The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

THREADED TAPERED SCREW APPLIANCE, A COST EFFECTIVE GEAR FOR THE MANAGEMENT OF TRISMUS

*Geethu R.M, **Sheela Virginia Rodrigues, ***Vijayanand K.R.

*Assistant Professor, Dept. of Prosthodontics, Govt. Dental College Thiruvananthapuram; **Professor and Head, ***Lecturer, Dept. of Prosthodontics, Govt. Dental College Alappuzha | Corresponding Author: Dr Geethu R.M, Email: drgeethumini@gmail.com

https://doi.org/10.55231/jpid.2023.v06.i03.07

Abstract

Trismus is a condition commonly encountered by the dentists, causing limited mouth opening, interferes with oral hygiene, restricts access for dental procedures, and may adversely affect speech and facial appearance. The overall success of treatment depends on prompt recognition of the cause and initiation of appropriate management. Ideally trismus appliances are used in conjunction with physical therapy effectively for the management of Trismus due to muscle fibrosis or scar tissue that has not yet matured. Currently several trismus appliances either externally activated or internally activated are available commercially. This case report presents a simple and cost-effective approach for the management of Trismus using a Threaded Tapered Screw appliance.

Keywords: Trismus, Tapered Screw Appliance, Mouth Opening

Introduction

Trismus refers to a motor disturbance of the trigeminal nerve especially sustained prolonged tonic contraction of the masticatory muscles causing limited mouth opening.[1] The word "Trismus" is derived from the Greek word "Trismos or Trigmos" which means grinding or rasping or gnashing[2]. However in layman terms Trismus denotes limitation of mouth opening due to reduced mandibular mobility[3]. The prevalence of trismus ranges from 5% to 38%.[4]

At maximum mouth opening normal interincisal distance varies from 40–45 mm. The maximum mouth opening in dentulous patients is measured between the incisal edges of maxillary and mandibular central incisors and in edentulous patients between the maxillary and mandibular alveolar ridges. Since the width of the index finger at the nail bed is between 17 and 19 mm, two fingers' breadth (40 mm) up to three fingers'

breadth (54–57mm) is considered as normal width of mouth opening.[5]

Diagnosis of trismus is made when maximum interincisal distance (MID) is less than 40–45 mm.[6] Based on the range of mouth opening Trismus can be classified as Light trismus(Mouth opening of > 30 mm), Moderate trismus (Mouth opening of 15-30mm) and Severe trismus(Mouth opening of < 15 mm).[7]

Various pathosis that leads to trismus are congenital disorders, infections, trauma, iatrogenic, neoplasia, radiotherapy, chemotherapy, temporomandibular disorders, drug induced, psychogenic, oral submucous fibrosis.[8]

Depending on the cause various treatment modalities were postulated and tried. Trismus resulted because of muscle fibrosis / formation of immature scar tissue, can be managed judiciously with physical therapy and use of trismus appliance. However, trismus resulted due to intracapsular anomalies involving temporomandibular joint, bony interference from styloid or coronoid processes, formation of dense fibrosis may require surgical interventions. The design of a device for jaw motion rehabilitation should provide wide range of mouth opening, adjustable maximum force applied to the jaw, sustained and constant stretch at the desired range of motion; ease of use by the patient him/herself for the entire exercise session, periodic repetition of the exercise at invariant conditions and in non-cooperating patients with reduced muscle force.[9]

Trismus patients may experience a marked restriction of jaw movements which can hamper overall physical and mental health of the patient. This article describes management of post traumatic trismus using threaded tapered Screw appliance.

Case Report

A 20yr old male patient referred to the department of prosthodontics Government Dental College,

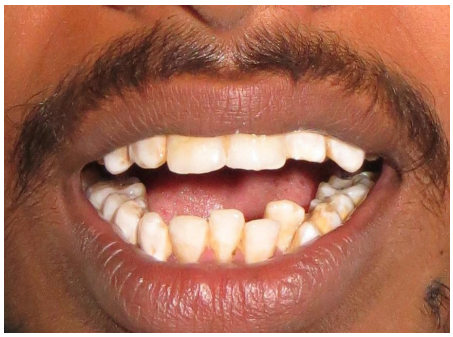

Figure 1 – Pretreatment

Figure 2 – Wax pattern

Figure 3- Mould space

Figure 4 – Threaded tapered Screw Appliance

Figure 5 – Post Treatment

Alapuzha for the management of restricted mouth opening. Patient revealed a history of fracture dislocation of left condylar process of the mandible due to Road Traffic Accident (RTA) occurred 1month back which was managed conservatively.

