Treatment of a mandibular fracture with biodegradable plate in an infant: Report of a case

Figen Cizmeci Senel, DDS, PhD,[a] Umut Saracoglu Tekin, DDS, PhD,[b] and Mehmet Imamoglu, MD,[c] Trabzon and Kirikkale, Turkey
KARADENIZ TECHNICAL UNIVERSITY AND UNIVERSITY OF KIRIKKALE

Mandibular fractures in infants are rare. Different methods have been described for treatment of fractures of the mandible in infants. Internal fixation of a mandibular fracture with a biodegradable plate in an 8-month-old baby is described. In addition, choices of treatment modality in such cases are discussed. **(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101:448-50)**

Mandibular fractures in infants (younger than 1 year of age) are rare. In the 0- to 1-year age group, the frequency has been reported to range between 0.9% to 2.6%.[1] Within this age group, the most frequent mandibular fracture site is the symphysis. The most common signs and symptoms are mobility and displacement at the fracture site, followed by gingival laceration and facial swelling, bone exposure, and submucosal hematoma.

Pediatric mandible fractures are treated by a wide variety of fixation methods such as acrylic splint, circummandibular wiring, intermaxillary fixation, intraosseous wiring, and internal fixation. Incomplete or nondisplaced fractures are treated by traditional methods of a soft diet or closed reduction. Displaced fractures are better served by open reduction and internal fixation.[2,3]

The body of literature on biodegradable materials goes back more than 30 years. In oral and maxillofacial surgery, biodegradable materials were first tested in animal studies[4,5] and later used clinically in humans for fixation in trauma.[6,7] Although few publications report the fixation of fractures with biodegradable materials,[4-7] no publication reports the internal fixation of infant mandibular fractures with biodegradable plates and screws.

The purpose of this report is to present the management of a fracture of the mandible in an 8-month-old infant using a biodegradable plate and screws with open reduction.

[a]Assistant Professor, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Karadeniz Technical University, Trabzon, Turkey.
[b]Assistant Professor, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, University of Kırıkkale, Kırıkkale, Turkey.
[c]Professor, Department of Otorhinolaryngology, Faculty of Medicine, Karadeniz Technical University, Trabzon, Turkey.
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CASE REPORT

On May 14, 2004, an infant was brought to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Karadeniz Technical University. Examination showed that the baby had extraoral hematoma around the area of symphysis. Intraoral examination showed that there was a displacement between the lower right and left incisor teeth. Diagnostic computed tomography (CT) was performed under sedation and confirmed the fracture (Fig. 1 and Fig. 2). The fracture was visibly displaced, and fragments were freely movable. The history revealed that the baby's head was compressed between the 2 layers of a sofa bed.

Treatment of the fracture with a combination of open reduction and semirigid fixation with a single bioabsorbable plate was planned. After induction, the patient was intubated via the nasal route without difficulty. Epinephrine 1:100 000 was infiltrated in the mandibular anterior vestibule. A horizontal incision was made at the crest. A mucoperiosteal flap was elevated to expose the fracture (Fig. 3). After reduction of the displaced fracture, a 4-hole plate (Inion 1.5-mm compact plating system (CPS) baby, Tampere, Finland) was adapted to the buccal side of the mandible, close to the inferior border, in order to avoid damaging the unerupted primary teeth and permanent tooth germs. The plate was fixed with 4 monocortical 1.5- × 4-mm microscrews (Fig. 4). The baby was placed on antibiotics and analgesics. Penicillin was given twice a day in a dosage of 50 mg/kg. In the follow-up period, the healing of the fracture was satisfactory. No deformities, functional restrictions, or complications were recorded. Drill channels and fracture line were not visible in the panoramic radiograph 8 months postoperatively (Fig. 5). There was no displacement with lateral flaring of the mandibular angles in the posteroanterior radiograph at 8 months (Fig. 6).

DISCUSSION

The incidence of jaw fractures in infants (0- to 1-year age group) is very low, and does not exceed 2.6% of all jaw fractures observed during the first decade.[1,8] At this age, mandibular condyle and ramus are rudimentary in form, and the mandibular body is filled with developing tooth buds. Within this age group, the most frequent mandibular fracture site is the symphysis.[9] Mandibular

Fig. 1. Axial computed tomography (CT) showing mandibular fractures in the symphysis region.

Fig. 2. Three-dimensional CT showing the markedly displaced fracture.

fractures in infants may result from trauma or short falls.[1] The fractured mandible in the infant was diagnosed clinically on the basis of a step deformity, hematoma in the floor of the mouth, and the mobility of the fractured segments.

Infants are generally apprehensive and difficult to examine. Therefore, their clinical examination can seldom be adequately accomplihed unless the infant is under heavy sedation or general anesthesia, and taking radiographs of good or even reasonable quality is troublesome and sometimes impossible. In this case, a CT was performed under sedation.

Treatment of mandibular fractures in infants presents unique problems not encountered with fractures in older children and adults. Minor greenstick fractures of the mandible in infants generally do not require immobilization. Simple body or angle fractures of the mandible in infants are generally treated with closed reduction.

