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Combatting Trismus: A Case Report on Orastretch and CRAC in Head and Neck Cancer

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ABSTRACT:

Trismus, a distressing complication characterized by restricted mouth opening, frequently occurs in head and neck cancer survivors following treatment. This case report examines the combined efficacy of OraStretch, a therapeutic device targeting jaw mobility, and Continuous Passive Motion (CPM) therapy, specifically the “**Contract Relax Antagonist Contract**” (CRAC) protocol, in preventing trismus. The study presents findings from patients who underwent head and neck cancer treatment and participated in a rehabilitation program incorporating OraStretch and CRAC therapy. Results reveal a notable enhancement in mouth opening range and functional outcomes post-intervention. Additionally, patient-reported improvements in quality-of-life metrics highlight the significance of this combined approach. These findings suggest that integrating OraStretch with CRAC therapy holds promise as an effective strategy for mitigating trismus and improving functional outcomes in head and neck cancer survivors.

Keywords: Trismus, Squamous Cell Carcinoma, Orastretch, CRAC Technique, Chemotherapy, Physical Therapy, Oral Rehabilitation.

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1. Introduction

Cancers of the head and neck region, in particular buccal carcinoma, first appear as tumours in the inner cheek tissues¹. The prevalence of trismus in head and neck cancer patients can vary depending on factors such as the type and stage of cancer, treatment modalities used, and individual patient characteristics¹. Studies have reported prevalence rates ranging from 5% to 38% among head and neck cancer survivors¹. The pathophysiology of trismus in head and neck cancer involves a cascade of events including tumor invasion into surrounding tissues, surgical interventions leading to scar tissue formation and muscle damage, and radiation therapy-induced fibrosis⁵. Chemotherapy can contribute to muscle weakness and neuromuscular dysfunction, while inflammation and pain exacerbate muscle tension⁶. Overall, these factors collectively contribute to restricted jaw mobility observed in trismus. It is usually treated with a combination of surgery, radiation therapy, and chemotherapy. It is frequently linked to risk factors like alcohol and tobacco use⁴. Improving prognosis and patient outcomes requires early discovery and swift action¹. Restricted mouth opening, or trismus, is a typical side effect for patients receiving therapy for head and neck tumours, especially squamous cell carcinoma¹. This restriction of jaw movement has a major effect on oral function, making it difficult for patients to eat, speak, and maintain good oral hygiene, all of which lower their quality of life overall². Due to tissue fibrosis and muscular rigidity, conventional treatments for head and neck tumours, such as chemotherapy and radiation, can cause or exacerbate trismus³. Therefore, treating trismus effectively is crucial to reducing symptoms and enhancing oral function in those who are impacted. Novel therapeutic strategies have surfaced in recent years to treat trismus in cancer patients⁵. Combining the OraStretch gadget with the CRAC method is one such strategy⁴. While CRAC consists of a sequence of contract-relax movements intended to promote muscle relaxation and stretching, OraStretch is a specialised oral stretching tool developed to permit controlled mechanical stretching of the masticatory muscles.⁴

In this case study, a patient with squamous cell carcinoma of the left buccal mucosa is evaluated for trismus, and the effectiveness of using OraStretch in conjunction with CRAC is assessed.

This article intends to add to the increasing body of information on successful trismus management options in cancer patients by providing a thorough review of treatment outcomes, including improvements in mouth opening range and functional gains. In physical therapy and rehabilitation settings, "Contract Relax Antagonist Contract" (CRAC) is a therapeutic approach that is frequently used to increase joint mobility and flexibility, especially in cases of muscular tightness or contractures⁶.

An exercise regimen designed to promote muscle relaxation and flexibility is known as the CRAC technique⁴. An aid to enhance jaw mobility and prevent disorders such as trismus, which is characterised by restricted mouth opening, is the OraStretch gadget¹¹.

It functions by giving the jaw muscles regulated stretching workouts that increase range of motion and flexibility. Usually made out of biting blocks or adjustable mouthpieces connected by a spring-loaded mechanism, the device lets users raise the stretch gradually over time¹¹.

OraStretch is frequently included in therapy plans for patients recuperating from temporomandibular joint issues, head and neck cancer, or other ailments impacting the function of the jaw¹¹.

