

Use of Gunning Splint for the Treatment of Edentulous Mandibular Fracture: A Case Report

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Abstract Treating edentulous mandibular fracture is difficult in elderly patients due to compromised medical condition of the patient and various contraindications for the surgical approach. The complication rate of infection or malunion is higher compared to fractures in younger, dentulous patients. For such conditions, ‘Gunning splint’ is a better option as it provides close reduction and stabilization of mandibular fracture, thus improving the prognosis.

Keywords Gunning splint · Edentulous patient · Mandibular fracture · Intermaxillary fixation

Introduction

The ‘Gunning splint’ initially was presented by Thomas Brain Gunning (1813–1889) for the immobilization of edentulous or partially edentulous jaw segments after reduction [1].

For edentulous patients, treatment planning poses greater difficulties during reduction and fixation of fractured atrophic mandible. Due to edentulism, guidelines provided by occluding teeth for reduction and fixation of fracture, are absent. Also, open reduction of fracture site is not helpful due to compromised medical condition of the patient at older age. The denture bearing area of the edentulous mandible is not only more easily fractured, but

also has less possibility of rapid and uneventful healing [2]. For such condition, closed reduction and fixation of fractured segment with Gunning type splint is preferred over open reduction technique. It holds together fractured segments of mandibular bone and immobilizes the jaws in occlusion.

A Gunning splint for the edentulous mandible consists of a type of monoblock resembling two bite blocks joined together. These splints take form of modified dentures with bite block placed in posterior region and a space in incisal area to facilitate feeding. Immobilization is carried out by attaching the upper splint to maxilla by per-alveolar wiring and the lower splint to the mandibular body by circumferential wires. Intermaxillary splinting can be done by connecting two splints with wire loops or elastic bands [3, 4].

In this clinical report, step by step method for fabrication of Gunning splint and its intraoral fixation in an edentulous patient is discussed.

Case Report

A 62-year old male patient was referred to Department of Prosthodontics, from Department of oral and maxillofacial surgery for the fabrication of Gunning splint. History revealed that the patient had trauma in mandibular anterior region 5 days ago. (Fig. 1) On clinical examination, there was pain and swelling at the fracture site. (Fig. 2) Mobility was also present between the two fractured segments of atrophic edentulous mandible. Orthopantomograph showed displaced mandibular fracture in right mandibular anterior region. Fracture line was extending till the base of the mandible in vertically favourable manner. (Fig. 3) General condition of the patient was

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Fig. 1 Extraoral photograph of patient



Fig. 2 Intraoral view of fracture site



Fig. 3 Orthopantomograph of patient showing displaced fractured segments

debilitated and frail. Hence, it was decided to perform closed reduction of the fractured mandible with Gunning splint instead of open reduction.

Procedure Used for the Fabrication of Gunning Splint

Impression of fractured mandibular arch was made with irreversible hydrocolloid impression material (Tropicalgin, Zhermack, Italy), while for maxillary arch, medium fusing impression compound was used. (Y DENT, India) (Fig. 4). Impressions were immediately poured in dental stone to obtain casts. Mandibular cast was altered by cutting it into two parts exactly in same way as the fracture in the patient's mouth (Fig. 5). These parts were then repositioned to resemble normal mandibular contours. On this altered cast, the record bases were fabricated and occlusal rims were made. Approximate jaw relation was made by clinical judgement and it was mounted on an articulator. Then the occlusal rims were altered. One anterior opening was made in rims for feeding purpose and posteriorly interlocking mechanism was provided to avoid any movement between two splints (Fig. 6). The splints were made in heat cured acrylic resin (HEAT CURE, DPI, Mumbai). The arch bar was incorporated on buccal side of each splint with help of self cured acrylic resin (Fig. 7). These arch bars were used for intermaxillary fixation of the splints. The splints were checked in patient's mouth for extension and frenum relief. Then finishing and polishing of splints was carried out and they were disinfected in glutaraldehyde solution,

During surgical procedure, first the maxillary splint was fixed with per-alveolar wiring. (Fig. 8) Close reduction of mandibular segments were carried out with hand manipulation of two fracture segments to their approximate position. The tissue side of mandibular splint was relined with low fusing impression compound. This was done to compensate for any discrepancy between the splint and the mandible and also to provide firm immobilization of mandibular segments [5]. Mandibular splint was fixed by circum-mandibular wiring (Fig. 8). After securing the splints to the underlying bone, intermaxillary fixation was done with arch wires to provide firm immobilisation (Fig. 9). This was kept for 6 weeks after which it was replaced with elastics. Orthopantomogram showed complete reduction of fractured segments (Fig. 10).

Discussion

Normal aging process is associated with significant changes in the functional vascular supply of mandible [5]. The endosteal supply from inferior alveolar artery begins to disappear and bone becomes increasingly dependent on periosteal network of vessels for its blood supply. Atrophic edentulous mandible has a reduced cross-sectional area as compared to dentate mandible. Due to decreased vascularity

Fig. 4 Impressions of mandibular and maxillary arches



Fig. 5 Mandibular cast split according to fracture site

and dense sclerotic nature of bone, open reduction of mandible will lead to slow and complicated healing process of the fracture site [6]. If mandible is atrophic, then the fractured fragments will be more easily displaced. Due to decrease in bone height, it is not suitable for screwing and plating the fracture site. Close reduction with Gunning splint is advantageous because, not only it preserves the periosteal blood supply, but also provides firm mandibular fixation and immobilisation [7].

