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Bilateral complicated crown fractures secondary to chin injury: a case report

CASE REPORT

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¹Private Practitioner, Gainesville, FL, USA; ²Department of Pediatric Dentistry, Hadassah Faculty of Dental Medicine, Jerusalem, Israel; ³Department of Pediatric Dentistry, University of Florida, Gainesville, FL, USA **Abstract** – Traumatic injuries to the chin are not uncommon in children. Nevertheless, crown fractures, which are common sequelae to this type of injury, might be overlooked, especially if dental care is not sought immediately after a visit to a non-dental facility. The present case report reviews the delayed diagnosis and treatment outcome of a bilateral posterior complicated crown fracture affecting mandibular second primary molars in a young child. Pharmacologic and orthodontic considerations are also discussed in the paper.

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Fractures of posterior teeth as a result of an indirect trauma to the chin area may not be detected during an emergency examination immediately after the accident. The diagnosis of posterior tooth fractures can be difficult, especially if the fractured part is not displaced and the fracture line is not clearly visible (1). Moreover, these fractures may also be overlooked if the emergency examination has been performed in non-dental facilities such as emergency clinics, hospital emergency rooms (ER), and physicians' offices where attention might focus on the treatment of the chin injury (laceration) unnoticing intraoral consequences of the impact to the chin (2-5). Cracks, fractures, and loss of tooth structure may only be detected later when patients start complaining about pain while chewing, or even when a swelling appears and a more detailed examination of the teeth is performed (1, 2, 6-8). Attention must also be given to the temporomandibular joint (TMJ), because subcondylar fracture has also been reported secondary to trauma to the chin (9, 10). Injuries to the chin in children are not uncommon and occur more often in boys than in girls (11).

The purpose of this article was to describe and illustrate a late clinical intervention following repeated injuries to the chin in a young child. In addition, this paper emphasizes important steps during clinical examination and diagnosis when indirect trauma to the teeth occurs.

Case report

A 43-month-old Caucasian female was referred to a private pediatric dental office by a local general dentist. The general dentist suspected tooth grinding and also

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stated that the case was very unusual. She presented to the appointment accompanied by her parents with the chief complaint of discomfort during mastication on both sides of the mouth. Medical history was positive for penicillin allergy, but otherwise non-contributory. Current medications included azithromycin prescribed by the general dentist because of swelling and discomfort localized bilaterally in the mandibular molar area around the second primary molars. A positive history of trauma to the chin 8 months beforehand requiring an ER visit and several stitches to the bottom of her chin was reported. Two months before the appointment at the office, patient reinjured her chin playing at home, however, not as severely as the first time, not requiring an ER visit or stitches. A clinical examination including extra and intraoral views, soft and hard tissue assessments as well as an occlusal evaluation was performed. Extraoral examination was negative for facial swelling, mandibular deviation upon opening or closing, and sensitivity at the TMJ. Intraoral soft tissue exam was positive for bilateral presence of sinus tracts adjacent to both mandibular second primary molars. Periapical radiographs of both teeth were obtained (Fig. 1). Radiographs revealed bilateral complicated crown-root fractures on both second primary molars with the fracture line located below the cementoenamel junction on both teeth. In addition, bifurcation involvement combined with extensive bone destruction was mainly noted on the mandibular left second primary molar. The proposed treatment plan presented to parents included pulpectomy and stainless steel crown on the mandibular right tooth and extraction combined with the placement of a distal shoe space maintainer for the left molar.



Fig. 1. Periapical radiographs of fractured mandibular right and left second primary molars during initial visit.

