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PRE-SURGICAL GUNNING SPLINT FOR AN ANTICIPATED MANDIBULAR FRACTURE: A CASE REPORT

Dentistry

Dr. Racharla Sundar*	Post-Graduate, St. Joseph Dental College, Eluru.*Corresponding Author
Dr. Kasina Sitaram Prasad	Professor & HOD, Department of Prosthodontics and Crown & Bridge, St. Joseph Dental College, Eluru
Dr. Yarlagadda Siva Kiran Babu	Professor, Department of Prosthodontics and Crown & Bridge, St. Joseph Dental College, Eluru, India
Dr. Matsa Priyanka	Reader, Department of Prosthodontics and Crown & Bridge, St. Joseph Dental College, Eluru, India

ABSTRACT

Elderly individuals with edentulous mandibular fractures or patients with high chances of fracture during surgical procedure are challenging to treat because of their deteriorated health and a number of surgical treatment contraindications. The complication rate of infection or malunion is higher compared to fractures in younger patients. The "Gunning Splint" is a preferable choice in these situations since it stabilizes and reduces the mandibular fracture, improving the prognosis.

KEYWORDS

Gunning splint, Fracture, stabilization appliance, IMF.

INTRODUCTION

For more than a century, the "Gunning splint" has been used to help fix fractured edentulous mandibles . It was first introduced by Thomas Brain Gunning and was intended to immobilize edentulous or partially edentulous jaw segments following reduction, . Maxillomandibular fixation (MMF) becomes a challenging procedure in cases with sparse or absent dentition, and the complexity increases in elderly patients. Decreased blood supply, atrophy of ridges, reduced healing potential, and lack of definitive occlusal surfaces to capitalize on for fracture reduction and MMF are the most notable limitations in such cases .

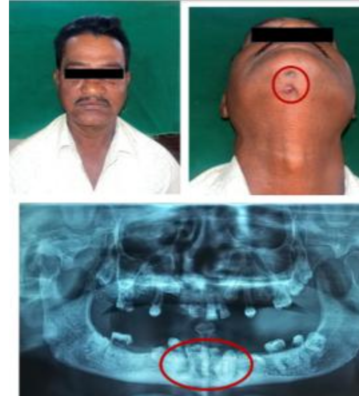
Additionally, because of the patient's deteriorating health as they age, open reduction of the fracture site is not beneficial. Closed reduction and gunning-type splint fixing of the fractured section are favored to open reduction in these situations. It immobilizes the jaws in occlusion and keeps broken mandibular bone fragments together .

A gunning splint is made up of a type of monoblock that resembles two-bite blocks joined together. It immobilizes the jaws and holds broken bone fragments together. There won't be any hard tissues in an edentulous patient for splint retention and stabilization. Consequently, connecting to the underlying bone structures is the primary method of obtaining retention. The lower splint is attached to the mandibular body by circumferential wires, while the top splint is attached to the maxilla by per-alveolar wiring to achieve immobilization. Using wire loops or an elastic band, two splints can be connected for intermaxillary splinting. In case of partially edentulous patients with no vertical stop, Gunning splint can be fabricated over existing dentition and the partially edentulous ridge providing stability to the appliance .

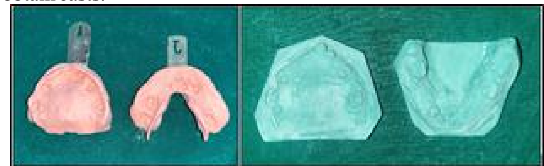
This clinical report describes a step-by-step procedure for making a pre-surgical gunning splint and fixing it intraorally in a partially edentulous patient.

CASE REPORT

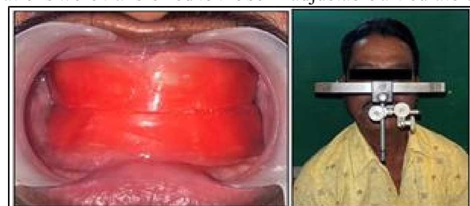
A 54-year-old male patient was referred to the Department of Prosthodontics and Crown & Bridge from the Department of Oral and Maxillofacial Surgery for fabrication of gunning splint. The chief complaint of the patient is pain and discharge of blood in the chin region extraorally since 2 months. On extraoral examination, sinus tract opening is seen in the inferior border of the mandible (chin region). Intraoral examination revealed that the patient is partially edentulous with collapsed bite and loss of vertical dimension (VD). Hence, intermaxillary fixation is not possible with the existing dentition. Orthopantomograph revealed multiple impacted teeth in maxilla and mandible, and diffuse radiolucency in the anterior region of mandible with thin inferior border between the mandibular canines. The case was diagnosed as Chronic suppurative osteomyelitis and surgical debridement was planned. Since the thickness of the inferior border of mandible is very less, there are high chances of fracture of inferior border of mandible. Hence the stabilization appliance was planned preoperatively so that it can be used for proper alignment and Immobilization of the fractured segments.



