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Case Report

Conservative treatment of paediatric mandibular fracture by the use of orthodontic appliance and rubber elastics: report of a case

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Abstract – Treatment principles of paediatric mandibular fractures may differ from the treatment of the adult population in that a conservative approach is in most cases advocated before the use of internal rigid fixation with plates and screws. This is because of a relative high risk of disturbed facial skeletal growth and risk of damaging unerupted teeth. Knowledge of conservative treatment options is essential in order to minimize these risks and one option is presented in this paper.This case report describes a 5-year-old girl that sustained an open fracture of the mandible and who was successfully treated by the means of applying orthodontic brackets and an arch bar combined with ligatures and rubber elastics.

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Paediatric fractures are rare when compared with fractures in the adult population and is estimated to occur in 5% of all maxillofacial traumas (1). The low incidence of facial fractures in young people is most likely because of a high cancellous to cortical bone ratio and lack of full pneumatization of the sinuses (2). Boys are more commonly affected than girls and the majority of injuries occur between 6 and 12 years of age. Most paediatric fractures result from motor vehicle accidents, falls and blunt trauma. Approximately 40% of all paediatric fractures involve the mandible (3). The basic treatment principles would not differ from the adult population if not certain anatomical features such as mixed dentition, unerupted teeth and ongoing growth had to be taken into consideration.

Open reduction and osteosynthesis of the paediatric fracture with titanium plates and screws is thought to have a negative effect on skeletal growth and unerupted teeth and involves two-stage surgery because of the need of plate removal after complete healing (4). The use of absorbable plates and screws are less likely to disturb facial skeletal growth but is still associated with risk of damaging unerupted teeth even when using monocortical screws (5). Because of these obvious risks closed reduction is in some cases advocated and knowledge of methods to accomplish this is necessary.

This paper describes a case of a paediatric mandibular fracture were treatment was performed with the use of orthodontic brackets, an arch bar and steel and rubber ligatures instead of using absorbable plates and screws in order to minimize the risk of complications.

Case presentation

The patient was a fully healthy and co-operative 5-year-old girl who had sustained a dislocated mandibular fracture after a fall indoors into a chair

2 days prior to the initial treatment. The patient was taken to the local dentist by the parents after notable lack of appetite and complaints of mouth pain. Clinical and radiological examination showed a dislocated fracture of the mandible in the area between the first and second right lower primary incisor (Fig. 1a,b). The patient was then referred to the department of Oral and Maxillofacial Surgery University Hospital in Uppsala County.

The clinical and radiological examination was expanded and no other injury but the fractured mandible was to be found. Because of altered occlusion and mobility in the fractured area of the mandible the patient was at first scheduled for open reduction and osteosynthesis with absorbable plates and screws the following day. No sign of infection was present but because of the open fracture antibiotic treatment was initiated with oral phenoxymethylpenicillin (Kåvepenin©, Astra AB, Södertälje, Sweden).

Under general anaesthesia, prior to the scheduled surgery, brackets and a rectangular wire (0.018″) was applied in the lower jaw to gain favourable reposition of the fracture. Rubber elastics was then added to the fixation in order to create a compressive horizontal force marginally over the fracture site from one side to the other, also secured secondarily by steel ligatures after reposition was accomplished. The fracture ends were manually moved carefully during compression so that further reduction of the fracture was seen. The patient was not put into inter-maxillary fixation because of the apparent stability of the horizontal fixation. The result of the performed closed reduction was successful and a decision to avoid further treatment was made (Fig. 2). The postoperative radiological examination showed successful repositioning of the fracture why the patient was given the permission to leave the hospital the following day. Antibiotic treatment for one week, soft diet and antibacterial mouth rinse (Clorhexidine) was prescribed.