Owing to patient's precooperative behavior and based on treatment complexity, different operative options were discussed with parents and a conscious sedation appointment was recommended. American Academy of Pediatric Dentistry presedation protocol recommendations were explained (12). Because of parents' hesitation, treatment was postponed a few weeks. After 1 month, patient and parents returned to the office for an oral sedation appointment. Patient weighted 20 kg and vital signs were within normal limits for her age. Twenty-five milligrams of hydroxyzine and 10 mg of midazolam were administered orally. After 40 min, patient was placed in a papoose board with a head holder (Olympic Medical Corp., Seattle, WA, USA), and 40% nitrous oxide/ oxygen inhalation was administered via nasal mask. Monitoring devices included pretracheal stethoscope and a pulse oximeter. Bilateral inferior alveolar nerve blocks were performed using a total of approximately 100 mg (2.5 ml) of 4% articaine (Septocaine[®]; Septodont Inc., New Castle, DE, USA) with 1:100 000 epinephrine. When restorative work was initiated on the mandibular right molar, pulp chamber and root canal systems were completely necrotic. After removal of the fractured piece and assessment of the gingival extent of the fracture line, the operator was concerned that the stainless steel crown margin would not completely cover the mesial aspect of the tooth leading to a possible leakage and consequently treatment failure in the future. Taking into consideration the guarded prognosis, a treatment option of extraction and distal shoe space maintainer was chosen. Parents were informed of the changes in treatment plan and consent was obtained. Five minutes postextractions, two prefabricated distal shoe bands (DENOVO Dental Inc., Baldwin Park, CA, USA) were fitted on the first primary molars, and spacers were cemented with resin-modified glass-ionomer cement (Ultra Band-Loc[®]; Reliance Orthodontic Products, Itasca, IL, USA). With treatment completion, patient was given 100% oxygen for 5 min. Because of uncooperative behavior (very agitated, crying and kicking throughout most of the procedure) immediate post-op radiographs were not taken. A 1-week follow-up appointment was made, but the patient did not show up. Several phone calls were made during the course of the year to have the patient return to the office. After 1 year, patient and her mother presented to the office for a follow-up consultation appointment. The behavior of the patient was cooperative and pleasant. No problems with eating, drinking, or any adverse responses were reported. When questioned about the lack of compliance after treatment, mom responded that the reasons were of financial nature only. Clinical examination revealed no gingival irritation from the distal shoe space maintainers, and there was adequate soft tissue healing around the extraction sites. Intraoral photographs (Fig. 2), bitewing radiographs together with mandibular right and left periapical radiographs were taken (Figs 3 and 4). Radiographic analysis revealed good position of the right distal shoe; however, on the left side, the distal blade was short and deeply positioned (Fig. 4). The recommended treatment plan was to continue monitoring clinically and radiographically both appliances and, as soon as the permanent first molars erupt, replace distal shoes by band and loops having the first permanent molars as band anchors. When the mandibular permanent centrals and lateral incisors fully erupt, a lower lingual arch was planned to be placed having the mandibular permanent molars serving as band anchors. This procedure is necessary to maintain adequate arch length and necessary space for the eruption of the second premolars (13).

Discussion

Regardless of the type of trauma, a detailed history of the event should always be obtained and documented. Important questions such as the time of the day, the location, and how the injury occurred are of paramount importance, especially when related to children. The aspect of abuse and neglect must always be ruled out.

Injuries to the chin identified by a bruise, abrasion, and/or laceration require an in depth evaluation to disclose fracture of the symphysis and/or the TMJ. The clinical examination should include palpation and movement of the joint and most important, an occlusion examination. In addition, an intraoral evaluation should be performed to disclose possible lacerations, presence of submucosal bleeding, and any abnormal mobility of the jaw bone. One of the signs of fracture of the symphysis is a sublingual hematoma (14). A comprehensive exam cannot be completed without radiographic documentation. Common radiographs to be obtained include images from the face and the skull, PA (normal posterior to anterior), lateral, lateral oblique, Towne's view (an A/P view used to assess the mandibular condyles and the



Fig. 2. Clinical view of bilateral distal shoes 1 year after placement.



Fig. 3. Bitewing radiographs 1 year after treatment.



Fig. 4. Periapical radiographs of extracted second primary molar areas 1 year after treatment.

condylar necks), and panoramic (4). Owing to the anatomic complexity of the jaw bones and overlapping of bone structures, when suspicion of a fracture exists, the two-dimensional image is not always very clear. In these circumstances, it is recommended to obtain a CTscan that allows the practitioner to obtain tri-dimensional images under high resolution (4). Lack of diagnosis of TMJ bone fracture in children can lead to ankylosis of the joint as well as bone growth problems on the affected side (2). A comprehensive examination should also disclose the possibility of cervical spine fracture that is the most serious complication following a chin injury (5).

