

Case Report

# “MaRhyThe© and cupping” – A novel multimodal approach for radiation-induced trismus

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## ABSTRACT

Head-and-neck cancer is the fifth most frequently occurring cancer in India. Among the various treatment options, side effects such as trismus are mostly caused due to radiation therapy. Physical therapy is known to be beneficial in treating post-cancer treatment side effects. To the best of our knowledge, this is the first study report highlighting the efficacy of MaRhyThe© in treating radiation induced trismus. A multimodal approach (MaRhyThe©, Cupping therapy, Myofascial Release, and exercises) has shown to be beneficial in treating trismus, shoulder disability, pain, muscle spasm, and improving the quality of life in the head-and-neck cancer patient.

**Keywords:** Head-and-neck neoplasm, Physical therapy modalities, Cupping therapy, Quality of life

## INTRODUCTION

Surgery, radiation therapy, and/or chemotherapy are treatment of choices when it comes to treating head-and-neck cancers which may lead to increased secondary complications such as fibrosis of the temporomandibular joint (TMJ), and muscles of mastication causing trismus which is defined as limited mouth opening <35 mm.<sup>[1]</sup>

Physiotherapeutic interventions such as myofascial release (MFR) of the fascial and neck muscles, active range of motion exercises of neck and shoulder, manual stretching, and jaw mobility exercises, have demonstrated to be effective in managing patients' trismus and improving the quality of life.<sup>[2]</sup>

Matrix rhythm therapy works on the principle of cellular oscillations with a frequency as low as 8–12 Hz maintaining the physiological functioning of the body.<sup>[3]</sup> Cupping therapy is a soothing technique which increases subcutaneous blood circulation draining the fluid and toxins while improving the flexibility of the connective tissue.<sup>[4]</sup> This is the first case report highlighting the benefits of MaRhyThe© and non-abrasive cupping massage as a multimodal approach along with routine physiotherapy in treating radiation-induced trismus.

## CASE REPORT

This is a case of a 48-year-old male with no prior medical and surgical history, family history, and no history of tobacco and

alcohol consumption, presented with a non-proliferative and non-healing ulcer in his right buccal mucosa in oncology OPD. A frozen sample of the non-healing ulcer was examined for histopathological investigations in January 2021 that suggested absence of any malignancy. In March 2021, the patient had a reoccurrence of the ulcer. CT scan report revealed ill-defined heterogeneity with focal mucosal thickening involving the right buccal mucosa measuring 10.0 × 5.0 × 10.0 mm along with a single enlarged right level IB lymph node. The patient underwent surgery where wide local excision with the right lymph node dissection (level I–V) was performed, and a histopathological examination of the frozen section was examined. He was diagnosed with well-differentiated squamous cell carcinoma with an advancing front showing moderately differentiated squamous cell carcinoma of the buccal mucosa (Stage 3). A radiation therapy dose of 60 grays was administered in 30 fractions on daily basis. Patient developed radiation-induced trismus 2-week post-initiation of RT. However, no physiotherapy treatment was advised during RT due to skin changes and fragility of the skin. He was referred to the oncology physiotherapy OPD after 1-week post-RT completion. The initial physical evaluation revealed incisive mouth opening of 0.9 cm, [Figure 1a] pain and restricted shoulder and neck range of motion, scapular muscle weakness and Grade II tenderness over the right TMJ, right upper trapezius, rhomboids, pectorals, and sternocleidomastoid. On neurological examination,

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**Table 1:** Pre- and post-treatment examination of the patient and 10-day physiotherapy protocol.