Postoperative monitoring was performed on a weekly basis for the first month and was favourable regarding healing and function (Fig. 3a,b). The arch bar and brackets and the elastics and steel ligatures were removed after 1 month and the patient tolerated the treatment well. A 6-months follow-up showed complete clinical and radiological healing (Fig. 4a,b). The first right lower primary incisor was exfoliated. Radiological examination of the previous fracture site showed healing but could not reveal any information of the underlying erupting permanent incisor.

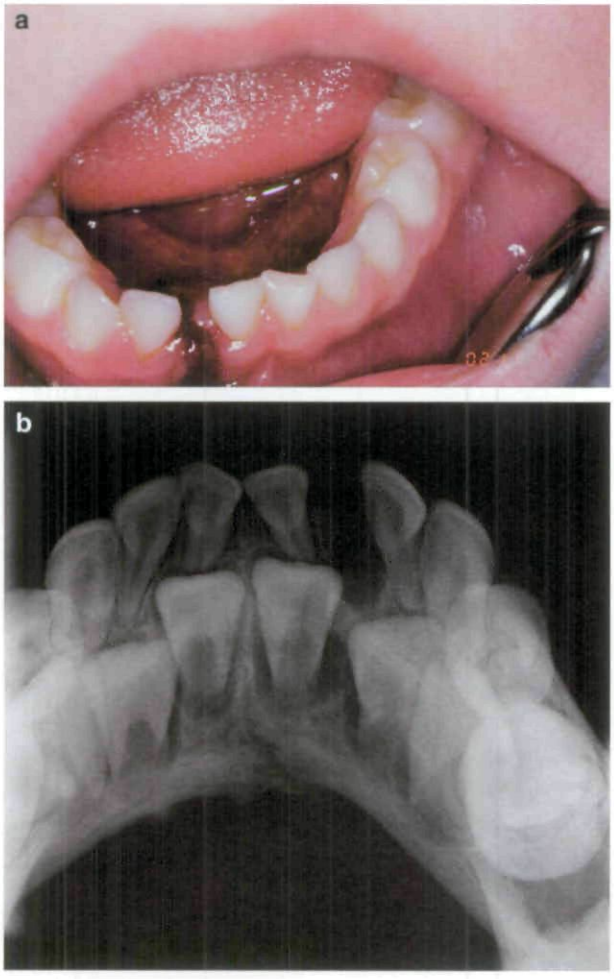

Fig. 1. Clinical (a) and radiological (b) fracture situation prior to reduction.

Discussion

The present case was first to be treated by open reduction and fixation with resorbable osteosynthesis plates and screws, which is now routinely performed in growing individuals at our institution. Although this innovation in skeletal surgery handles the issue of altered skeletal growth when using ordinary titanium plates and screws, the risk of damaging the tooth

Fig. 2. Preoperative appearance after completed reduction.

