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Paediatric mandibular fractures: report of a case

CASE REPORT

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Abstract – The conservative approach in the treatment of maxillofacial trauma in children has been widely adopted. The type of fracture and its presence within the growing facial skeleton along with the presence of tooth buds may result in different management strategies to that employed in adults. An understanding of conservative treatment options is essential to make informed choices which will best manage these injuries, and an example is presented in this paper. This case report describes a 14-year-old boy who sustained trauma to the chin as a result of a fall, causing a mandibular symphyseal fracture. He was successfully treated by the means of applying direct interdental wiring combined with an acrylic splint.

Maxillofacial fractures are less common in children than in adults. Boys are more commonly affected than girls by a ratio of 2:1 and the majority of injuries occur in teenagers. A fall from a bicycle, steps or climbing apparatuses is the most common cause of mandibular fractures. Approximately half of all paediatric facial fractures involve the mandible (1).

Treatment principles of paediatric mandibular fractures differs from the treatment of the adult population in that a conservative approach is, in many cases, highly advocated. This is because of the differences between adults and children in anatomic, physiologic and psychologic development. Not only do the consequences of trauma differ, but the management techniques should be modified to address the child's particular stage of anatomic, physiologic and psychologic development (2).

Open reduction and internal rigid fixation with titanium plates and screws is often employed. This technique, however may be challenging and could involve a high risk of disturbing the facial skeletal growth, as well as an increased risk of damaging unerupted or growing teeth (3, 4).

Treatment may include the use of absorbable plates and screws as these have been reported to cause less disturbance in facial skeletal growth, but are still associated with the risk of damaging unerupted teeth even when using monocortical screws (5).

An understanding of conservative treatment options is essential to make informed choices which will best manage these injuries. This paper describes a case of a paediatric mandibular fracture where treatment was performed with the use of direct interdental wiring and an acrylic splint instead of using absorbable plates and screws in order to minimize the risk of complications.

Case presentation

The patient was a healthy and co-operative 14-year-old boy who had sustained a minimally displaced mandibular fracture, after a fall from his house ceiling, 4 days prior to the initial treatment. The patient was taken to the local doctor by the parents after notable lack of appetite and complaints of mouth pain. The patient was then referred to the department of paediatric dentistry.

Clinical and radiological examination showed a minimally displaced fracture of the mandible in the area between the two mandibular permanent central incisors (Fig. 1a,b). This resulted in an altered occlusion and a midline diastema in the fractured area. The examination also revealed a subluxation of the upper permanent incisors, and an enamel fracture in one tooth.

Interdental wiring (0.5 mm stainless-steel wire) was applied under local anaesthesia to the lower incisors (Fig. 2), to gain favourable reposition of the fracture. This also created a compressive horizontal force marginally over the fracture site from one side to the other. Simultaneously, the fracture ends were manually moved carefully during compression so that further reduction of the fracture was seen. Once favourable occlusion was obtained, an impression of the lower arch was taken using alginate impression material. A hard acrylic splint was cemented 3 h later. The upper

