



### Case Report

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## Modified Trismus Appliance for Post-Radiation Trismus in Edentulous Patients- A Case Report

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### Abstract

Treatment for restricted mouth opening, often known as trismus or lockjaw, is determined by the root cause of the condition's multiple problems. Patients who get radiation therapy for head and neck cancer may experience adverse effects like trismus. If left untreated, trismus might worsen to the point where the patient is malnourished, unable to function and the dentist faces difficulties treating patients with restricted oral access. A 68-year-old man who had just received radiation treatment for oral cancer presented to the department of Prosthodontics complaining of difficulty in opening his mouth and speaking. On examination, He was diagnosed as having grade-3 trismus with a maximum mouth opening of just 2 mm. A conventional threaded screw trismus appliance may injure the edentulous ridge on activating the appliance, as patient is partially edentulous. An innovative trismus denture base made on the edentulous ridge with a soft reline to prevent tissue damage as the trismus screw is opens the mouth. A comfortable mouth opening of 28 mm was attained without causing any stress to the edentulous ridge during a 6-month follow-up. As a result, patients with trismus who also have an edentulous ridge can employ this modified trismus device. None of the trismus management techniques can be used to an edentulous patient without endangering the remaining ridge, despite the fact that we have a number of options at our disposal. All those problems can be resolved and a healthy mouth function established with this new procedure.

**Keywords:** Radiotherapy, Trismus, Denture Base.

### INTRODUCTION

Trismus is characterized by a reduced ability to open the mouth, directly affecting many aspects of daily life, such as chewing, swallowing, speaking and maintaining oral hygiene. Thus, it may result in starvation, weight loss, and difficulty receiving dental care, which may cause tooth decay<sup>[1]</sup>.

Trismus has been linked to more severe health-related quality of life, according to many research. Among patients with head and neck cancer (HNC), radiation treatment to the head and neck region is one of the most common causes of trismus. Patients with HNC can develop trismus due to fibrosis and injury to the masticatory muscles, which may result from radiation therapy, surgery, the tumor's own effects, or a combination of these factors. When an adult's maximum inter-incisal opening (MIO) is less than 35 mm, they are said to have trismus, a restriction in mouth opening.

There are several methods of stretching and jaw-mobilizing tools available, such as the Dynasplint Trismus System and the TheraBite System. While some of these therapies work well for trismus in general, they cannot be utilized in a patient who is edentulous and requires tooth support for the appliance or device to work<sup>[2]</sup>. The purpose of this article is to convey a new modality of managing a post radiation trismus patient with an edentulous ridge using a modified trismus appliance.

### CASE REPORT

A 68-year-old male patient was referred from the Oncology Department of jipmer to the Department of Prosthodontics at Mahatma Gandhi post graduate institute of dental sciences, following cancer therapy.

The patient was diagnosed with squamous cell carcinoma affecting the right buccal mucosa (tumour [T], nodes [N], and metastasis [M] stage: T2N0M0). He underwent for wide local excision of the carcinoma

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followed by radiotherapy. After a five months of post-radiotherapy, the patient had difficulty in mouth opening and speaking.

Later he was diagnosed with grade-3 trismus with 2mm of mouth opening and referred for exercise therapy for managing trismus and to restore his oral function (Figure 1).



**Figure 1:** Preoperative photograph of 68 year old patient with post radiotherapy trismus. Maximum mouth opening of 2mm

As the patient was having severe restricted mouth opening of 2mm, none of the conventional devices were helpful. In addition to that the patient was edentulous, patient had pain with mucosal injury on using a threaded screw trismus appliance.

Thus, we made the treatment plan with a modification in using the trismus appliance by providing a soft trismus denture base on the edentulous ridge with a tooth like projection to engage with the trismus appliance threads.