Variables		Pre-treatment	Post-treatment	1-week follow-up		
Visual analog scale (on activity)		7/10	2/10	0/10		
Tenderness on palpation		Grade II	Grade 0	Grade 0		
Intraoral examination						
Mucositis (WHO grades)		Grade I	Grade 0	Grade 0		
<b>Sensations (Taste)</b>	<b>Sweet</b>	<b>Altered/Reduced</b>	<b>Normal</b>	<b>Normal</b>		
Incisional mouth opening (in cm)		0.9	2.8	4.2		
<b>Range of motion (in degrees)</b>	<b>Movements</b>	<b>Right</b>	<b>Left</b>	<b>Right</b>	<b>Left</b>	-
Shoulder	Flexion	0–100	0–180	0–176	0–180	-
	Scaption	0–76	0–180	0–170	0–180	-
	Extension	0–45	0–48	0–50	0–50	-
	Abduction	0–110	0–178	0–176	0–180	-
	internal rotation	0–80	0–90	0–90	0–90	-
Neck	external rotation	0–90	0–90	0–90	0–90	-
	Flexion	0–70		0–80		-
	Extension	0–56		0–68		-
	Lateral flexion	0–42	0–30	0–45	0–40	-
Manual muscle testing (MRC grading)	Rotation	0–70	0–64	0–76	0–72	-
	Shoulder flexors	3+/5	3+/5	4+/5	4+/5	-
	Shoulder extensors	4–/5	4/5	4/5	4+/5	-
	Shoulder abductors	3–/5	4–/5	4/5	4/5	-
	Shoulder adductors	4/5	4/5	4+/5	4+/5	-
	Shoulder internal rotators	4/5	4/5	4+/5	4+/5	-
	Shoulder external rotators	4/5	4/5	4+/5	4+/5	-
	Neck flexors	3/5	3/5	4/5	4/5	-
	Neck extensors	3/5	3/5	4/5	4/5	-
SPADI (0–130)	Neck lateral flexors	3/5	3/5	4/5	4/5	-
	Neck rotators	3/5	3/5	4/5	4/5	-
	SPADI (0–130)	71		10		-
	SPADI Pain (0–50)	32		03		-
SPADI Disability (0–80)	37		07		-	
FACT-H and N (Total score: 0–148)	60		124		-	
Physical well-being (0–28)	12		26		-	
Social well-being (0–28)	14		22		-	
Emotional well-being (0–24)	08		18		-	
Functional well-being (0–28)	10		26		-	
Head-and-neck cancer subscale (0–40)	16		32		-	
<b>10-DAY PHYSIOTHERAPY PROTOCOL</b>						
Day	Intervention	Position		Frequency		
DAY 1–2	a. SCM, upper trapezius, pectorals b. Breathing exercises: Apical exercise, diaphragmatic exercise, segmental exercise, thoracic expansion exercises. c. Active ROM exercises of neck and shoulder joint d. MFR: SCM, trapezius, pectorals, rhomboids, fascial muscles. e. TMJ mobilization. f. Mouth opening exercises (depression, elevation, retraction, protraction,	a. Stretching: in sitting position with arms resting on the arm rest and feet supported on the ground. b. Breathing exercises: Sitting c. Active ROM: sitting and standing unsupported d. MRF: sitting e. TMJ mobilization: supine lying f. Mouth opening exercises: sitting position with arms resting on the arm rest and feet supported on the ground.		a. Stretching: 5 repetition × 30 s hold b. 5 repetitions × 3 sets c. 8 repetition × 2 sets d. 15–20 min e. 5 repetition × 2 sets f. 10 repetitions × 2 sets x 5 s hold g. 8–10 repetition × 2 sets; with ½ kg weight cuffs h. 10–12 repetition × 2 sets; with ½–1 kg weight cuffs i. 12 repetitions × 3 sets; with 1 kg weight cuff		

(Contd...)

**Table 1:** (Continued).

10-DAY PHYSIOTHERAPY PROTOCOL			
Day	Intervention	Position	Frequency
DAY 3–5	and side to side) Tongue movements (protrusion, retrusion, and tongue curls). g. Same protocol as day 1–2 + Resisted exercise for the upper limb and upper back		
DAY 6–7	h. Same protocol as day 1–2 + resisted exercises for the upper limb and back		
DAY 8–10	Same protocol as day 1–2 + i. resisted exercises for the upper limb and back		
DAY 1, 3, 5, 7, and 9	Matrix rhythm therapy was given every alternate day (five sessions). <sup>[5]</sup>		
DAY 2, 4, 6, 8, and 10	Non-abrasive cupping massage was given every alternate day (five sessions) to trapezius (upper and middle), pectorals, and rhomboids. <sup>[7]</sup>		
DAY 1–10	Intraoral massage with honey		20 circles × 2 sets

\*FACT-H&N: Functional assessment of cancer therapy-head-and-neck, SCM: Stretching of sternocleidomastoid, MFR: Myofascial release, TMJ: Temporomandibular joint, SPADI: Shoulder pain and disability index

taste sensation was altered (sweet). Patient also presented mild skin changes over the irradiated area; however, the skin was not fragile. No other neurological deficits were observed. Physiotherapy rehabilitation was designed according to the needs of the patient and was explained to the patient on 1<sup>st</sup> day that included counseling. Due to the above-mentioned complaints, the patient underwent a 10-day multimodal tailor-made rehabilitation program [Table 1]. MaRhyThe© and non-abrasive cupping massage along with routine physical therapy was administered to the patient by certified practitioners. No adverse effects due to physical therapy were noted during and after treatment sessions [Table 1].

MaRhyThe© is invariably a novel therapy and was 1<sup>st</sup> time administered to the cancer patient. While administering MaRhyThe©, patient was in a supine lying position and progressed to prone lying. Sterilized talcum powder was applied that to minimize the friction produced by the MaRhyThe© probe on the skin of cancer patient. It was given over the TMJ, SCM, trapezius, pectorals, rhomboids, paraspinal muscles, and the suboccipital region<sup>[4]</sup> [Figure 2]. Non-abrasive cupping massage was given for 5–10 min in supine lying for pectoralis muscle on the affected side and sitting with arms and feet rested for posterior neck muscles extending from the sub-occipital area covering the upper back including trapezius muscle<sup>[5]</sup> [Figure 3].

