

CASE REPORT

A MODIFIED CAP SPLINT FOR PREVENTION OF ORAL TRAUMA IN COMATOSE PATIENT

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ABSTRACT:

Trauma to oral soft tissues in comatose patients may be more widespread than reported as no extensive study of this problem has been conducted. These patients exhibited ruminant chewing and bruxism that often resulted in self-inflicted oral soft tissue trauma. The success of using various dental appliances was found to be associated with the neurologic status of these patients. Variables such as etiology, depth and duration of coma, and age of patient can influence the medical prognosis and hence the success of using these appliances. This article, presents a case report of a 3 year old comatose child treated with a dental device to prevent the patient from injuring his tongue. This appliance was a modified cap splint. The lesions of the patient had improved after using the appliance but unfortunately patient passed away due to cardiac arrest.

Key words: Comatose patients, cap splint, trauma.

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INTRODUCTION:

Self-injury or self-mutilation is defined as a behavioral disturbance that consists of deliberate destruction of or damage to body tissues that is not associated with a conscious intent to commit suicide.¹

Principal syndromes and conditions that favor the appearance of self-mutilation are Lesch–Nyhan syndrome, Mental retardation, Moebius syndrome, Munchausen syndrome, Riga–Fede disease, XXY syndrome, Gilles de la Tourette syndrome, XXXXY syndrome, Cerebral palsy, Rett syndrome, Autism, Epilepsy, Cornelia de Lange syndrome, Mental disorders (depression, obsessive compulsive disorder), Congenital insensitivity to pain with anhidrosis (CIPA), Infectious diseases (encephalitis), Individuals with damage to the cerebral cortex, hypothalamus, reticular or pyramidal system, coma, etc., Pharmacological or recreational drug reactions, Individuals who cannot manifest their stress or discomfort to their parents or carers, Others: persons under great stress, prisoners, homeless, etc.

Patients in coma, from whatever cause, may develop chewing movements presumably similar to those seen in healthy people during sleep. If coma is prolonged, these chewing movements may be as powerful and persistent as to cause self-inflicted trauma to the soft tissues of the oral cavity and attrition of the teeth.¹ Guyton has termed this condition neuropathologic chewing.²

A team effort is needed in the management of the comatose patient with self-inflicted oral trauma. On occasion, the dental practitioners may be asked to provide clinical assistance to the team. Prevalence of trauma to oral tissues in the comatose patient is not well documented, but when it occurs it is quite destructive and distressful for both patient and family members.³

The literature concerning neuropathologic chewing is scarce. The exact mechanism of the coordination of tongue and jaw movements during mastication is still unclear. Hanson et al. designed an intraoral dental appliance based on the neurophysiology of jaw movement in comatose patients.⁴ Others fabricated tongue stents⁵ and removable appliances⁶ for adults to prevent self-inflicted

trauma to the tongue. Freedman et al. reported success in managing a 2-year-old patient with neuropathologic chewing with a removable bite block⁷. Peters et al. reported success in managing an 8-year-old patient with a tongue stent and circummandibular wires.⁸

Dental services in hospitals frequently are called upon to assist in the management of comatose patients who exhibit bruxism. Some of these cases are complicated by severe intraoral soft tissue laceration as a result of the uncoordinated movement of the tongue and jaw. Thus, it is desirable for dentists to understand this condition and develop effective methods for managing these patients in a hospital setting.⁹

CASE REPORT:

The Department of Pedodontics and Preventive Dentistry was asked to examine and recommend treatment for a 3-year-old male patient who was diagnosed with depressed fracture of parietal bone & was found to be in an unconscious state. Surgery was carried out for the elevation of parietal bone. Surgical correction was followed with tracheostomy. The nutrition was provided by means of nasogastric tube. After surgery, patient remained in unconscious state and he developed tongue chewing habit in unconscious condition only (Fig. 1). History revealed that the child had fallen from about 12 feet height and was unconscious on arrival to the hospital. He could involuntarily move his arms and legs and frown on painful stimulus, developed tongue and lip bite. On examination it was found that almost anterior one-third of tongue was severely damaged. First, maxillary and mandibular arch impressions were made with addition silicon impression material, (Virtual hydrophilic vinylpolysiloxane impression material Ivoclar Vivadent, USA) and a working cast was obtained. A modified oral screen was fabricated on this cast (Fig. 2). It was placed in patient's mouth but due to the involuntary movements of the jaw, the patient pushed it out of the mouth and hence the appliance was discarded and a second line of treatment was planned. The padded tongue blade was fixed into place in the meanwhile. A new appliance was designed which was simple and effective. It resembled a closed cap splint (Fig. 3).



Figure 1: Self-inflicted habit in comatose patient



Figure 2: Modified oral screen



Figure 3: Modified cap splint appliance

The design was such that the appliance would cover upper and lower teeth completely and could act as a single assembly but provided with an anterior open bite space, creating room for proper tongue movement. Holes were made on this splint and secured with suture material to prevent accidents such as aspiration, swallowing etc. Finally appliance was cemented with zinc phosphate cement (Elite cement 100, GC corporation Tokyo, Japan). After insertion of the appliance, the initial resolution of the wound was observed within 3 days. Unfortunately, the patient passed away shortly afterwards due to cardiac arrest.

DISCUSSION:

Patients in coma may have sustained injuries to the cerebral cortex, the reticular or pyramidal system, the trigeminal nucleus, or the hypothalamus, and the fine coordinated movements of the jaw and tongue may have been lost. Jackson states that the placement of a bolus between the teeth perpetuates myotactic masticatory reflex⁵. In comatose patients, the tongue can become

juxtapositioned between the teeth resulting in this chewing reflex.

