Case Report
Volume 12:5, 2022

Clinical Case Reports

ISSN: 2165-7920 Open Access

Bone Supported Arch Bars: A Boon or Curse in Condylar Fractures?

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Abstract

Intermaxillary Fixation (IMF) is a standard component of the treatment of maxillary and mandibular fractures. Several techniques have been described, most of which involve the placement of wires around teeth. However, these approaches are limited in the setting of poor dentition or in patients who are partially edentulous, can be time consuming, and are associated with risks of mucosal, dental, and needle stick injuries. Bone supported devices such as bone supported arch bars have been described, but may be limited to minimally displaced and favourable fractures and do not exert a tension band effect. An alternative is the use of titanium arch bars fitted with eyelets for locking screw fixation directly to the maxilla and mandible. This device combines features of arch bars and bone supported devices, potentially yielding the advantages of both. This is a case report to convey our experience of bone supported arch bar on patient with reduced mouth opening and poor accessibility.

Keywords: Intermaxillary fixation • Mandibular fractures • Mucosal • Mandible

Introduction

Intermaxillary Fixation (IMF) is a standard component of the treatment of maxillary and mandibular fractures. Several techniques have been described, most of which involve the placement of wires around teeth. However, these approaches are limited in the setting of poor dentition or in patients who are partially edentulous, can be time consuming, and are associated with risks of mucosal, dental, and needle stick injuries [1,2]. Maxillofacial surgery, especially that related to facial fracture management, has evolved exponentially, from the days of cumbersome, painful procedures such as wiring and arch bar fixations to the current rapid, efficient, and painless techniques of the intermaxillary fixation screw (IMFS) technique. The traditional wiring techniques reported in published studies for achieving intermaxillary fixation (IMF) have been eyelet interdental wiring by Robert H. Ivy in 1922, Erich's arch bar, Gilmer's wiring, and Stout wiring [3,4]. Because of discomfort, difficulty in wire removal, and maintaining oral hygiene, patients have a low acceptability to arch bars [5]. In addition, the incidence of glove perforation was significantly high with wiring techniques, which increases the percutaneous injury risk [6]. Bone supported devices such as bone supported arch bars have been described, but may be limited to minimally displaced and favourable fractures and do not exert a tension band effect [1,2]. An alternative is the use of titanium arch bars fitted with eyelets for locking screw fixation directly to the maxilla and mandible. This device combines features of arch bars and bone supported devices, potentially yielding the advantages of both. Potential advantages include applicability in cases of poor dentition or in partially edentulous patients, tension band effect, less time required for device application, and decreased risk of needle stick injuries. However, possible disadvantages include tooth root or mucosal injury, interference with concurrent internal fixation procedures, screw loosening, and hardware failure [7-9].

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Received: 07 May 2022, Manuscript No. jccr-22-63050; **Editor assigned:** 09 May 2022, PreQC No. P-63050; **Reviewed:** 30 May 2022, QC No. Q-63050; **Revised:** 02 June 2022, Manuscript No. R-63050; **Published:** 09 June 2022, DOI: 10.37421/2165-7920.2022.12.1508

Case Report

Patient named Himanshu reported to the department of OMFS with the chief complaint of reduced mouth opening and pain on left and right of the face. He also complained of inability to chew food. He gave the history of Road Traffic Accident. He stated that he fell from the bike around 10 days prior and then he reported to a nearby hospital where from where he received first aid and painkillers but even after 10 days of accident, he didn't get any relief from pain and along with the reduced mouth opening after which he was referred to ITS-CDSR, Muradnagar, Ghaziabad.

On diagnosis it was seen that his mouth opening was only 20 mm and there was tenderness bilaterally on TMJ. It was also observed that there was clicking sound on opening and closing of mouth with deviated mouth opening. After which radiographic examination was done and it revealed that there was bilateral condylar fracture.

Treatment Plan

The patient was given two treatment options i.e. the conservative method of management and also the surgical option ie ORIF but the patient wanted to undergo conservative treatment so the introduced treatment plan was the placement of bone supported arch bar in both the maxillary and mandibular arches followed by IMF for at least 6 weeks.

