

Management of mandibular fracture in a medically compromised pediatric patient

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ABSTRACT

Maxillofacial injuries in pediatric population warrant special attention because of anatomic considerations, potential for growth disturbances and rapidity of healing. We report a case of displaced mandibular fracture in a child who tested positive for hepatitis B surface antigen (HbsAg) and, therefore, was managed conservatively by closed reduction stabilized with acrylic dental splints fabricated on reduced dental models.

Key words: Mandibular fracture, open reduction and internal fixation, pediatric, splint

INTRODUCTION

Maxillofacial injuries in pediatric population warrant special attention because of anatomic considerations, potential for growth disturbances and rapidity of healing. The incidence and etiology of pediatric trauma is largely affected by age-related activity, besides social, cultural and environmental factors.^[1]

Midface fractures are rare in children because of retrusive position of midface relative to prominent calvaria. Therefore, mandibular fractures are more frequent facial skeletal injuries reported in hospitalized pediatric trauma patients.^[2] While treating these mandibular fractures, one has to bear in mind the important differences between management of children and adults with facial fractures, with reference to both preliminary and definitive management.

While open reduction and internal fixation is undoubtedly the treatment of choice in mandibular fractures in adults, the same may not hold true for

pediatric population, mainly because of developing tooth bud at inferior border and the potential for inducing growth disturbances. Apart from these factors, presence of adverse systemic condition may further alter the proposed treatment plan.

We report a case of displaced mandibular fracture in a child who tested positive for hepatitis B surface antigen (HbsAg) and, therefore, was managed conservatively by closed reduction stabilized with acrylic dental splints fabricated on reduced dental models. This technique helped us in preventing prick injury during local anesthesia administration, circummandibular wiring and through the complete process of an invasive surgery under general anesthesia. Hence, the spread of blood borne viruses (hepatitis B) among the operating room personnel was avoided.

CASE REPORT

A 7-year-old boy reported to the Department of Oral and Maxillofacial Surgery of U.P. Dental College and Research Centre, Lucknow, with a history of fall from a 10-feet high guava tree.

Extraoral examination revealed facial asymmetry with mild swelling in the region of right parasymphysis of mandible. On palpation, there was step and tenderness in the right parasymphysis and left body region of the mandible.

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Intraoral examination revealed deranged occlusion with anterior open bite and molar gagging onto the left side [Figure 1]. On palpation, there was step and tenderness in right parasymphysis region between lower right deciduous lateral incisor and deciduous canine and left body region between permanent 1st molar and permanent unerupted bud of 2nd molar.

Routine blood examination [Hb%, total leukocyte count (TLC), differential leukocyte count (DLC), bleeding time (BT), clotting time (CT), HbsAg and human immunodeficiency virus (HIV)] and radiographic examination [orthopantomogram (OPG), PA view of mandible and lateral oblique view] was done. The routine blood examination reported the patient to be HbsAg positive along with an Hb% of 8 g%.

The OPG showed right parasymphysis and left body fracture of the mandible, with significant inferior displacement of right parasymphysial segment along with superior and medial displacement of left body segment [Figures 2–4].

Management

Compromised medical status of the patient refrained us from doing ORIF under general anesthesia and hence he had to be managed by conservative means.

Alginate impressions of upper and lower jaws were poured with dental stone. The mandibular cast was sectioned at the fractured site with the help of hex saw. The sectioned segments were then reduced in accordance of maximum intercuspation with the teeth in the upper cast and stabilized in reduced position.

An occlusal splint was constructed with clear heat cure acrylic over the reduced mandibular cast. Closed reduction of the fractured segment was done under local anesthesia. The splint was then secured over the reduced mandibular arch with the help of zinc phosphate cement [Figure 5].

Immediate postoperative OPG showed an appreciably good basal reduction at both the fracture sites [Figure 6].

The patient was kept on a soft diet, with regular follow up for a period of 3 weeks. Splint was removed and the healing thereafter was uneventful.

DISCUSSION

The basic techniques for management of mandibular fracture during the deciduous and mixed dentition have undergone little change since 1943.^[3] Undoubtedly, the consideration of the effect of treatment should always, in every case, be weighed on risk versus benefit ratio.