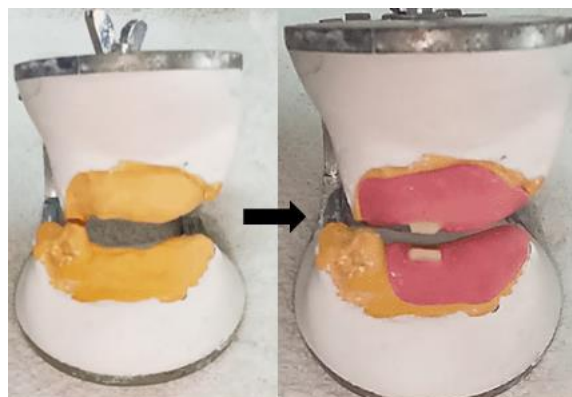
**Figure 2:** A putty wash impression is made over the anterior most region of maxillary and mandibular residual ridge

A putty wash impression was made just covering the anterior most part of the edentulous ridge, as impression tray cannot be used in a patient with trismus (Figure 2). The cast poured and articulated using a bite record obtained from the patient. Now a trismus denture base was made on the anterior maxillary and mandibular residual alveolar ridge using an autopolymerizing acrylic resin with a tooth like projection extending from denture base using tooth moulding acrylic resin (Figure 3).

The trismus denture base was relined with the edentulous ridge to reduce the tissue compression on activation of trismus appliance.

The trismus appliance was made using a customised flasking technique with a conventional compression moulding process. The appliance's T-shaped handle with wax design were sculpted out of modeling wax. To create the wax pattern for the appliance, modeling wax was formed into

the shape of a cone, serrations were imprinted with a thread, deepened using a carver. The threads were designed with an increasing width of 2mm from tip of the appliance to the handle (Figure 4).

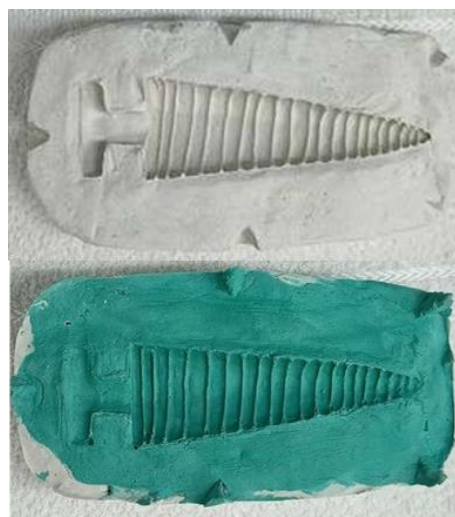


**Figure 3:** Maxillary and mandibular cast articulated on a hinge articulator. Denture base and tooth like projection made using auto polymerization denture base resin



**Figure 4:** Trismus appliance wax pattern was made with an increasing width of 1mm per thread from tip to base of the trismus appliance

A customized cardboard box was made surrounding the trismus wax pattern for the first pour of plaster of paris (POP) covering half the portion of wax pattern. Indexing was made at the borders of the investment and wax sheet was used for boxing surrounding the first pour. After applying a petroleum jelly, second pour of POP was done and allowed to set for dewaxing. Later the two portion of the investment was separated and mold space was obtained by dewaxing (Figure 5).



**Figure 5:** Customized flasking and dewaxing done for the trismus appliance wax pattern and processed with heat cure denture base

Every area of the plaster is covered with a single layer of separating media. A heat cure acrylic resin in dough form was Packed into the mold cavity and tightened using a metal clamp. After a one hour of On completion of curing the appliance, it was retrieved carefully, finished and polished [3] (Figure 6).



**Figure 6:** Finished and polished trismus appliance made

The trismus appliance was delivered to the patient and was advised to place the smaller end of the tapered screw appliance between upper and lower tooth like projection on the trismus denture base, and rotate the appliance clockwise using the handle. This rotation pushes the appliance more lingually resulting in stretching of muscles and gradual increase in mouth opening. The patient was instructed to exercise 5 - 8 times daily. Each session should be done for 5 minutes initially and increased gradually by 2 minutes per sitting upto 15 minutes (Figure 7).