Extraoral examination revealed tenderness and clicking sound present on the left Temperomandibular Joint (TMJ), mouth opening of about 25mm, deviation of mandible towards left side on mouth opening.(Fig 1) Intraoral examination revealed the presence of full complement of teeth. Radiographic examination comprised of orthopantamograph and computed tomography which revealed dislocation fracture of left condylar head and obliteration of left TMJ space.

Based on the clinical and radiographic findings it was diagnosed to have early fibrous ankylosis of left TMJ. Following comprehensive diagnosis, it was planned to manage by immediate non invasive, non surgical approach mainly physiotherapy with threaded tapered screw appliance.

The appliance was fabricated using conventional compression moulding technique. A wax pattern of the appliance and T shaped handle was carved in modeling wax. Modelling wax was shaped in the form of a cone, serrations were marked with the help of a thread and it was deepened using a carver to obtain the wax pattern of the appliance.(Fig 2) An appropriate dental flask with sufficient clearance was selected. Plaster of paris was mixed in the right proportion and poured into the lid and middle of the flask. A layer of plaster of paris was applied around the carved wax pattern to avoid air bubbles. Place and press the wax pattern and handle into the centre of the flask. Care should be taken not to create any undercuts. Remove the excess plaster and fill the deficient areas before the initial set of plaster. Smoothen the surface of plaster with a piece of cotton followed by emery paper after its initial set. Apply separating medium all over the plaster surface except over the wax. A proper mix of plaster of paris was poured into the base of the flask. The base of flask was kept into position and checked for complete seating. All the excess plaster of paris is removed from the flask and place the flask assembly in a dental clamp, tighten it and allow the material to set for 30 min. Dewaxing was done to get the mould space (Fig3). A single coat of separating medium is applied on all the plaster surface. Autopolymerising acrylic resin mixed in dough state was packed into the mould space. A wet cellophane sheet was placed over the resin dough and keep the second half of the flask over the cellophane sheet. Compress the flask in a hydraulic bench press at 1500 psi pressure. Remove the excess flash using a blunt knife, After the final closure, flask is left under pressure of 3500 psi for 3hrs to ensure complete polymerization. On completion of curing the appliance and T shaped handle was retrieved carefully, finished and polished. Handle is attached to the base of the appliance using autopolymerising acrylic resin and final polishing was done.(Fig4)

The appliance was delivered to the patient. He was advised to place the smaller end of the tapered screw appliance between upper and lower premolars and rotate the appliance clockwise using the handle. This rotation made the appliance push more lingually resulting in stretching effect of muscles and gradual increase in mouth opening. The patient was instructed to perform this exercise 6 to 7 times daily. Each session should be done for 5minutes initially and increased gradually by 2 minutes per sitting upto 20minutes. Stretch should be hold for 10 seconds, rest for 10seconds and again repeat. Patient was also motivated to do massage, alternate warm and cold fomentation, jaw opening, closing and side to side jaw movement exercises.

Patient was advised to continue the exercise for a period of 6 months at regular 2 weeks of review. At each recall visits prognosis and difficulties during the exercises were evaluated and instructions were

given to motivate the patient.

Mouth opening was improved to 34 mm after 2weeks and 45mm after 1 month (Fig 5). It was also noted that deviation of mandible on mouth opening was also reduced during recall visits.

Discussion

A fracture dislocation of the condylar head can result in a mechanical obstruction and limited jaw function.[10] A detailed history, clinical, functional and radiographic examination facilitating correct diagnosis followed by immediate physiotherapy yields a drastic improvement in mouth opening. Depending on the cause various measures have been utilized to counteract trismus. Treatment objectives are to remove edema, soften and stretch the fibrous tissue, improve muscular strength, restore circulatory efficiency, thus increasing mouth opening, and retain muscular dexterity.

