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Case Report

Treating trismus with dynamic splinting: a case report

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Abstract: Trismus is a pathological condition of the muscles of mastication which commonly affects patients who have undergone dental procedures, oral surgery, and radiation therapy for head and neck cancer. The purpose of this case report is to describe the use of dynamic splinting, a noninvasive modality to reduce trismus which occurred in a patient following multiple dental procedures. A 26 year old man of African descent was referred for severe trismus and pain following three dental procedures on the lower right molars. The patient presented with Maximal Interincisal (opening) Distance (MID) of only 5mm and mastication muscle spasticity. Following physical therapy (massage, ultra sound, NMES, moist heat) three times per week for two months and additional treatment of dynamic splinting for four weeks (TID) the patient increased his MID to 52mm and returned to normal eating and speaking. (J Oral Sci 51, 141-144, 2009)

Keywords: contracture reduction; dynasplint; interincisal distance; range of motion.

Introduction

Trismus is described as a pathological condition of the muscles of mastication which commonly affects patients who are undergoing dental procedures, oral surgery, and radiation therapy to treat head and neck cancer. Trismus is a result of the sustained contraction of one or more of the muscles of mastication: the masseter, temporalis or ptergoid muscles which can yield contracture of the connective tissue resulting in a restriction in mouth opening (1-14). Trismus is diagnosed from clinical examination of the maximal interincisal distance (MID) of less than 40-45 mm caused by contracture not by obstructive joint impingement. This represents the distance from the incisal edge of the maxillary and mandibular incisors (1-14). In edentulous patients, it is measured between the maxillary and mandibular alveolar ridges of less than 40-45 mm will be classified as trismus (1-3) (see Fig. 1).

The hypomobility of this condition will result in contracture of the connective tissue and degeneration of the musculature (2). Previous treatment methods have included manual manipulation with wooden splints such as tongue depressors. These methods have restricted efficacy because they do not use a dynamic, calibrated

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Fig.1 Maximal interincisal distance.

tension for increase time at end range, as range of motion changes. Surgical reduction is considered a rescue procedure (3-5) but noninvasive procedures would be preferred. Dynamic splinting uses calibrated, changeable tension with a protocol of low-load, prolonged-duration stretch, to reduce contracture for different pathologies (6) (see Fig. 2).

The progression of trismus can be slow or as dramatic as 2.4% per month for dental or nasopharyngeal cancer patients treated with radiation therapy (1,2). The muscles affected are the muscles of mastication: the buccinator, temporalis, masseter, medial pterygoid, and lateral pterygoid. The continued contraction causes a physiological change of shortening in the connective tissue, which is contracture and that will cause the secondary atrophy of the musculature. The purpose of this case report is to describe use of dynamic splinting and low-load prolonged-stretch to reduce trismus in a patient following dental procedures.

Case Report

A 26 year-old, right handed man of African descent, and was referred for severe trismus and pain following three dental procedures on the lower right molars. Three procedures for dental caries (cavities) were performed over a five day period and each procedure required the patient to have his mouth open for 45 min to 1 h. Following these procedures the patient reported increased pain and "decreased opening range" (of his mouth). Trismus was present one month before physiotherapy began.

The patient presented with MID of only 5 mm and pain that increased as he attempted to open his mouth further. MID deviation was 3 mm left and 5 mm right, and the visual analog scale of this pain was 6/10 at opening and 10/10 at MID. This patient was having significant challenge eating (only a soft, liquid diet was possible) and he had difficulty talking which challenged his performance in seminary, as he was training to become a priest. This patient did not have obstructive impingement nor were there tempro mandibular problems.