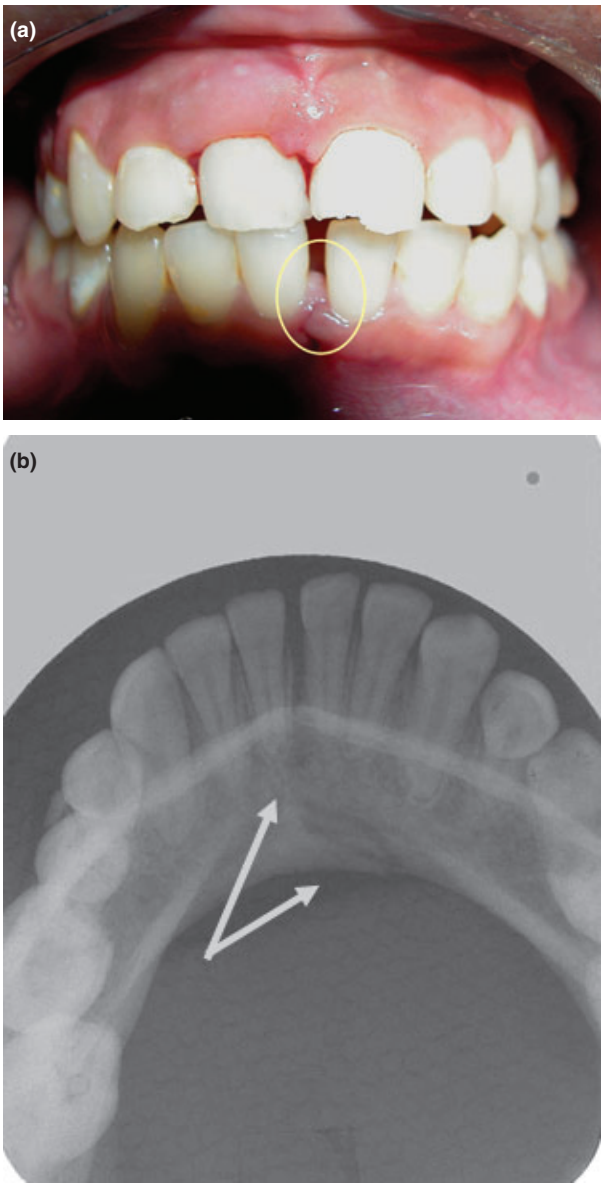

Fig. 1. Clinical (a) and radiological (b) fracture situation prior reduction.

permanent incisors were splinted with orthodontic wire splint for 2 weeks.

The patient was not put into inter-maxillary fixation because of the apparent stability of the horizontal fixation. This also met the parent's desire for a conservative treatment. The result of the performed closed reduction was successful and a decision to avoid further treatment was made (Fig. 3a,b).

The postoperative radiological examination showed successful repositioning of the fracture and thus the patient was given the permission to leave the hospital the same day. Antibiotic treatment for 1 week, soft diet, avoidance of physical activities and antibacterial mouth rinse (Clorhexidine 0.12%) was prescribed.

Postoperative monitoring was performed on a weekly basis for the first month and was favourable in both healing and function. The interdental eyelet wiring and acrylic splint were removed after 1 month and the patient tolerated the treatment well.

Follow-up 6 months later showed complete clinical and radiological bone healing and an optimum occlusion had been obtained. The teeth and periodontal tissues were also examined by testing; vitality, mobility, percussion, periodontal probing and radiography. All investigations were normal (Fig. 4a,b,c). Further follow-up was planned after 2 years.

Discussion

The present case is normally treated by open reduction and fixation with conventional titanium plates and screws. This, metallic osteosynthesis system are looked on as the 'gold standard'. However, this metallic system has an important disadvantage; in all cases, plate and screw removal is recommended, particularly in young children such as in this case. If not removed, Bos (2005) reported that the metal implants may cause stress shielding with local osteoporosis and possible refracture after removal. Removal is recommended for all young patients. This means a second operation is required along with a general anaesthesia and hospitalization (6).

The use of biodegradable plates and screws in developing jaw bones is a possibility, in which the biodegradable systems allows a gradual transfer of load

