CASE REPORT

3 Dimensional Plate in Management of Sagittal Palatal Fracture: A Novel Technique

Anshul Rai¹

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Abstract The palatal fracture is rare. There are varieties of techniques mentioned in the literature for fixation of palatal fracture. The management with Kirschner wire fixation, maxillary arch stabilization with the arch bars, trans-palatal, intra osseous, inter-molar, figure of eight wiring were technique sensitive and having poor patient compliance. We recommended the use of isolated 3 dimensional plate for fixation of sagittal palatal fracture.

Keywords 3D plate · Sagittal palatal fracture · ORIF · RAI technique

Introduction

The palatal fracture is rare and most of the times associated with maxillary fracture. Their management is a matter of debate. Rimell and Marentette [1] first reported internal fixation in palatal fractures with micro-plating of alveolar process without fixation of the palatal vault. There are varieties of techniques mentioned in the literature for fixation of palatal fracture including plate fixation of alveolar process in isolation or associated with inter-molar wiring, with combined splint and inter molar wiring, mesh fixation of alveolar process, with external plate fixation of palatal vault, with external screw fixation of palatal vault, etc. [2]. We herein report a novel technique of palatal fracture fixation with isolated 3 dimensional (3D) plate.

Case Description

A 27 year old male patient, conscious, cooperative and well oriented to time, place and person reported to us with the chief complaint of mobility of upper front teeth and difficulty in eating after fall while walking. On clinical examination there was mobility of upper right and left central incisors; as well as mobility of anterior maxilla, palatal bone and flaring of the maxillary arch. The provisional diagnosis of sagittal palatal fracture was made which was confirmed on radiograph i.e. computed tomography (CT) scan (Fig. 1). Under general anaesthesia, a mid palatal incision was given to expose the fracture site. The exposure of fracture site was done through the mid-palatal incision, maxillo-mandibular fixation was done with the help of an arch bar to achieve the occlusion and after that Hayton William forcep was applied around the maxillary arch in the molar region for reduction of fracture and fixation was done with 3D plate (Ortho Max Shreerang Apartments, Kothi, Baroda, India) and 4 mm diameter screws after drilling the holes with 1 mm drill bit under copious saline irrigation (Fig. 2). The palatal flap was sutured back with vertical mattress suturing to avoid post operative dehiscence.

Indications of 3D Plate in Palatal Fracture

1. Sagittal fracture.
2. Para sagittal fracture.
3. Transverse fracture.
4. In edentulous palatal fracture patients.

✉ Anshul Rai
anshulrai007@yahoo.co.in

¹ Department of Trauma and Emergency Medicine, AIIMS, Bhopal, MP, India

Fig. 1 Computed tomography scan showing sagittal palatal fracture

Fig. 2 Fixation of fracture with 3D plate

Advantages with the Use of 3D Plate

1. It forced the fractured palatal fragments towards each other providing excellent reduction and good stability (Fig. 3).
2. Very useful in partially and complete edentulous patients.
3. 3D plates interfere less with speech and eating compared with circum-dental wires.
4. Post operative intermaxillary fixation (IMF) not required.

Fig. 3 Occlusal radiograph showing reduction and fixation of palatal fracture with 3D plate

Discussion

The management of palatal fracture with Kirschner wire fixation, maxillary arch stabilization with the arch bars, trans-palatal, intra osseous, inter-molar, figure of eight wiring were technique sensitive and having poor patient compliance [3]. It is very difficult to achieve functional occlusion, proper stability and reduction when these techniques are used in isolation. The use of 3D plate eliminates all these drawbacks.

The trans-palatal screw traction causes difficulty in speech and eating; most important drawback of this technique was that it does not expose the fracture site and chances of bone mismatch are very high [4]. Similarly the inter-molar wiring is retained for 4–5 weeks which is done in a trans-palatal direction from left molar to the right molar. The wiring can interfere with speech, irritate the tongue and it is very difficult to maintain the oral hygiene. All these disadvantages were not noticed while using 3D plate for fixation [5].

The maxillary arch is U shaped and divided into two unstable segments after fracture, a strong inward force in the transverse direction is required to achieve proper reduction and use of single miniplate either 2 or 4 hole with gap can cause displacement of the reduced fracture fragment and can result in infection and malocclusion [6]. On

the other hand 3D plate had two bars strong enough to maintain fracture fragment into reduced position.

Cienfuegos et al. [7] advocated plate fixation of the alveolar ridge with external fixation of the palatal vault with 2-mm miniplates that were screwed into the hard palate on top of the mucosa over a reduced fracture line. This may cause food lodgement over the plate and difficulty to clean resulting in infection. This may also result in mucosal necrosis and fistula formation. With the use of 3D we did not face these problems.

Denny and Celik in cases of sagittal fracture used box miniplates at the alveolar process and palatal vault [8] which is almost similar to the plates used in the present technique except that at the alveolar process we stabilize the fracture fragment with the help of the arch bars and wires. Pollok [9] used mini locking plates for fixation of the palatal fracture and concluded that the ideal treatment of palatal fracture is open reduction and internal fixation.

Plate and screws exposure, development of palatal fistula, mucosal necrosis, exposed bone or infection were the complications reported in the literature [7, 10] after open reduction and internal fixation (ORIF) of palatal fracture; we did not notice such complications in all our three cases.

We have reported this technique after successful treatment of three patients with 3D plate. To know the superiority of this technique further clinical trials are required with large sample size to compare the present approach with other methods of fixation of palatal fracture and to determine the advantages and disadvantages of this new method.

Compliance with Ethical Standards

Conflict of interest Author declares that he has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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