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Case Report

Rehabilitation after Ankylosis Surgery with the Use of a Personalised Expansion Trismus Relieving Appliance

Rashmi S Gupta[1], Manjunath TR[2], Roma Goswami[3], Noopur Rathi[4*]

[1]Independent Researcher, Implantology, Guptas Dental and Implantology Center, Durgapuri Chowk, Delhi, India
[2]Columbia Dental Care, Fraser Town, Bangalore, India
[3]Department of Prosthodontics, Subharti Dental College, SVSU, Meerut, Uttar Pradesh, India
[4]Department of Prosthodontics, Divya Jyoti College of Dental Sciences, ABVMU, Uttar Pradesh, India

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Abstract: Temporomandibular joint (TMJ) ankylosis is a condition where the mandible is fused to the fossa, causing discomfort and potentially life-threatening issues. Factors include trauma, odontogenic and non odontogenic infections, prior surgical interventions, congenital defects, iatrogenic/idiopathic causes, with trauma being the most common cause. Treatment is mainly surgical, followed by long-term physiotherapy, preferably through a trismus opening appliance. We present a case of a young female patient who was surgically treated for right-side TMJ ankylosis. The patient had a limited mouth opening, which made impression making difficult. A double-sided, spring-loaded expansion appliance was fabricated that was customised to the patient's occlusal surfaces of maxillary and mandibular arches. The appliance was difficult to wear initially, but after continuous expansion over a time period, the trismus was relieved and normal mandibular movements were restored. Patient was thoroughly satisfied with the outcome of the treatment.

Keywords: TMJ Ankylosis, Trismus, Mouth Opening Limitation, Post-surgical Rehabilitation, Temporomandibular Joint Ankylosis.

INTRODUCTION

Trismus (Greek origin ‘trismos’) is a clinical condition characterised by hypomobility of the mandibular jaw [1]. The oral cavity is bounded by the maxilla and the mandible, with the maxilla being fixed to the cranium while the mandible has limited mobility in horizontal (protrusion, retrusion) and vertical directions. A maximal interincisal opening (MIO) of at least 35 to 40 millimeters is used to determine the existence of trismus [2]. It can be either directly as a result of ankylosis of the temporomandibular joint (TMJ) or secondary to other medical (stroke, radiation therapy) and dental (following oral surgical procedure, odontogenic or non-odontogenic space infections, pulpitis/pericoronitis) conditions or procedures [3-5]. At most of the times, it can be directly associated with masticatory muscle pathology, where there is sustained contraction of one or more masticatory muscles (commonly pterygoid muscles) secondary to an occlusal problem involving TMJ [6]. Such cases are more prominent if vertical dimensions of occlusion are altered either physiologically or pathologically. It may also be due to motor disturbances of the major nerve supply (trigeminal nerve) of the maxillary and mandibular arches [7]. It can have various causes, ranging from simple and non-progressive to life-threatening. Trismus can impair eating, oral hygiene, dental procedures, speech, and facial appearance, which makes dentists familiar with the differential diagnosis of this condition [1-5]. For prosthodontists and restorative dentists, the condition can be associated with various subcategories of temperomandibular disorders (TMDs), including extracapsular and intracapsular problems found to be more prevalent in females [8]. Trauma frequently causes intracapsular problems, and pain upon palpation may indicate anterior disc displacement [6]. Mastication involves chewing and grinding food to fit for swallowing. It essentially involves muscles like the masseter and pterygoids (medial/lateral), with jaw closure being the most active process. In primates, there are six degrees of freedom for jaw movements, with jaw closing and opening reflexes [5]. Lateral pterygoid muscles open the mouth, while medial pterygoid, temporalis, and masseter muscles close the mouth. Jaw closure is more powerful than opening movement, which is useful in designing rehabilitation exercises for trismus

***Corresponding Author:** Noopur Rathi
Department of Prosthodontics, Divya Jyoti College of Dental Sciences, ABVMU, Uttar Pradesh, India

patients [9]. The facial nerve, which is a mixed nerve, and the trigeminal nerve, which is a motor nerve, provide the primary nerve supply to the face, with the facial nerve serving as the motor to the facial expression muscles [9]. In trismus, facial expressions thus become affected without actual pathology of the facial nerve. Motor disturbances of the trigeminal nerve cause difficulty in mouth opening, like that in the early symptoms of tetanus. Ankylosis of the TMJ is usually resolved by surgical correction, which is often associated with facial deformation since one side fails to grow. Such facial deformations are difficult to correct even after plastic surgeries [1. At times, trismus may be permanently associated with other congenital disorders, especially those that may cause clefts in the lip or palate due to depleted musculature [11].

