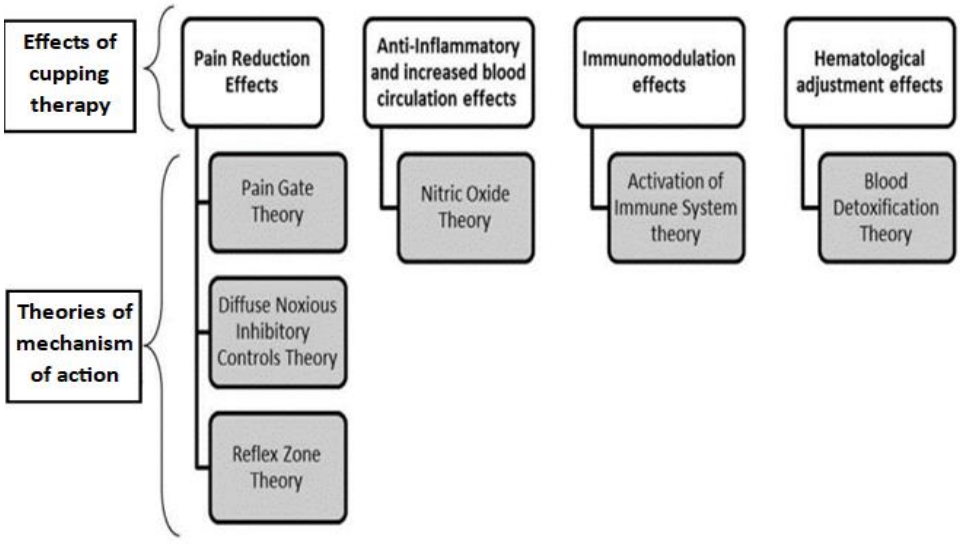

Figure 8. Mechanisms of action of cupping therapy – modified from (Al-Bedah et al., 2019)

The anatomical location of the injured tendon, also, affects the healing process after tendon injury, which is controlled by a complex cellular healing response. The physiological mechanisms of healing for intrasynovial tendons, like the flexor tendons of the hand, and extra synovial tendons, like the Achilles tendon, differ. Growth factors generated by the epitenon and endotenon, which passively travel via the synovial fluid to the site of injury, aid in the healing of the sheathed tendon. On the other hand, extra synovial tendons recover through blood flow and growth hormones released by the cells from the paratenon because they lack sheaths and synovial fluid.

Intrinsic and extrinsic healing are additional terms used to describe the tendon healing process. Fibroblasts from the paratenon migrate to the site of damage during extrinsic healing and encourage adhesion, which may prevent tendon excursion. Contrarily, intrinsic healing is characterized by fibroblasts moving from the endotenon and epitenon in the synovial sheath, inhibiting adhesion with the surrounding tissue, promoting early mobilization and a stronger healing response.

In a study of flexor tendons using a dog model, it was shown that immobilizing a tendon after damage promotes adhesion with the surrounding sheath while causing collagen resorption (Canata, 2017).

The tendon is a complicated biochemical structure made up of collagen fibres enmeshed in a proteoglycan matrix. A water-rich matrix (60–65 percent water) made up of proteoglycans,

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glycosaminoglycans, elastin, and collagen fibrils make up the tendon's acellular part. The perimysium, periosteum, and paratenon vascularize the tendons; the flow of blood is sluggish (0.5 ml per 100 g tissue per minute) and is concentrated on the tendon's outside surface. Because of this, the tendon is regarded as having inadequate blood flow and requires a lengthy time to regenerate (Canata, 2017). So, Sports Cupping role in remodelling tissue after injury is by reducing fluid, reducing tissue adhesion, and releasing fascia, this achieves pain reduction and freedom of range of motion.

Cupping massage has a positive effect on the speed of recovery and restoration of electrical activity variables and getting rid of muscle fatigue. (Helmy, 2017) . Wet cupping therapy (WCT) shows that the cases of calcified supraspinatus tendinitis may be successfully managed. (Kapadiya et al., 2022). Oil cupping massage therapy is very effective in the management of frozen shoulder. Cupping therapy has promising results in pain control, restoration of ROM, and improvement of quality of life and minimizes the potential risks of treatment. (Imam, 2017). Limitations of thos study: **T**he examination of range of motion was based on observation only which is a subjective method. We recommend that future studies using objective methods are recommended, randomized trials with a powered sample and follow up.

IV. CONCLUSION

Using Sports Cupping for supraspinatus tendinosis is effective in repairing and remodeling tissue after injury restoring the integrity of injured tissues, resolving pain, restoring normal (AROM) / (PROM) and active power of movement as well.

ACKNOWLEDGMENT

The authors would like to thank the patient for his believe in hijama, good compliance and convenience.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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