**Figure 7:** Trismus denture base inserted and relined with soft relining material. The trismus appliance is activated by screwing it between the tooth projection on the trismus denture base

A follow up of 1 week showed an improvement of mouth opening to 4mm without any discomfort to the patient. Patient was advised to continue using the appliance for the next few months. Later patient reported after 3 months of using the appliance with a mouth opening of 28mm.

## DISCUSSION

Trismus is common and can affect many head and neck cancer (HNC) survivor's post-radiotherapy, affecting their oral function and Quality of life adversely. It profoundly affects various aspects of activities of daily living, such as nutrition consumption, grinding ability, chewing problems, practising adequate oral hygiene, attending dental appointments, and speech [3].

Surgery is frequently used to correct trismus in order to eliminate postoperative complications. However, due to a history of radiation therapy in the region, the patient's reluctance to have another operation, and financial limitations, second surgeries to relieve trismus are typically avoided in cancer patients [4]. Forcible mandibular opening used to treat trismus might result in severe and dangerous side effects. It requires general anaesthesia, as the procedure is extremely painful and furthermore, employing general anaesthesia itself is a hazardous task to perform as the immobile mandible makes blind intubation necessary. Various techniques have been employed to mitigate trismus and augment interarch space. After radiation therapy, the best course of treatment for trismus is prevention. One can always expect trismus when the main masticatory muscles are in the radiation field [5].

To preserve maximal mouth opening and maximum jaw mobility, the patient should be encouraged to perform jaw exercises every day. It is

possible to push more tongue blades between the anterior teeth, which serves as a wedge and a visual indicator of how far the teeth are opening [6]. In case of severe trismus, there are devices used to increase the oral opening like 'dynamic bite opener. Once the desired opening is reached, it is maintained with jaw exercises and occasional use of the 'bite opener' [7].

There are several techniques for stretching and jaw-mobilizing devices are available, including the TheraBite System and the Dynasplint Trismus System. Many studies showed a positive effect of exercise therapy with a jaw-mobilizing device (TheraBite) in patients with radiotherapy-induced trismus. The trismus appliance technique makes use of an acrylic resin screw that is threaded and tapered. It gradually wedge the teeth apart, as the patient inserts the screw between his rear teeth. The patient regulates the amount and timing of pressure needed to progressively widen the gap between the jaws, while the threads guide the teeth along the taper [8].

Though all the above techniques were effective in management of trismus, they cannot be used in a situation of edentulous condition, as they won't get support on a resilient mucosa and the exerted pressure on the edentulous ridge may traumatise the tissues. When compared to other procedures, the modified trismus appliance with a trismus denture base can function without damaging the residual alveolar ridge. It is a simple and economical treatment, and the patient found it easy to use the equipment. Patient motivation plays a major key factor in the success of these kinds of appliance therapy.

## CONCLUSION

Trismus is typically a subsequent symptom of some temporomandibular joint (TMJ) dysfunction and is generally innocuous. Pathologies that impede mouth opening might induce mental stigma for patients. As a result, prompt diagnosis and therapy will greatly increase mouth opening, aiding in the patient's emotional, physical and psychological recovery. This case report demonstrated a promising improvement in mouth opening that was achieved without putting any stress to the edentulous ridge over a 3-month follow-up. As a result, trismus patients with edentulous ridges can utilize this modified trismus device.

## Clinical significance

As the patient is partially edentulous, activating a conventional threaded screw trismus device may cause injury to the edentulous ridge. When we use the trismus appliance by inserting a soft trismus denture base on the edentulous ridge with a tooth-like protrusion to engage the appliance's threads, tissue injury can be prevented. Thus, it is a straightforward, cost-effective, and non-traumatic approach of addressing trismus patients with edentulous ridges.

## Conflicts of Interest

The author reports no conflicts of interest.

## Funding

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