Oral surgical procedures like tooth extractions may result in trismus due to myosities of masticatory muscles or iatrogenic TMJ trauma. Inaccurate needle positioning during the inferior nerve block usually results in limited mouth opening 2-5 days after the mandibular block. When radiation therapy is used in the treatment of cancer patients (tumours of the nasopharyngeal area, salivary gland, and/or the maxilla or mandible), the incidence rates for trismus range from 10% to 40% of patients [12, 13]. Trismus significantly affects and deters one's daily activities by creating challenges in eating and oral hygiene; it also dramatically affects one's speech [14]. This clinical case presentation of a young female presents one such incidence of trismus that was associated with postsurgical correction of ankylosis of the right TMJ with a customised spring appliance that could be activated to increase the effect of the appliance.

CASE REPORT

A young female adult patient was scheduled to undergo surgical correction of right side TMJ ankylosis in the department of oral maxillofacial surgery. The patient had a type 1 ankylosis of TMJ, with minimal bony fusion characterized by extensive soft tissue fibrous adhesions of the right sided TMJ. The patient was presented with a treatment plan that included surgical intervention by performing arthroplasty followed by compulsary post surgical physiotherapy. The patient was referred to the prosthodontic department one week after surgery for fabrication of an appliance. At the time of prosthodontic evaluation, the patient presented with a swollen right side of the face that had a surgical dressing (Perfect Surgicare, India) in the TMJ region (Figure 1A). Limited mandibular movement was the chief characteristic of extra and intra oral examinations, showing very little interoccusal space (8 – 12 mm) during various mandibular movements (Figure 1B). The masticatory muscles were palpated and were found to be non tender or non sensitive to palpation ruling out myospasms associated with some tempero mandibular disorder. The patient was informed about her condition, the planned appliance and educated about the necassity of wearing it. After taking a written consent, the patient was scheduled for trismus appliance fabrication.

The preliminary impressions for the maxillary and mandibular arches were made using a modified stock tray (PSM, Ghaziabad, India) as described in previous literature on sectional impression procedures [15]. Both impressions were made of fast set irreversible hydrocolloid (Fast Set; Jeltrate Alginate, Dentsply Intl) with impressions being considered to be adequate if they covered and recorded the existing teeth and adjacent gingiva upto 2 or 3 millimeters (Figure 1C). The maxillary and mandibular casts were mounted on an average value articulator, and the interocclusal distance was assessed (Figure 1D). A jaw extension appliance that could be activated externally after removal from the mouth was designed utilising 20-gauge orthodontic stainless steel (Pigeon Dental stainless steel, India) wires and a contra-rotating extended screw. The wires were made based on the principles of spring action, with one of its ends embedded in the mandibular arch and the other in the maxillary arch within self-cure acrylic resin (Fortex; Lucite Intl, Durham) (Figure 2A). The two loops of each individual spring were placed at a distance of 10 mm, with activation being in the form of opening the loop (Figure 2B). The acrylic portion of the appliance was extended over the occlusal surfaces up to the gingival margin without any of its portions touching or hampering oral hygiene. The appliance was fitted into the patient's occlusion, and the physiotherapy was initiated (Figure 2C). After every week, the appliance was activated to increase the interocclusal space. At the end of the 8 weeks, the patients interocclusal opening had returned to normal, confirmed by the three-finger test (Figure 2 D). The patient was extremely satisfied with the outcome of the trismus appliance, although initially, the patient had difficulties with it. Trismus as a result of surgery was therefore relieved by using a customised dynamic jaw extension appliance.