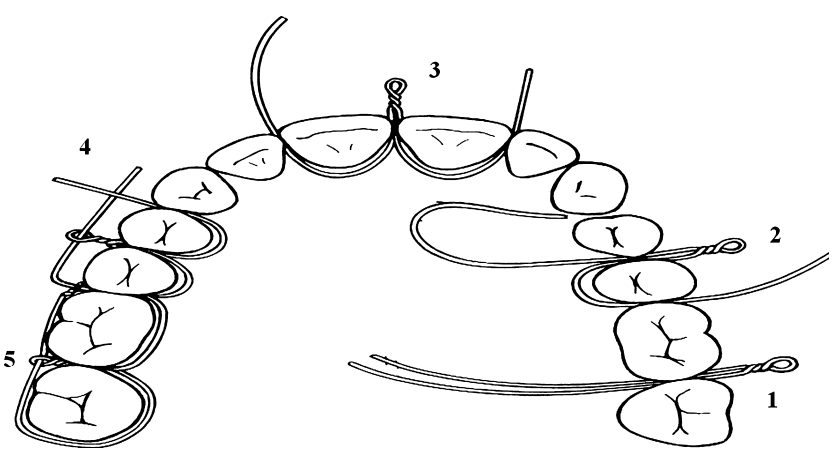

Fig. 2. Interdental wiring technique.

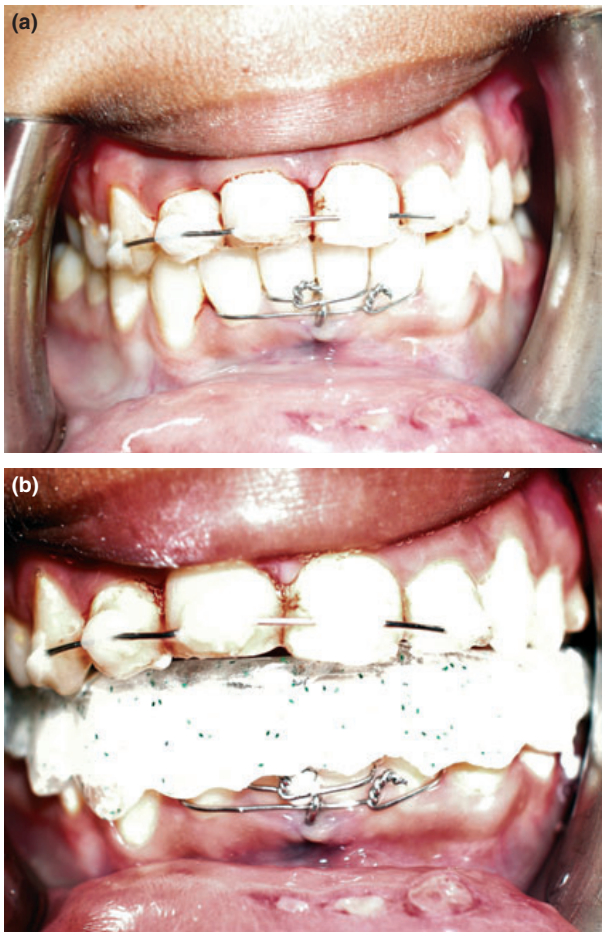

Fig. 3. Appearance during (a) and after (b) complete reduction.

to the healing bone during resorption and eliminates the need for a second operation (7). However, this was not useful in this particular case because it would have required general anaesthesia as well as hospitalization and the parents were opposed to both.

The treatment of displaced symphyseal fractures has included a closed reduction and immobilization with arch bars and elastics (8). This technique may lead to a great disturbance in the patient's lifestyle particularly feeding and speaking. Various authors agree that a long period of immobilization (more than 2 weeks) may cause ankylosis of the temporomandibular joint and damage in developing teeth (8, 9).

The degree of precision required in a child is not quite as great as in an adult, as the adaptive potential of alveolar bone and the replacement of deciduous teeth by permanent teeth can bring about a various degree of self correction. The high osteogenic potential of the paediatric mandible is responsible for a low complication rate (9).