Fig. 3. Intraoral view showing grossly displaced fracture of mandible.

Fig. 4. Four-hole microplate with 4 screws was placed on buccal side of mandible.

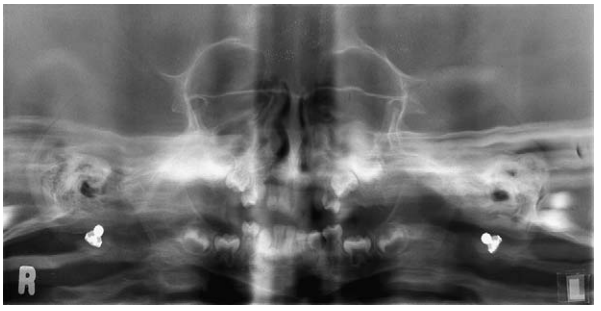

Fig. 5. Panoramic radiograph showing perfect healing of the markedly displaced fracture site 8 months postoperatively.

Closed reduction with splints fixed by perimandibular wires is the commonly recommended method of treatment.[2] Displaced and mobile mandible fractures often require open reduction and internal fixation. So as to not damage the tooth germs in this region the plates should be placed at the lower border or microplates

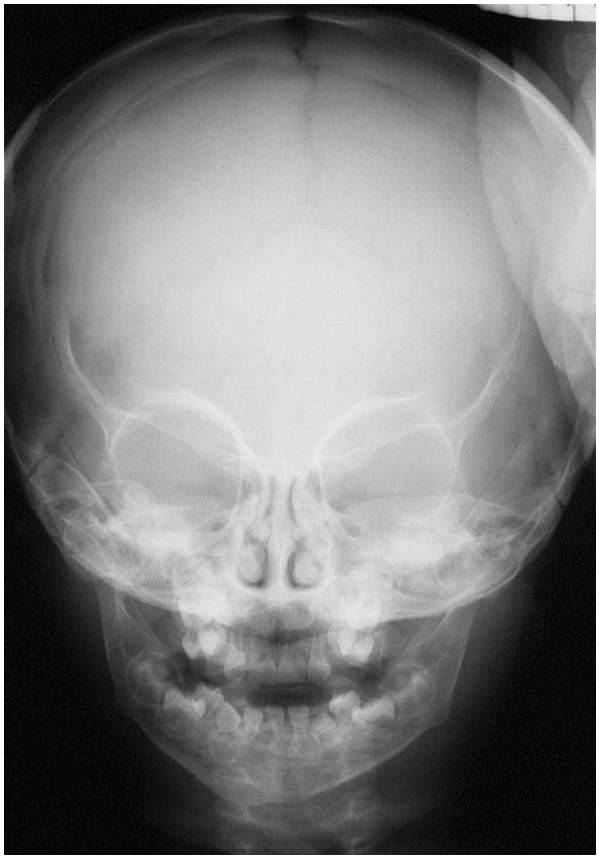

Fig. 6. Postero-anterior radiograph showing no lateral flaring of the mandibular angles.

and microscrews should be used with minimal traumatic technique.[10]

Acrylic splints, although effective, usually require intraoperative impressions and model fabrication. Although mandibular splint with circummandibular wiring is suitable for symhysis fractures in infants, the mandibular splint alone does little to control a significantly displaced fracture of symhysis.

Rigid metal fixation of mandibular fractures in children, however, can be complicated by a mixed dentition that can occupy the entire vertical dimension of the bone and places teeth at risk during screw insertion. In addition, ongoing development of the mandible poses risk of intrabony translocation of metal plates and screws, risking potential growth and teeth disturbances, and difficulty with secondary removal if needed.[11] For these reasons, the use of biodegradable plates and screws in developing jaw bones is a logical choice. As the pediatric mandible is fairly malleable, fractures tend to be less displaced and rarely comminuted. Because the dentition is often mixed and more growth is expected, absolute compression of the fracture edges together is not necessary. Unlike fixation with more rigid metal plates, biodegradable plates cannot be overbent and their physical properties allow them to lie passively against the bone.

Serel et al.[12] reported that absorbable plates could be an alternative method to metal microplates and screws. One siginificant advantage of resorbable screws in the pediatric mandible is the avoidance of potential odontogenic injury.[13] As the drill hole and tapping of the screw threads penetrate only the outer cortex, tooth bud injury is unlikely. Subsequent resorption of the screws removes any potential obstruction to tooth eruption.

We conclude that displaced symphyseal fractures of the mandible in infants may be treated with open reduction and biodegradable microplates, instead of splints, perimandibular wires, and internal fixation with metal plates. As such, biodegradable plates and screws may be applied in even the infant mandible where the entire bone is composed entirely of teeth and could be an alternative method.

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Reprint requests

Dr. Umut Saracoglu Tekin, DDS, PhD
Ozanlar Sokak No. 6/1
Kurtulus 06600
Ankara, Turkey
umutekin@gmail.com