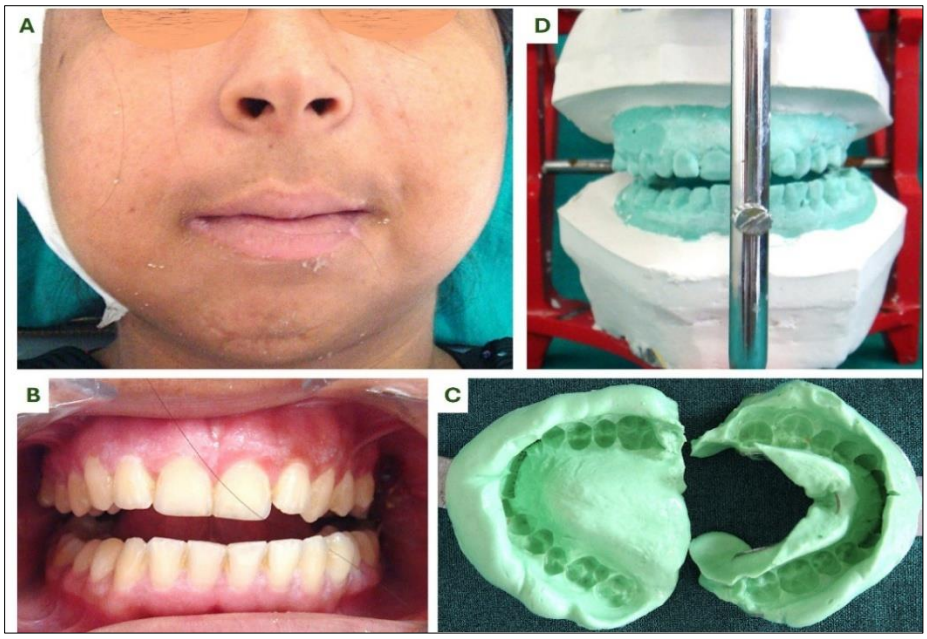

Figure 1: (A) Extra oral view showing right side swelling post surgical correction (B) Maximum opening before physiotherapy (C) Impressions for both arches (D) Mounted casts with limited interocclusal space

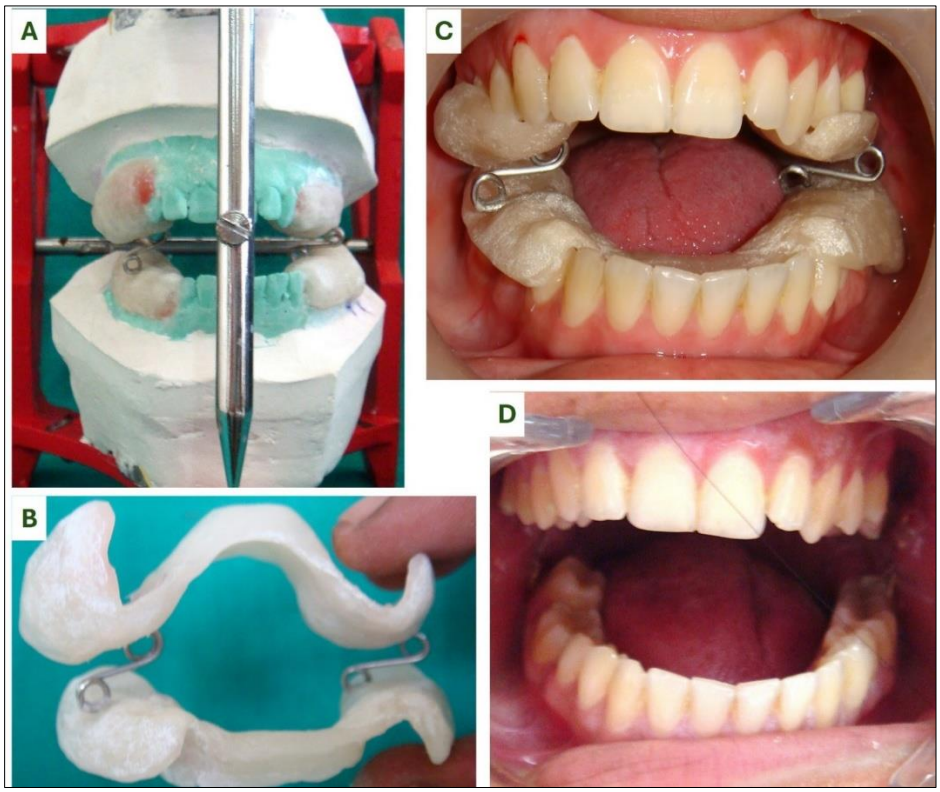

Figure 2: (A) Trismus appliance after activation of spring (B) Trismus appliance before insertion in the patient (C) Trismus appliance fully activated at 8 weeks (D) Post physiotherapy mouth opening