The interdental wiring and the acrylic splint used in this case added a favoured stability and gave direction to the compressive forces that were given by the digital manipulation. Because of the favourable pretraumatic

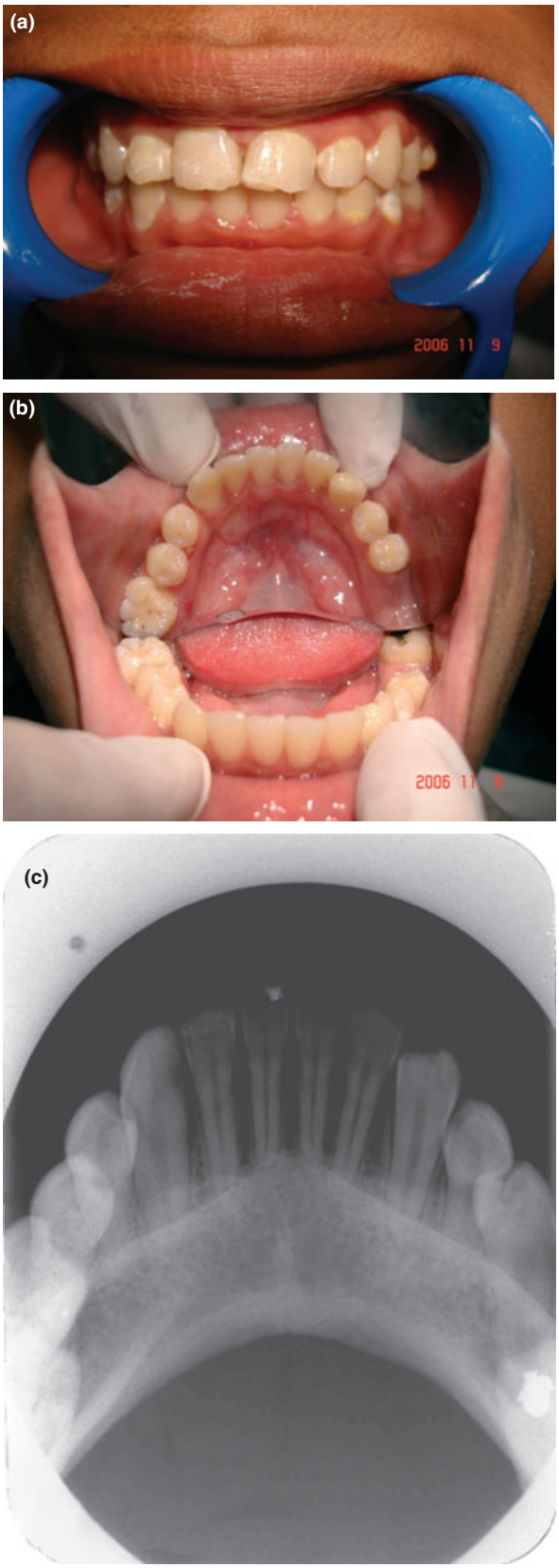

Fig. 4. Clinical (a,b) and radiological (c) situation at 6-months follow-up.

occlusion with intact teeth in this case, the application of an interdental wiring and an acrylic splint was easy to perform. A case of delayed treatment may make closed reduction impossible, and may not be a suitable candidate for this kind of treatment.

The objectives of surgical treatment of mandibular fractures are to restore normal occlusion and provide stability that supports fracture healing and allows normal eating and drinking. The use of interdental wiring with the acrylic splint achieves these goals, is inexpensive, does not require specialized skills or materials, and can be easily performed under local anaesthesia.

In a recent 1-year follow-up study that was related to the wire ligatures, the authors concluded that the wiring of teeth to splint jaw fractures caused no permanent changes in the tissues surrounding the teeth (10). The results of the follow-up of the fracture site in this case showed complete healing without any complications on the wired teeth or the surrounding tissues.

The technique described here is particularly helpful for greenstick or minimally displaced fractures. It may be particularly useful in rural areas where there is a high prevalence of poor living conditions, poor patient compliance and where general anaesthesia is not available.

This case report describes a mandibular symphyseal fracture, which was successfully treated by the means of applying direct interdental wiring combined with an acrylic splint. This case reinforces the previous recommendations regarding the conservative approach in the treatment of paediatric maxillofacial trauma. The treatment protocol should be expanded to include this approach and applied on children with mandibular fractures in the primary dentition, mixed dentition as well as permanent dentition.

Acknowledgements

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