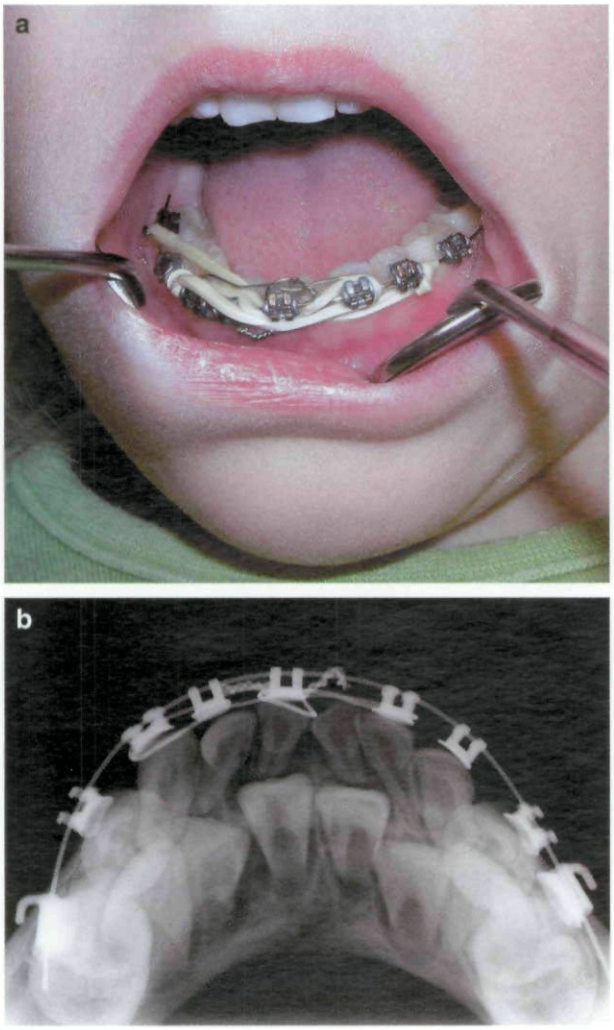

Fig. 3. Clinical (a) and radiological (b) situation 9 days postoperative.

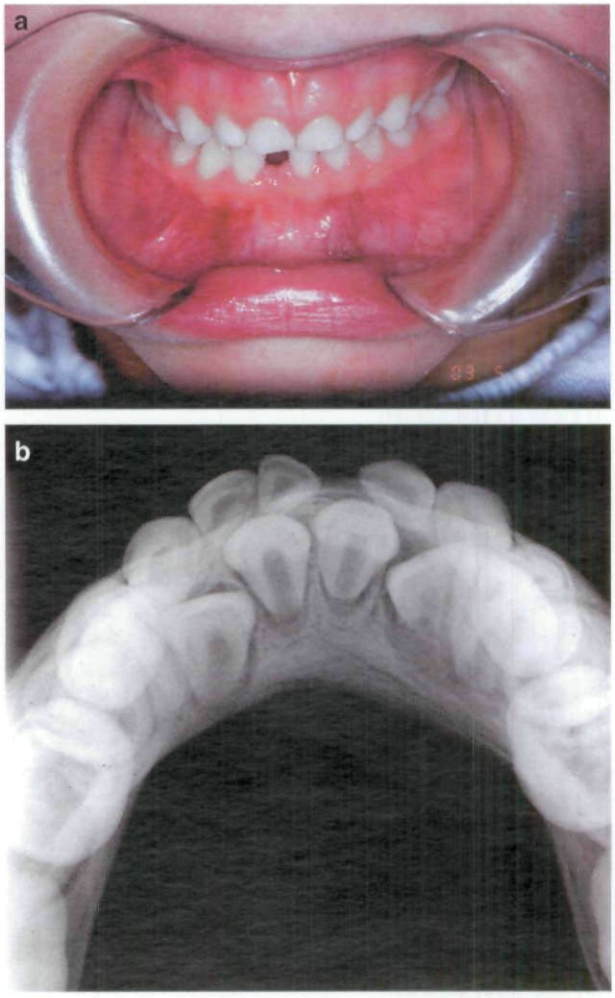

Fig. 4. Clinical (a) and radiological (b) situation at 6-months follow-up.

buds in the paediatric jaw is still present because of the drilling for direct application of the resorbable plates and screws. The available bone area for inserting screw and plate fixation between vital structures offers a great challenge associated with risks and a conservative approach is therefore of great value when treating paediatric jaw fractures.

The bonded arch bar used in this case added the favoured stability and gave the direction of the compressive forces given by the elastics and the digital manipulation. Because of the favourable pretraumatic occlusion with intact teeth in this case, the application of an arch bar with brackets was easy to perform. A case of mixed dentition or a case with severe caries may of course not be a suitable candidate for this kind of treatment.

The regenerative potential and bone healing capacity in a child is evidently higher than in an adult, which renders shorter healing periods. In this case the fixation was held for 4 weeks and the fracture site was found very stable at the time of fixation removal. So far, follow-up cannot yet reveal anything about the erupting permanent incisors adjacent to the fracture site. The patient is scheduled for another examination in 2 year time. The question arises whether open reduction even further adds to the risk of damaging the tooth buds in the fracture site.

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