Comparison of circummandibular wiring with resorbable bone plates in pediatric mandibular fractures

D. Saikrishna · Nimish Gupta

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Abstract Pediatric patients present a unique challenge to maxillofacial surgeons in terms of their treatment planning as well as in their functional and nutritional needs which are different from that of adult patients. Early literature has advocated conservative closed management of pediatric fractures to prevent complications. However recent advances in maxillofacial surgery has enabled us to use biodegradable plates and screws, which overcomes the limitations of metallic plates. We present a comparison of two cases of parasymphysis fracture treated with circummandibular wiring and biodegradable plate fixation their outcome in terms of fracture healing and functional stability.

Keywords Parasymphysis fracture · Circum-mandibular wiring · Biodegradable plates and screws

Introduction

Maxillofacial fractures are less common in children. The incidence ranges from approximately 1% in children under age of 5 years to 8% in children younger than 12 years of age [1]. Mandibular fractures are reported to belong to most frequent facial fractures in pediatric patients. Conservative approach in treatment of maxillofacial trauma in children was common for many reasons, the presence of tooth buds and elasticity of pediatric bone were factors for splinting or IMF as standard treatment for mandible

fracture in children during deciduous dentition. Open reduction and fixation was avoided for preventing harm to the teeth. Nondisplaced fractures are better treated by traditional methods of soft diet or closed reduction. Displaced fractures are better served by open reduction and internal fixation [2].

Development of microplate and screws have made it possible to apply these fixation materials in pediatric traumatology but found to have limitations in terms of growth restriction, stress shielding and corrosion. Introduction of biodegradable plating system has added a new dimension in pediatric trauma treatment (Fig. 1).

Patient and Method

Two patients of age 7 and 5 years were treated for favourable mandibular parasymphysis fracture. In case 1 fracture was reduced and stabilization was done with the help of custom made splint covering the buccal and lingual alveolar mucosa, held in place by circum-mandibular wiring. In case 2 after open reduction of fracture through intraoral vestibular degloving incision and subperiosteal dissection, stabilization was done with four holed biore-sorbable plate and screws at the lower mandibular border (Fig. 2).

Results

Fracture healing was satisfactory in both the operated cases with clinical and radiographical evidence of union of fracture segments at the end of 1 year. Both cases were followed for a period of 1 year. There was uneventful soft and hard tissue healing in both cases with no

D. Saikrishna (✉) · N. Gupta
Department of Oral and Maxillofacial Surgery, JSS Dental
College and Hospital, Mysore, Karnataka, India
e-mail: degalasaikrishna@gmail.com

Fig. 1 Splint with circummandibular wiring

Fig. 3 Resorbable plate

Fig. 2 Occlusal photograph

Fig. 4 Occlusal photograph of ORIF patient

complications. Healing of bone was monitored regularly by clinical as well as radiographical examinations. There was no evidence of any malocclusion or any growth restriction during 1 year follow-up period (Fig. 3).

Discussion

Pediatric patients present a unique challenge to surgeon because of the type and frequencies of injuries sustained by children are often different from adults. There is general preference for conservative or closed approach towards the fractures in pediatric cases due to multiple reasons like fear of damage to developing teeth, stripping of excess periosteum, remarkable healing capacity of bone in children, scar development, fear of growth restriction after placement of metallic plates and most importantly abundant of clinical data in support of good results after closed reduction [3] (Fig. 4).

Sometimes open reduction and internal fixation becomes necessary as for example in cases with bilateral condylar

fracture with symphysis or parasymphysis fracture of mandible where stabilization of symphysis or parasymphysis fracture can facilitate in early mobilization of mandible with minimal or absolutely no need for intermaxillary fixation. But ongoing development of mandible increases risk of intrabony translocation of metal plates and screws risking potential growth and teeth development [4]. In both of our cases there has been complete union of the fractured segments with no evidence of any occlusal disharmony or any functional derangement. Bioresorbable plate fixation at the inferior mandibular border is safe position with no fear of any injury to tooth buds. In our follow-up period of 1 year there were no signs of any growth restriction and patients were allowed to have soft/liquid diet with regular mandibular functioning from day next to operation.

Conclusion

Our follow-up period is less and patient preference claiming for any long term results, but the initial results have come out

quite satisfactory. Favourable results regarding circum-mandibular wiring have been published earlier in literature. Bioresorbable plates in our case have shown sufficient stability and rigidity for time period necessary for healing of fracture without any evidence of growth changes.

Bioresorbable plate fixation in pediatric maxillofacial fracture cases appears to be an dependable option, especially for the cases where open reduction and internal fixation with plates and screws is treatment of choice and expected to result in favorable outcome.

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