Numerous important factors need to be considered before initiating dental treatment for a comatose patient. A careful history should be taken which would include the etiology of coma, the age of the patient, the depth and duration of coma, and how rapidly the patient was resuscitated in instances due to anoxia. These are all important factors in predicting the outcome of the comatose patient. The design of any dental appliance also depends on the prognosis of the patient, the neurologic status, and the severity of chewing and/or bruxing⁹. When examining the patient, dentists should be familiar with the clinical findings in stupor and coma¹⁰.

Apart from this a team effort is needed therefore; neurosurgeon should be consulted to learn the neurologic status and prognosis of the patient. An oral examination should be performed to detect the presence of ruminatory movements of the jaw, bruxism, and the severity of self-inflicted trauma to intraoral soft tissues. Then, the anesthesia team should be consulted as to the risk of sedating and/or paralyzing the patient if impressions must be obtained for the fabrication of dental appliances.

Indications for the need of fabricating dental appliances should be based on the following criteria:

- The presence of persistent ruminatory movements of the jaw or bruxism which is usually of more than 24-hr duration
- The presence of intraoral soft tissue lacerations.

If either of the above criteria is absent, the fabrication of appliances is not immediately necessary. Patients with mild ruminatory movements can be treated well to a taped mouth prop or a rubber bite-block. These are hygienic appliances, easy to insert, and no laboratory preparation is necessary. The removable custom-made appliance with a posterior bite-block is the next most hygienic appliance for patients with mild ruminatory movements.⁹

In the present case first a modified double oral screen appliance was made because it is easy to insert due to the metallic ring in the centre, and oral hygiene maintenance was not a problem but the appliance was not effective as the patient had powerful chewing movements. In patients with mild jaw movements, modified double oral screen is recommended as a good treatment option. As in literature it was stated that patients with powerful chewing movements, the use of removable appliances usually fails because of problems of retention. A fixed tongue depressing stent may be necessary to temporarily depress the tongue and prevent it from being traumatized⁸. Another method of preventing self-inflicted oral trauma is the fabrication of a soft acrylic custom tray with vinyl mouth guard material but literature review reported that poor recovery were seen with such appliance due to poor retention⁹. Thus, in present case a new modified fixed cap splint appliance was designed to control the habit. Inter-maxillary fixation is not indicated as oral hygiene cannot

be maintained, and since, the forces were so strong that it would lead to luxation of teeth.

REVIEW OF LITERATURE:

Intraoral devices basically work through 2 mechanisms: they impede the patient from performing certain habits, helping to repress this behavior, and they represent a direct barrier that prevents the patient from being able to bite the oral tissues (e.g., maintaining the lip at a distance from the dental arches) (25). Numerous methods had been tried to prevent self-injurious oral trauma in patients including taped mouth prop (Molt mouth prop), rubber bite-block (Mekesson rubber bite-block), and removable custom made appliance with a posterior bite block for mild ruminatory movements whereas fixed tongue depressing stent (11), soft acrylic custom tray were recommended for powerful chewing habit (9). A retrospective study of 16 pediatric comatose patients with neuropathologic chewing was carried out by Ngan and Nelson since 1979-84 (9). These patients ranged in age from 11 months to 16 years and were comatose. Dental appliances were fabricated for 11 of the patients who met the criteria for appliance fabrication. Eight patients were managed successfully with biteblock therapy. Two other patients were treated with soft acrylic custom trays because of a poor recovery prognosis. In 1 patient, the remaining teeth were extracted due to poor retention of the appliance and powerful jaw movements. These 2 patients exhibited soft tissue improvement, but died within a short period after initiating treatment. In 1 other patient, due to the limited mouth opening from TMJ disease, treatment was limited to the use of a mouth prop. In the other group of 5 patients for which dental appliances were not indicated, dental treatment included observation alone.

Literature from the past 2 decades shows that mouthguards have been the most widely used devices, although with variable results. They have been reported to be effective in some cases (12, 13), to have failed in others (14, 15). Another option is the acrylic splint that can be positioned directly on the teeth (16), cemented to the teeth (17, 18), or held in place by extraoral straps (19) or by retention loops of orthodontic wire (20). The fixation systems for these splints increase their stability and prevent the patient from removing them; for this reason, it is widely agreed that they are more effective than mouthguards. A number of variants have been described, such as the joining of the upper and lower parts of the splint in a single unit, with a small central orifice to permit respiration; this model prevents injury both to the lip and to the tongue (21). Another device frequently used is the 'lip bumper'. This consists of one long element and a small acrylic shield, fixed by intermaxillary wires or elastic bands to tubes or bands anchored to the first molar teeth. These devices act by displacing the lip downwards and forwards to prevent it being bitten, and they have been used successfully in a number of cases described in the

literature (13, 22, 23, 24). The oral screen has the advantage that it does not have to be fixed to the teeth, and it may therefore be indicated in infants and children in whom tooth eruption is not advanced (15). Most of the authors were not considered intermaxillary fixation and extractions as the treatment of choice.

CONCLUSION

- For every patient in coma, a dental check up should be made mandatory.
- Dentist should have a thorough knowledge of neurophysiology of coma so as to make correct decision before fabrication of any appliance.
- The medical and dental fraternity should work as a team to treat such cases.
- Custom designing of the appliances should be done in each case.

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