Case Presentation:

Patient information

A 61-year-old male presented with pain, headache, weight loss, and trismus. Squamous cell carcinoma of the left buccal mucosa was diagnosed based on computerized tomography (CT) scan and histological examination of cervical lymph nodes. The therapy consisted of three courses of chemotherapy with a platinum-based combination, typically cisplatin, administered every three weeks for a total of six cycles. During this period, the patient's general condition improved, and symptoms began to disappear, accompanied by an improvement in weight. Mouth opening at the time of diagnosis was restricted due to the tumor. However, during chemotherapy, the interincisal distance increased from 13 mm to 28 mm, and the protrusive movement of the mandible increased from 2 mm to 8 mm. Prior to radiotherapy, a physical examination revealed normal joint play of both temporomandibular joints (TMJs) and a normal length of both masseter muscles. It was concluded that the medial pterygoid muscle restricted mouth opening. Physical therapy based on the CRAC technique was initiated.

Physical Examination:

- **Restricted Mouth Opening:** Interincisal distance measured at 20 mm (normal range: 35-55 mm).
- **Pain and Tenderness:** Palpation reveals tenderness and tightness in the masticatory muscles, particularly the masseter and medial pterygoid muscles.
- **Deviation during Opening:** The patient exhibits a slight deviation of the mandible to the affected side during attempted mouth opening.
- **Muscle Strength:** Normal muscle strength was observed in the unaffected side, but slight weakness was noted in the affected side due to disuse and muscle atrophy.

Assessment: Based on the history and physical examination findings, the patient is diagnosed with trismus secondary to head and neck cancer treatment. The restricted mouth opening and muscle tightness are likely attributed to radiation-induced fibrosis and muscle contracture.

Application of OraStretch with CRAC Technique

The patient utilized the OraStretch device by inserting it into the mouth. Concurrently, the CRAC technique was implemented. Initially, the patient commenced mouth closure at the maximal mouth opening range without actual movement (Contraction phase). Subsequently, after approximately 10 to 15 seconds, the patient relaxed (Relaxation phase), followed by active mouth opening (Antagonist Contraction phase), aimed at enhancing the range of motion. This facilitated the stretching of the mouth-closing muscles, including the medial pterygoid muscle.

Following the immediate application of this combined technique, the patient experienced a notable increase in mouth opening from 28 mm to 35 mm. With consistent exercise over several days, the mouth opening further improved to a maximum of 41 mm. The OraStretch regimen comprised two to three applications daily, each lasting approximately 10 to 15 minutes, maintained over a period of nine months. Subsequently, eight months post-irradiation, the patient achieved a mouth opening of 46 mm. This approach effectively facilitated the gradual and sustained improvement in mouth opening, enhancing the patient's oral functionality and quality of life.

Intervention

Week 1-2:	<ul style="list-style-type: none"> - Begin with gentle passive stretching exercises using the OraStretch device for 5-10 minutes, twice daily. - Introduce CRAC technique: Instruct the patient to contract the jaw muscles gently for 5 seconds, followed by relaxation for 10 seconds, and then actively open the mouth as wide as comfortable (antagonist contraction). Repeat this sequence 10 times, twice daily.
Week 3-4:	<ul style="list-style-type: none"> - Increase the duration of passive stretching exercises with the OraStretch device to 10-15 minutes, twice daily. - Continue CRAC technique with increased repetitions: Perform 15 repetitions of the contraction-relaxation-antagonist contraction sequence, twice daily.
Week 5-6:	<ul style="list-style-type: none"> - Advance passive stretching exercises with the OraStretch device to 15-20 minutes, twice daily. - Progress CRAC technique: Increase repetitions to 20-25 repetitions, twice daily.
Week 7-8:	<ul style="list-style-type: none"> - Maintain passive stretching exercises with the OraStretch device at 15-20 minutes, twice daily. - Continue CRAC technique: Maintain 20-25 repetitions, twice daily.
Week 9 onwards:	<ul style="list-style-type: none"> - Gradually reduce the frequency of passive stretching exercises with the OraStretch device to once daily. - CRAC technique: Reduce repetitions to 15-20 repetitions, once daily. - Encourage the patient to continue performing jaw mobility exercises independently as needed to maintain gains achieved during therapy.
Table No 1: Weekly Interventions program	

Throughout the protocol, closely monitor the patient's progress, tolerance to exercises, and any signs of discomfort. Adjust the intensity and duration of exercises as necessary based on the patient's response and clinical assessment.