Treatment plan should ideally be directed towards managing the cause of trismus. Literature review demonstrated the efficacy of different trismus appliances to improve the mouth opening.[11] Studies have proven that sledge-hammer, tied to the mandible for 2 min twice a day, and an orthodontic "clothes pin appliance" inserted between the molars resulted an increase in mouth opening of 18mm and 6 mm respectively.[12] Trismus appliances impart force either in continuous or intermittent manner, light or heavy, and elastic or inelastic[13]. They includes Dynamic bite opener, Threaded tapered screw, Screw type mouth gag, Tongue blades, Continuous dynamic jaw extension apparatus. Based on their design trismus appliances can be either externally activated or internally activated appliances. Externally activated appliances utilized stretching the elevator muscles by depressing the mandible to increase mouth opening, Internally activated appliances rely on patients depressor muscles to stretch the elevator muscles. It was proved that elevator muscles generate 10 times greater force than those generated by the depressor muscles. The amount of force delivered depends on the strength and motivation of the patient.[10]

The present case was managed with a threaded, tapered screw made of acrylic resin. The threads guides the teeth along the increasing taper and the patient controls the timing and degree of pressure required to gradually increase the jaw separation. This method is simple and cost effective as compared to other methods and it was easy for the patient to use. The threaded tapered acrylic screw functions on the patient's depressor group of muscles to separate the jaws. Patient motivation is the key factor in the success of this kind of appliance. The patient was recalled every 2weeks to evaluate the improvement in mouth opening. At each recall visits patient was instructed that pain during the stretch was normal and was motivated to continue the exercise for further improvement in mouth opening. The force imparted by this appliance is in elastic, and its direction is limited by the mechanical pressure available between the posterior teeth. Unfortunately use of this appliance is restricted to dentate or partially edentulous patients and anterior teeth in particular can become loosened if excessive force is applied during its use.[14]

Conclusion

Trismus is usually a secondary sign of any TMJ pathology and is mostly harmless. Any pathology that restricts mouth opening carries a mental stigma to the patient. Hence prompt diagnosis and initiation of appropriate management yields a drastic improvement in mouth opening helping to restore the physical, psychological, and emotional health of the patient.

Refrences

1. Tveteras K, Kristensen S. The etiology and pathogenesis of trismus. Clin Otolaryngol 1986;11:383–7.
2. Lucky.N, Sternberg .C, Aetiology and diagnosis of clinically evident jaw trismus, Aust Dent J 1990;35(6), 523-529.

3. Singh A, Gambhir A, Nagpal A, Singh S. Intricate Role of Trismus Appliance in Dental Perspectives: A Comprehensive Cum Technical Revelation. Int J Oral Health Med Res 2016;2(6):98-100.
4. Molen L, Ackerstaff AH, Pretreatment organ function in patients with advanced head and neck cancer: clinical outcome measures and patients' views. BMC. 2009: 9; 10-4.
5. Shah K. Trismus: bizarre finding. (Letter to Editor) Br J Oral Maxillofac Surg 2000; 38: 397–398.
6. Dhanrajani PJ, Jonaidel O. Trismus: etiology, differential diagnosis and treatment. Dent Update 2002;29:88–94.
7. Vaishali M R, Roopashri G, Maria Priscilla David, Indira A P, Trismus, IJDA, 2(3), July-September, 2010.
8. Lund TW, James I, Cohen. Trismus appliance and indications for their use. Quint Int 1993;24(4):275-279.
9. Luca GN, Gianmaria C, Giuseppe F, Daniele M. Springbite: a new device for jaw motion rehabilitation. A case report. Stomatologija Baltic Dental and Maxillofacial Journal 2013;15:54-7.
10. G Poornima, Poornima, Trismus , Journal of Health Sciences & Research, July-December 2014;5(2):15-20.
11. Melchers LJ, Van Weert E. Exercise adherence in patients with trismus due to head and neck oncology: a qualitative study into the use of the Therabite. Int J Oral Maxillofac 2009: 38; 947–54.
12. Scott B, Butterworth C, Lowe D, Factors associated with restricted mouth opening and its relationship to health-related quality of life in patients attending a Maxillofacial Oncology clinic. Oral Oncol 2008: 44; 430–8.
13. Bensadoun RJ, Riesenbeck D, Lockhart PB, A systematic review of trismus induced by cancer therapies in head and neck cancer patients. Support Care Cancer 2010: 18; 1033–8.
14. Mehrotra V, Garg K, Md Sajid Z, Sharma P, The Saviors: Appliances used for the Treatment of Trismus, I J Pre Clin Dent Res 2014;1(3):62-67