Advantages

1. It does not require surgical exposure of fracture site
2. Can be used in both dentulous and edentulous patients
3. In edentulous cases, even the previous dentures can also be used as splints to stabilize the fractured segments, if the fracture line is present in the denture bearing area
4. It is a minimally invasive technique



Fig. 6 Occlusal rims with opening in midline

Disadvantages

1. Inadequately secured splints—if circummandibular wires placed too close to the fracture site
2. Contraindicated in unfavourably displaced fractures
3. The splints may become foul, if proper oral hygiene is not maintained

Conclusion

In almost all the selected and planned cases of fractured atrophic edentulous mandible, a satisfactory union of the fractured segments can be obtained with Gunning type of splint. The splints are easy to fabricate, are cost effective and

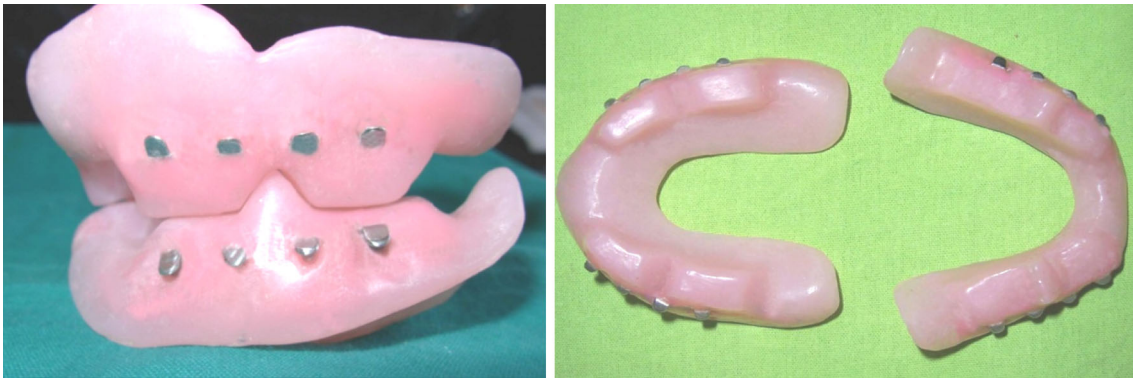


Fig. 7 Final Splints with attached arch bar

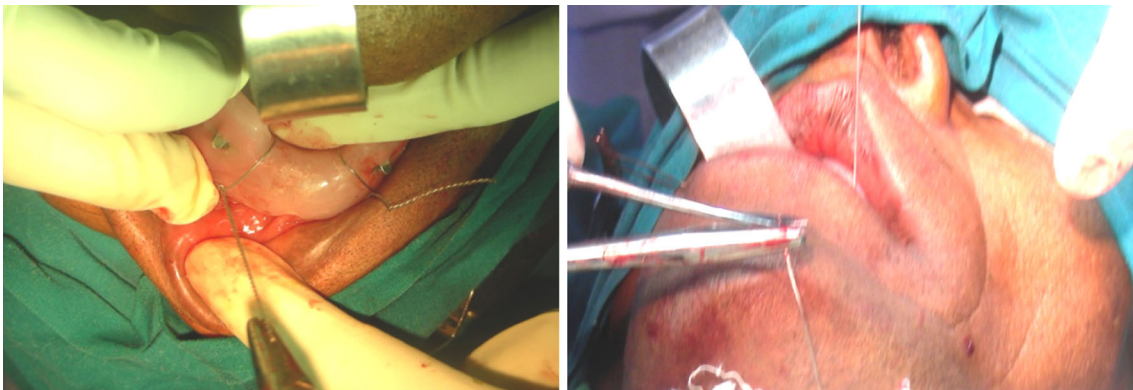


Fig. 8 Fixation of splint



Fig. 9 Intraoral photograph of Gunning splint

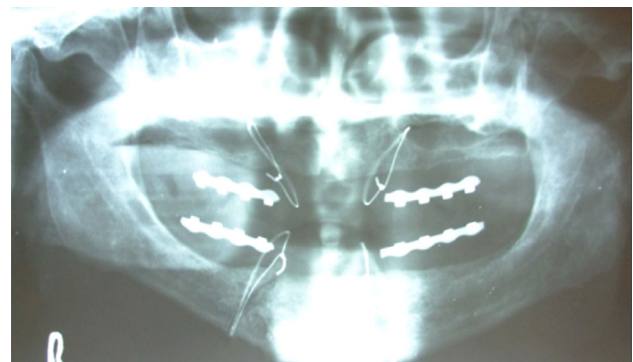


Fig. 10 Orthopantomograph of patient after reduction

minimally invasive for the treatment of fractured jaw segments. Gunning type splints, when properly designed and planned for a particular case; prove to be a very good treatment option for fractured atrophic edentulous mandible.

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