Additionally, provide education and support to the patient regarding proper technique, home exercises, and the importance of compliance for optimal outcomes.

Outcome:

Following physiotherapy intervention, the patient experienced reduced discomfort and improved completion of daily activities. Moreover, there was a notable increase in the **range of motion** of the temporomandibular joint (TMJ), indicating enhanced mouth-opening capability. The patient demonstrated high motivation and enthusiasm for engaging in physical treatment. Additionally, they received guidance on modifying exercises during their home program. Notably, on postoperative day 12, the mouth opening measured **28 mm**, which significantly improved to **41 mm** after six weeks of physiotherapy intervention following surgery. These advancements in mouth opening reflect steady progress throughout the treatment period, underscoring the effectiveness of the physiotherapy approach in facilitating recovery and improving functional outcomes.

Span	1. Mandibular Movement Range	Disparity
Week 1	28 mm	-

Week 2	30 mm	(+2 mm)
Week 3	33 mm	(+3 mm)
Week 4	36 mm	(+3 mm)
Week 5	38 mm	(+2 mm)
Week 6	41 mm	(+3 mm)

Table no 2: Breakdown of incremental improvement in mouth opening range over each week of the intervention.



FIG. 1.1: Patient receiving the treatment.



FIG. 1.2: OraStretch Device.

2. Discussion

The successful management of trismus in the presented case underscores the importance of a comprehensive and multidisciplinary approach in the treatment of head and neck cancer patients. Trismus, characterized by restricted mouth opening, is a debilitating complication often observed in this patient population, with diverse etiologies including tumor invasion, surgical interventions, and fibrotic changes in masticatory muscles^{1,2}.

In this case, the patient's trismus improved significantly during chemotherapy, suggesting the potential role of systemic treatments in alleviating tumor-related symptoms and promoting

functional recovery^{3,4}. Notably, the platinum-based chemotherapy regimen, particularly cisplatin, has been associated with tumor regression and reduction in fibrosis, which may contribute to the observed improvements in mouth opening^{5,6}.

Moreover, the integration of physical therapy techniques such as the Continuous Remote Active Motion (CRAC) protocol, supplemented with the OraStretch device, played a pivotal role in enhancing the patient's range of motion and functional outcomes^{7,8}. By incorporating controlled stretching exercises and contract-relax movements, CRAC therapy targets the underlying muscular components contributing to trismus, complementing the effects of systemic treatments⁵.

The normalization of temporomandibular joint (TMJ) function observed during physical examination prior to radiotherapy suggests that the primary limitation to mouth opening was predominantly muscular, particularly involving the medial pterygoid muscle^{4,9}. This underscores the importance of targeted physical therapy interventions aimed at addressing muscular restrictions and promoting optimal jaw mobility⁷.

Overall, the successful management of trismus in this case highlights the synergistic effects of systemic treatments, physical therapy modalities, and supportive interventions such as the OraStretch device¹¹. Moving forward, further research is warranted to elucidate the optimal timing and sequencing of these interventions in trismus management and to evaluate their long-term efficacy and safety in improving patient outcomes⁴.

Limitations and Considerations:

Despite the positive results, several limitations should be acknowledged. Firstly, this case report represents a single patient outcome and may not be generalizable to all individuals with trismus. Additionally, the lack of a control group limits the ability to assess the comparative efficacy of OraStretch with CRAC against other therapeutic modalities. Future studies incorporating larger sample sizes and randomized controlled trials are warranted to validate these findings and elucidate optimal treatment protocols.

3. Conclusion

In conclusion, this case highlights the importance of a comprehensive approach in managing trismus in head and neck cancer patients. Combining systemic chemotherapy with targeted physical therapy like CRAC and the OraStretch device led to significant improvements in mouth opening and functional status. Early intervention and tailored rehabilitation strategies are crucial in mitigating the adverse effects of cancer treatment. Further research is needed to optimize the timing and sequencing of interventions for better outcomes in trismus management.

Human Ethics:

Participant consent for this study was obtained.

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