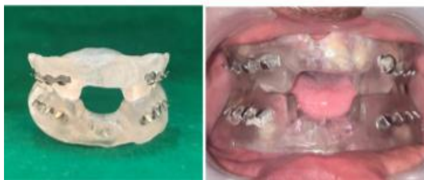
Preliminary impressions of the maxillary and mandibular arch were made with irreversible hydrocolloid impression material (Algitex, DPI, Mumbai). Impressions were immediately poured in dental stone to obtain casts.



Denture bases and occlusal rims were fabricated on master casts and patient is recalled for recording jaw relations. Lost vertical height was re-established and tentative jaw relations were done similar to conventional complete denture. Facebow transfer was done and the jaw relations were transferred to the semi adjustable articulator.



An anterior opening was made on the occlusal rims for feeding purpose, arch bar was attached on the buccal side of both upper and lower occlusal rims. Posteriorly, interlocking mechanism (Two V-shaped projections about 4mm, one a nick extending from buccal side of the rim to half of the rim and another projection a notch extending full length of the rim buccolingually in the mandible and corresponding grooves in the maxillary occlusal rim) was provided to restrict the medio-lateral as well as antero-posterior movement of the mandible. The wax rims were finished, polished, and processed in heat-cured acrylic resin (Heat Cure, DPI, Mumbai). The obtained gunning splint is checked in the patient's mouth for fit, extension and frenum relief.



DISCUSSION

The gunning splint was developed by Thomas Brain Gunning to immobilize edentulous or partially edentulous jaw segments following reduction[1]. When treating fractured jaws, the goal is to keep the fractured extremities in perfect and close apposition until the temporary callus is consumed and the union of fractured segments has occurred. The cross-sectional area of an atrophic mandible is small. Open reduction of the mandible will result in a long and difficult healing process at the fracture site because of the reduced vascularity and dense sclerotic nature of the bone[5]. The fractured fragments will be more easily displaced if the mandible is atrophic. The benefits of close reduction with a Gunning splint include firm mandibular fixation and immobilization, as well as the preservation of the periosteal blood supply. Gunning splints can be applied intraorally in varying situations. These intraoral splints require anchorage to the remaining teeth and /or to the inferior border of the mandible [6].

A careful history, oral and facial examination and complete radiographic survey are imperative whenever any fracture is anticipated[7]. Through meticulous treatment planning and interdisciplinary collaboration, the dental team should assess the treatment alternatives based on the patient's needs and choose the best case [8].

In the above-mentioned case, it was required to fabricate the appliance pre-operatively before the surgery as the fracture of the lower border of mandible is highly anticipated during the surgery. Since the patient is partially edentulous with collapsed bite and loss of vertical dimension (VD), existing dentition cannot be used for intermaxillary fixation (IMF), so the appliance was fabricated over the patient’s dentition. An opening was made on the anterior region of the occlusal rim for feeding purpose and arch bars were attached on the buccal side of each splint similar to the case report done by *Dharaskar et al*[3]. Different interlocking mechanisms were reported, *Shah et al*. used patients’ dentures for IMF. *Sharma et al.* used a 3mm projection and a groove for centric position and arch bars for IMF[9]. *Sohail et al.* used Maxillomandibular Fixation (MMF) screws and arch bar for IMF [10.] In the aforementioned case report, two V-shaped projections about 4mm, one a nick extending from buccal side of the rim to half of the rim and another projection a notch extending full length of the rim buccolingually in the mandible and corresponding grooves in the maxillary occlusal rim was provided to restrict the medio-lateral as well as antero-posterior movement of the mandible respectively, thus keeping the mandible in centric relation during surgery and arch bars were also added for IMF. The appliance can be modified (Perforations for per alveolar/circumferential wiring can be given) for fixation of the gunning splint to the maxilla and mandible.

CONCLUSION

A gunning type splint can provide a satisfactory union of the broken segments in nearly all carefully selected and planned cases of fractured atrophic edentulous mandibles as well as pre-operatively in patients with high anticipation of fracture during the surgery. These splints are easy to fabricate, rigid, affordable, well-tolerated by the oral mucosa, and minimally invasive. For patients who are about to undergo surgery, where fracture of the mandible is highly anticipated, Gunning splints are an excellent option as it restores the original position and contour of the mandible.

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