Review of literature repeatedly points that fracture treatment in children differ from that in adult because of anatomic consideration (presence of numerous tooth buds in developing mandible), potential for growth disturbance, rapidity of healing and degree of patient cooperation.^[1] Methodical and thoughtful evaluation of these points, in most instances, help in formulating a treatment plan that may be individually customized depending upon the site of injury, degree of displacement and patient's age.

Today, ORIF has become the standard for management of displaced fractures. ORIF provides stable three-dimensional reconstruction, promotes bone healing, shortens treatment time and eliminates the need for or permits early release of maxillomandibular fixation. (MMF),^[2] thereby allowing immediate jaw mobilization.^[4] Decreased dependence on MMF improves respiratory care, nutritional intake and oral hygiene measures. Although no adverse effects have been reported in humans,^[5,6] it is recommended that plates should not traverse suture line or midline of mandible and should be removed as early as 2–3 weeks after placement.^[7,8] Also, the use of resorbable plates and screws for fixation of pediatric facial fractures is both well tolerated and effective.^[4]

The temptation to perform open reduction and direct fixation in an attempt to minimize the adverse effects on mandibular growth, which an extended period of MMF may have, must be balanced with the potential surgical damage to the developing structures encountered, such as the periostium, soft tissues,^[9] as well as presence of tooth germs. Other tooth-related factors of importance, influencing decisions on the best treatment option, are the number of teeth present, the age of deciduous teeth and their stage of bone resorption and the potential effect on the condylar growth center. All these factors should persuade the attending clinician, when confronted with a mandibular fracture in a child under the age of 5 years, to give serious consideration to conservative management.^[10]

If the stabilization of reduced fractured segment is accomplished by an acrylic splint which is fabricated on a reduced mandibular cast, precluding the necessity for MMF, the discussion falls again in favor of conservative management. Regarding the concern for degree of patient cooperation, Waldran *et al.* state, "patient and kind handling of these injured children will usually assure cooperation and an altogether satisfactory union of fractures."^[11] Our experience with the injured pediatric population has been the same.

Precise anatomic reduction and three-dimensional stability of fracture segments, as offered by ORIF, may be debated for or against conservative management,



Figure 1: Preoperative photograph

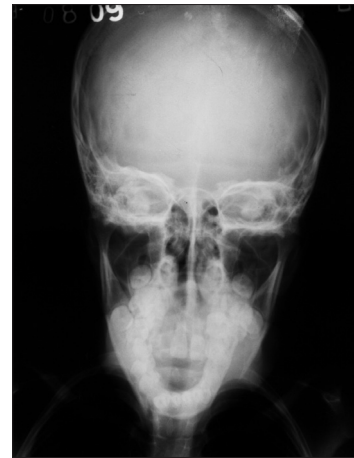


Figure 2: Posteroanterior view of skull



Figure 3: Lateral oblique view of skull



Figure 4: Preoperative OPG



Figure 5: Postoperative OPG



Figure 6: Occlusal splint

but remodeling eventually occurs under the influence of masticatory stresses, even when there is imperfect apposition of bone surfaces. Thus, there is a greater degree of tolerance permissible in alignment of the fragments and restoration of occlusion, which will subsequently be corrected by alveolar bone growth at the time of eruption of the permanent teeth.^[10]

Although our patient had a significant degree of displacement, both at parasymphysis and body region, due to the downward pull exerted by anterior belly of diaphragm and mylohyoid muscles, we aimed at

achieving reduction by closed means and assumed that if we could hold the reduced parasymphyseal dentate segment with the splint, upward rotation of the body would automatically be reduced and controlled. Meticulous reduction of mandibular cast and fabrication of acrylic splint resulted in an excellent degree of retention in patient's mouth after closed reduction and, that too, without adverse concerns that MMF can pose in young children, such as cooperation, compliance and inadequate nutritional intake.^[4] The procedure not only saved us the stigma of putting an HbsAg positive child under General Anesthesia for

surgery by ORIF but also allowed us to get away with splint fixation without circummandibular wiring, thereby preventing any chances of blood borne cross infection by prick injury.

CONCLUSION

In conclusion, our clinical experience supported by reports from literature, shows that conservative treatment protocols (close reduction) and stabilization with dental splint is an effective treatment modality for mandibular pediatric fractures. Though open reduction and internal fixation are widely in use, closed reduction, wherever can be accomplished, avoids risk of potentially growth disturbing interventional surgery.

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