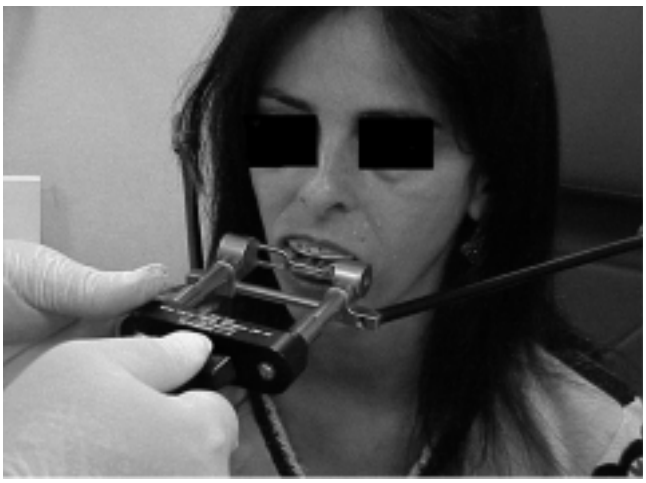

Fig. 2 Patient in dynasplint trismus system.

The patient also reported regular right sided temporalis/frontalis headaches at a 6/10 to 8/10 level of pain. Palpation of the right temporalis area yielded myospasm throughout the muscles of mastication, and multiple trigger points were noted in the anterior and middle temporalis muscles and the right masseter muscles. His posture was unremarkable.

Treatments

The patient was treated with two regimes of prednisone that reduced the pain but had no effect of MID. This patient was prescribed physical therapy 3 times per week for 2 months. Initial treatment methods included the following:

- Intra-oral and extra-oral massage
- Ultrasound treatment of the muscles of mastication
- Neural electrical muscle stimulation
- Moist heat to all affected areas
- Dry needling to the right anterior temporalis trigger points
- Home exercise program for increasing range of motion in MID

During 1 month these modalities showed only minimal benefit (MID only increased to 10 mm) and the patient was becoming despondent with the slow progress. At this point the patient was prescribed the Dynasplint trismus (DS) equipment (Dynasplint Systems, Inc. Severna Park, MD, USA). He was custom fit with the unit and taught how to don and doff the system, and he was given oral and written instructions on wear schedule and safety procedures (Fig. 2). The patient was instructed to wear this device three times each day (minimal tension setting #1 which exerts 0.3 foot pounds of torque) with gradual, weekly increase in tension as tolerated, and continue with his physical therapy 3 times per week. The direction of force and unique features of this DS system are seen in Fig. 3. The direction of force as labeled #1, and the torque tension chamber, #2. The bilateral Tension Rods are labeled #3, and the tension adjustment piece is labeled #4.

Results

After 2 weeks in the Dynasplint the patient's MID tripled to 30 mm, and he was able to progress to a modified soft diet. At this point the patient increased the DS tension to #2 (0.9 foot pounds of torque), and continued physical therapy. The patient's headaches were resolved and the

muscle spasms were significantly reduced. After one month of exclusive physical therapy treatment and one additional month of concurrent physical therapy and DS treatment (TID), the patient's trigger points for pain and muscle spasm no longer were present and he was discharged with a MID of 52mm (Fig. 4)

Discussion

Trismus is described as a pathological condition that is rising in frequency, particularly following dental procedures and radiation therapy for head, neck cancer. The purpose of this case report is to describe use of dynamic splinting to reduce trismus in a patient following dental procedures. The low-load, prolonged-stretch modality has been shown effective in treating ROM deficits in different pathologies (6,7), and this modality has been shown effective for patients with preexisting trismus of up to one year (7). This dynamic splinting might also be used effectively in prevention of trismus.

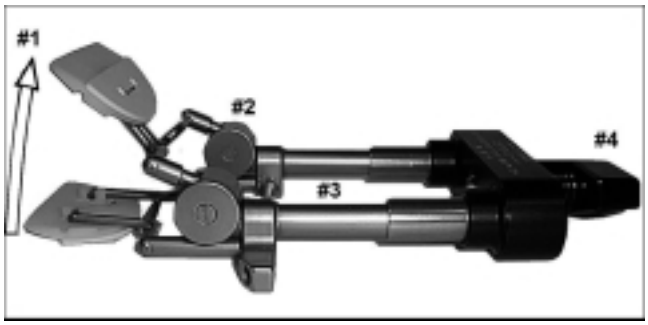

Fig. 3 Dynamic splinting and direction of force.