Methodology

After obtaining the informed consent from the patient, the patient was draped and scrubbed with the help of betadine solution. This was followed by infusion of local anaesthetic (2% lignocaine with 1:100,000 adrenaline) agent at the procedural site.

Five 2.0- and 6-mm-long stainless-steel screws were used in the maxilla and five 2.0- and 8-mm-long screws were used in the mandible. The number of screws placed was based on ensuring that there were at least 2 screws on either side of a fracture. The length of bone supported arch bar was measured from 1st molar of one side to 1st molar of other side in both the maxillary and mandibular arches. The morphology of the roots was analysed and with the help of straight fissure bur (no 702) the holes were drilled between the two roots. The drilling started with the anterior region: The first hole was drilled between the central incisors of the maxillary arch and the arch bar was

stabilized by tightening the screw with the help of screw driver, then the screw placement was done on either side between 2nd premolar and molar and then the last two screws were placed according to the need of stability. This same procedure was repeated in mandibular arch. Then the IMF was done with the help of elastics (Figure 1)

The obstacle

The maxillary arch bar was easy to place in this case but when it came to the mandibular arch the problem of accessibility was encountered due to reduced mouth opening. The mandibular arch bar was initially stabilized by placing the screws in between the two central incisors, then the screw was placed on the right side between tooth number 45 and 46. The problem of accessibility posed a major issue when stabilization was to be done in the left region i.e. between 35 and 36. Excess of bleeding and salivation also posed to be an issue while placing the screw between these two teeth. Although we managed to put the screw and stabilize the arch bar somehow but the bleeding from that region didn't arrest and hence the patient was kept in male general ward for observation.

After 2 hours the bleeding from that region increased that kept on increasing with time, after that betadine pressure pack was applied although the bleeding stopped for some time but it again started after 30 minutes. The pressure pack was again changed and along with betadine pressure pack the adrenaline solution was also applied with the intention to stop bleeding, when this attempt was also unsuccessful, AB gel was used. The bleeding although stopped for few hours but it again started after 3 hours then the injection of tranexamic acid was given but it was also ineffective in achieving the haemostasis.

At last, the bone supported arch bar of the mandibular segment was removed and it was seen that the bleeding was due to the screw placed between tooth number 35 and 36. Poor accessibility due to reduced mouth opening resulted in inappropriate tightening of the screw and the hole drilled between 35 and 36 posed as the site of bleeding. After the removal of mandibular arch bar, the bleeding got arrested by it but still a precautionary pressure pack was given.

The patient was recalled next day for follow up and further treatment after complete evaluation. He was then given Erich arch bar in the mandibular arch and IMF was again done.

Figure 1. Placement of arch BARS.

Discussion

This case proved to be a challenge for us and this was mainly due to the fact that reduced mouth opening resulted in poor accessibility. Bone supported arch bar has its upper hand over the conventional Erich arch bar when it comes to factors like time of application and removal, the gingival health and also the glove perforation but since every coin has two sides, this arch bar also has its advantages and disadvantages. The major disadvantage is quite clear in this case is that this arch bar is not versatile, it cannot be used efficiently in all the cases specifically in cases where there is reduced mouth opening. Bilateral condylar fracture as such in this case with mouth opening of 20 mm the posterior segment of left side wasn't accessible and this resulted in inappropriate loosening of the screw in the hole between 35 and 36 which later on became the site of bleeding. Repeated efforts were done to arrest the bleeding which was not that successful and ultimately the removal of arch bar only resulted in arrest of bleeding.

Conclusion

Although bone supported arch bars are superior to conventional Erich arch bars in many important aspects like gingival health, time for application and removal and also doesn't result in much of glove's perforation but still it is very technique sensitive and cannot be used in every other cases. Along with the cost, the chances of failure due to technique sensitivity are also high. Hence in cases where there is poor accessibility and reduced mouth opening the Erich bar should be considered over bone supported arch bars.

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How to cite this article: Srivastva, Pallavi, Vidhi C Rathi, Rahul Kashyap and Gauri Bargoti. "Bone Supported Arch Bars: A Boon or Curse in Condylar Fractures?." Clin Case Rep 12 (2022): 1508.