## DISCUSSION

The present case reported the application of MaRhyThe© and non-abrasive cupping as novel multimodal and innovative therapies along with therapeutic exercises that



**Figure 1:** Incisional mouth opening pre treatment.

are beneficial in improving incisinal mouth opening, pain, tenderness, and range of motion of shoulder and neck as seen in shoulder pain and disability index scores, the strength of upper extremity, and quality of life as assessed by Functional Assessment of Cancer Therapy-Head and Neck questionnaire. Post-1 week of therapy, follow-up was done, and the patient showed further improvements in incisinal mouth opening [Table 1 and Figures 4a and b].

Head-and-neck cancer and its related medical treatments are known to cause a range of adverse effects on the musculoskeletal system which impairs the flexibility of the muscle. This is said to decrease joint motion, physical, and functional ability of the individual to carry out their daily activities. Radiation therapy when subjected to the treatment area releases ionizing radiation causing free radicals to



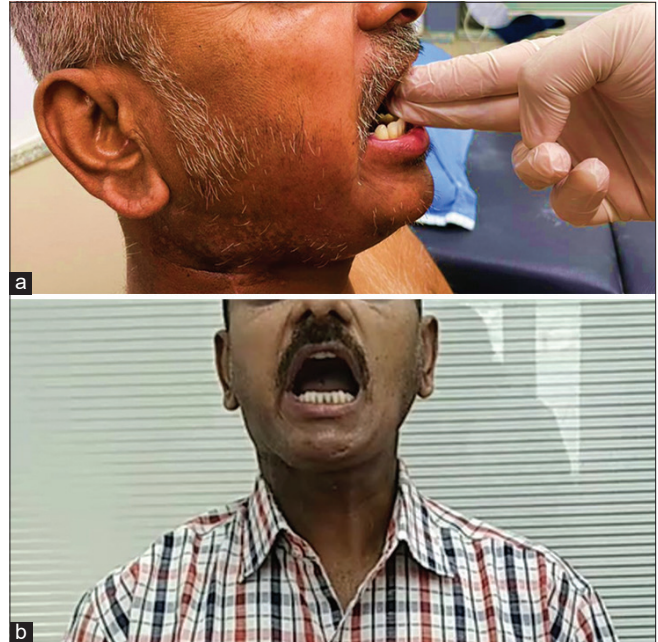
**Figure 2:** Matrix rhythm therapy over temporomandibular joint.



**Figure 3:** Non-abrasive cupping over trapezius.

be released, causing an increase in oxidative stress. It also attributes significantly to collagen synthesis and inhibits collagen degradation resulting in connective tissue growth factor causing fibrosis.<sup>[1]</sup> These fibrotic changes cause further restricted movement. MaRhyThe© is known to improve the natural cellular oscillations causing an increase in local internal temperature at the treatment site causing an increase in the blood flow. Improved circulation helps in decreasing this oxidative stress and flushing of the metabolites. MaRhyThe© also influences muscle viscoelasticity and plasticity, improving the flexibility and endurance of the muscle. The improvement in muscle properties helps in reducing pain and improving the range of motion of the joint.<sup>[5]</sup> A similar study found MaRhyThe© to be efficient in improving 3–4 mm of incisional mouth opening.<sup>[6]</sup>

Cupping therapy works on the mechanism of negative suctioning that causes an increase in blood flow which



**Figure 4:** (a) Mouth opening post treatment, (b) Mouth opening on follow-up.

relieves muscular tension. Thus, the use of non-abrasive cupping massage promotes muscle flexibility and joint range of motion.<sup>[4]</sup> 15-min cupping sessions have demonstrated beneficial in improving the shoulder range of motion when applied to the chest, upper-arm and back, and shoulder and neck regions.<sup>[7]</sup> Muscle spasms due to tissue injury caused by radiation therapy can be relieved through cupping therapy.

MFR attributes to changing the viscosity of the muscle. As the myofascial system stabilizes the musculoskeletal system, when altered due to various insults such as surgeries or radiation, it may result in pain and postural dysfunction. MFR has proved its efficacy in reducing neck pain and is widely used in a clinical setup with similar complications where five consecutive sessions of MFR have indicated that the discomfort and pressure pain levels in the trapezius and suboccipital regions have decreased.<sup>[8]</sup>

## CONCLUSION

MaRhyThe© and cupping therapy were used as a multimodal approach along with routine physiotherapy in treating radiation-induced trismus and it has shown to be beneficial in treating trismus, shoulder disability, pain, muscle spasm, and improving the quality of life in head-and-neck cancer patient. Similar approaches may be recommended for further clinical trials in similar settings to further prove its effectiveness in this patient population.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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