In general, patients come to the dental office seeking treatment for their chief complaint. After data collection is completed, diagnosis is reached and, in most cases, more than one treatment option may exist. As part of the informed consent process, providers are obliged to discuss with patients and their parents the advantages and disadvantages as well as future implications of each treatment option (15). Factors that may influence the decision making into a more conservative or aggressive approach include patient medical condition, age and behavior (safety for completion of the procedure), treatment conditions (conventional, sedation, or general anesthesia), restorability, lifespan of the tooth, professional experience, and financial considerations (16). For severely fractured second primary molars, when the eruption of first permanent molars has not yet occurred, the following treatment options need to be considered: (i) pulp treatment and restoration and (ii) extraction combined with a space maintainer. The decision to extract the mandibular left second primary molar was based on the extensive bone destruction presented at the bifurcation, periapical, and proximal areas (Fig. 1). For the right mandibular primary molar, a conservative approach to preserve the tooth was selected. However, when real clinical conditions were faced (questionable tooth restorability and guarded prognosis in combination with unexpected poor cooperation), the clinical dilemma of preserving or not the tooth was resolved. The operator's decision to proceed with the extraction and placement of space maintainer was supported.

Treatment of injured primary teeth often occurs in very young children creating a double challenge to the pediatric dentist: the injured tooth and the need to cope with an uncooperative patient. In certain circumstances, the administration of sedative agents to achieve treatment objectives may be necessary (17). In our case, a short acting benzodiazepine (midazolam) in combination with a mild sedative/anxiolytic agent (hydroxyzine) was selected to be used. The rationale for using this protocol was to allow increased treatment time since midazolam alone has a short action time. Although optimal patient cooperation was not obtained, treatment was safely accomplished. In prolonged treatments, such as the current case, an increase in crying and movement toward the end of treatment is not uncommon and has been obtained when this protocol (hydroxyzine combined with midazolam) was originally published (18). Despite the poor cooperation, one of the advantages of using midazolam is its amnesic effect (19). Based on the patient's behavior at the 1-year recall appointment, it is our belief that the amnesic effect must have worked in this case, because the now 4-year-old had no apprehensions toward returning to the clinic and allowed for intraoral radiographs and photographs to be taken. Treatment under general anesthesia for the extraction of multiple molar fractures in a young child when behavioral difficulties are expected has also been performed (20).

One may consider the administration of a bilateral mandibular block in young children to be unusual. However, its administration in comparison with unilateral block proved to cause less soft tissue trauma in children and no contraindications of its use were found (21). No adverse events or trauma were reported by the parents from the bilateral inferior alveolar nerve blocks. Adewumi et al. (22) reported safety records after the utilization of 4% articaine in young children. However,

prolonged paresthesia after treatment (between 3 and 5 h) might be expected and parents should be informed of that. The administration of bilateral local infiltration or intraligamental anesthesia instead of mandibular block was not considered by the providers. This is mainly due to the questionability of the profoundness of anesthesia to be achieved and the risks of local anesthetic overdose in case supplemental local anesthetic had to be given.

Space maintenance is critical for the normal development of the dentition in a growing child. When extraction of a second primary molar is deemed necessary and eruption of the permanent first molar has not yet occurred, a distal shoe is the recommended space maintainer to be used. In the case presented, the lower left distal shoe could have been placed more posteriorly to avoid the distal blade from being positioned on top of the dental sac of the developing tooth-bud (Fig. 4). The child's disruptive behavior at the end of the procedure did not allow radiographs to be taken for the verification of the correct position of the appliance prior to cementation. Nevertheless, no sign of damage to the developing second premolar was noted. As a consequence, mild mesial tipping of the lower left permanent molar might be expected during eruption which could be addressed later if necessary. Distal shoe technique description and illustrative details about this procedure have been published previously (23). After eruption of the permanent first molar, the distal shoe appliance should be removed and replaced by a regular band or crown-andloop with anchorage in one of the adjacent teeth. A lower lingual arch before the eruption of permanent centrals and laterals incisors is not recommended because the wire resting adjacent to the primary incisors might interfere with the eruption of the permanent dentition (13).

Close monitoring including clinical and radiographic follow-up is of paramount importance for the assurance of treatment success. Oral hygiene instructions as well as parental supervision to rule out inflammation at the appliance(s) site should be reviewed and emphasized during each recall visit, assuring good outcome for the treatment.

In summary, when complicated crown fractures occur in young children, the dentist treating injuries in primary teeth should be able to control the child's behavior and provide the best treatment option without having to compromise because of lack of cooperation.

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