Other current treatment methods in oral rehabilitation include tongue blades and manual spring loaded devices for MID stretching. Dynamic splinting is different from both these modalities in that the "dynamic" system uses a reproducible, calibrated, changeable tension that is delivered through a bilateral tension system. The protocol of "stacking tongue blades" uses forced expansion of the mouth which does not allow the flexibility to absorb compression during a muscle spasm, but the DS does. Manual spring loaded devices lack the bilateral tension delivery system and its "manual" tension allotment is neither replicable nor calibrated.

The dynamic splinting modality can use a customized mouth piece to accommodate partially or fully-edentulous patients differ from tongue blades or the manual stretching device. The dynamic splinting system is usually used in a hands-free process, thereby enhancing patient comfort and compliance.

This patient regained a normal diet and the ability to converse with his parishioners and effectively speak from the pulpit. This report shows the progression of reduced trismus through different treatment protocols. A randomized, controlled, cross-over study could be effective

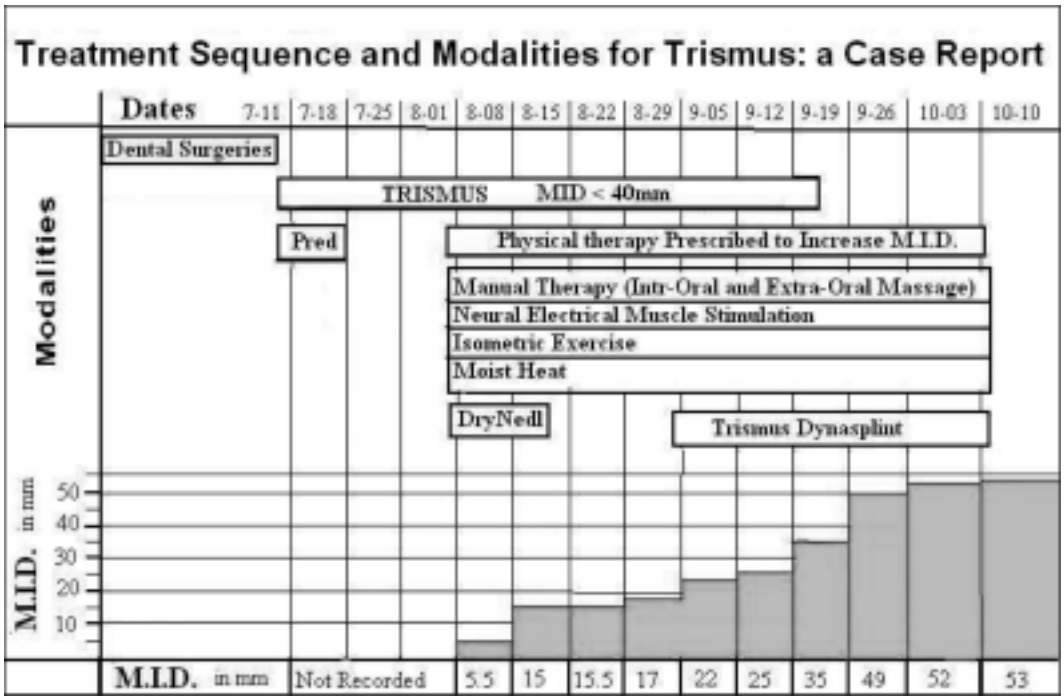

Fig. 4 Progression of MID.

in measuring potential change in MID between patients who were fitted with the DS immediately versus patients who were initially control subjects and then fitted with the system at a later date, as cross-over patients.

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