DISCUSSION

A case of a female patient having undergone gap arthroplasty of the right-sided ankylotic condyle successfully rehabilitated for trismus, using a custom-made physiotherapy appliance, has been presented in this case report. Depending upon the severity of the case, the trismus progresses either slowly or rapidly (2.4% per month in nasopharyngeal cancers) [17]. Oral malignancies can destroy more tissues than any other portion of the body [18]. These deficits include cranial nerve palsies, ophthalmoplegia, seizures, psychiatric problems, ataxia, hemiparesis, blindness, deafness, and mental retardation. The current stage of the disease also indicates a likelihood of poorer neurological outcomes. If there are associated signs and symptoms, you should

rule out tetanus. Conditions that affect the central nervous system, such as meningitis/encephalitis, brain tumour/abscess, and epilepsy, should be ruled out. Tonsillitis, tetanus, meningitis, parotid, and brain abscesses cause trismus [19, 20]. Trauma such as fascio-maxillary fractures of the mandible, zygoma, and zygomatic arch can produce trismus. Dental operations can limit mouth opening, and trismus can develop from mastication muscle inflammation or temporomandibular joint damage [19]. Trismus can happen after removing mandibular molars, placing inferior and superior alveolar nerve blocks, or having dental restorative work done. Tricyclic antidepressants, succinylcholine, and phenothiazines are typical drug side effects that produce trismus. Metoclopramide, phenothiazines, and other drugs can also cause trismus [21]. Radiotherapy and chemotherapy treat regional lymphomas and head-and-neck squamous cell carcinoma. Treatment difficulties may arise due to the amount of radiation, the presence of healthy tissues in the radiation beam's path, and the method of treatment.

Clinical assessment of the maximal interincisal distance (MID) between the maxillary and mandibular incisors diagnoses trismus. Before surgery to fix a unilateral or bilateral ankylosis, inadequate tissues should be enlarged and malpositioned structures repositioned [22]. This prepares for minimally invasive surgery. It is measured between maxillary and mandibular alveolar ridges in edentulous people. A value of <40 mm indicates trismus. Trismus can impair eating, speaking, and oral hygiene, lowering patients' quality of life [23]. Head and neck cancer patients with trismus benefit from trismus exercises [24]. Congenital or trauma-induced defects and ablative tumour removal surgery can cause aesthetic deformities, functional difficulties, and psychological effects. Without prosthetic rehabilitation, most patients experience social, psychological, and emotional discomfort after injury. Successful rehabilitation requires the patient to appear in public without fear of attention. Physiotherapy for jaw opening and closure and mandible lateral excursions for 5 minutes, every 3-4 hours is recommended [23]. Sugarless chewing gum also moves the TMJ laterally. Avoid dental treatment until symptoms improve and the patient is comfortable. Trismus appliances, such as threaded screws, screw-type mouth gags, fingers, tongue blades, and stacked wooden pieces or blades, can synergize physiotherapy to force elevator muscles to stretch. These devices provide controlled force but are not elastic. Physical therapists are essential in supporting maxillofacial patients and ensuring proper oral hygiene [25]. These devices are essential for managing trismus and supporting maxillofacial patients. Restorabite is a portable trismus device that improves safety and exercise adherence in patients with trismus [26]. The Dynasplint Trismus System uses a low-load, prolonged-duration stretch to reduce contracture and can be customised for partially edentulous patients [27]. Plaque biofilm formation around tooth and gingival junctions triggers an inflammatory immune response, potentially leading to maladaptive and damaging responses [28]. All resin-based appliances, like complete dentures, often fracture due to sudden impact, but low flexural strength from prolonged use can also cause failure [29].

CONCLUSION

Customised trismus appliances are far more convenient for patients in terms of their retention and fitting, which enhances treatment compliance. Depending upon the patients tolerance, they can be custom activated, which further enhances their patient satisfaction. The appliance is simple, easy to fabricate, and less bulky than prefabricated ones.

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