Examples of Dentoalveolar Traumatology in Pediatric Dental Practice

11

This chapter contains examples of dentoalveolar trauma cases.

Names of distinguished colleagues who supplied the images for this chapter are mentioned with the radiographs. If there is no name mentioned with the radiographs, the radiographs were taken by the author of this book or collected from the different university clinics he has worked in (Ghent University in Belgium, University of Washington in Seattle, USA, and University of Western Australia in Perth, Australia).

11.1 Bony Fractures

Dentoalveolar trauma is a common fact in pediatric dentistry. Children fall all the time and often nothing bad results; however in some cases, even in the very young age dental radiographs are indicated to verify intrusion or avulsion of primary teeth. The techniques described in Chap. 3 can be used to obtain adequate and diagnostic radiographic material. In older children these techniques can also be used of course, especially if positioning the image detector is painful or difficult. In this section a myriad of examples are given and commented. Figures 11.1 and 11.2 are illustrations of cone beam computed tomography scans taken for jaw traumas. The first is a very young child, whereas the second one is an 18 year old young man who presented with several fractures after being kicked in the face.

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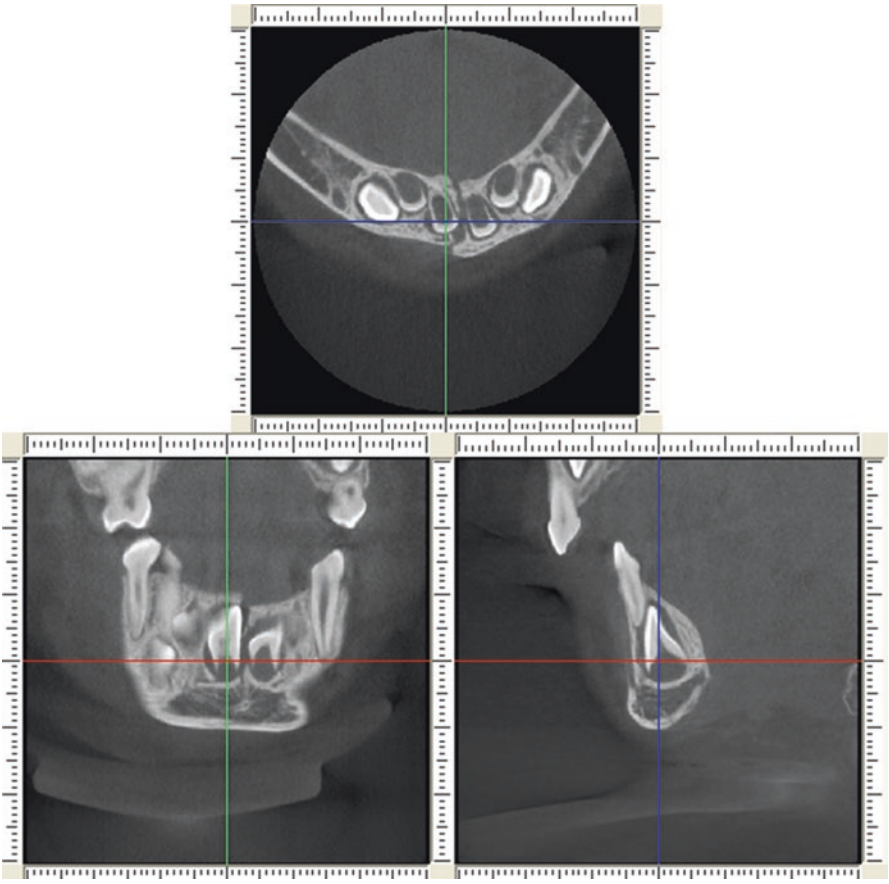

Fig. 11.1 This is a small-field-of-view cone beam computed tomography of a 4-year-old child with a mandibular symphysis fracture. The axial slice shows nicely how the fracture line meanders between the tooth germs of the permanent central incisors. In the coronal view one can appreciate the step in the alveolar crest, with the patient's mandibular body on the left-hand side being a little more inferior than that on the right-hand side. One can debate if this was an accident or child abuse (courtesy of Prof. Dr. Edgar Hirsch, Germany)

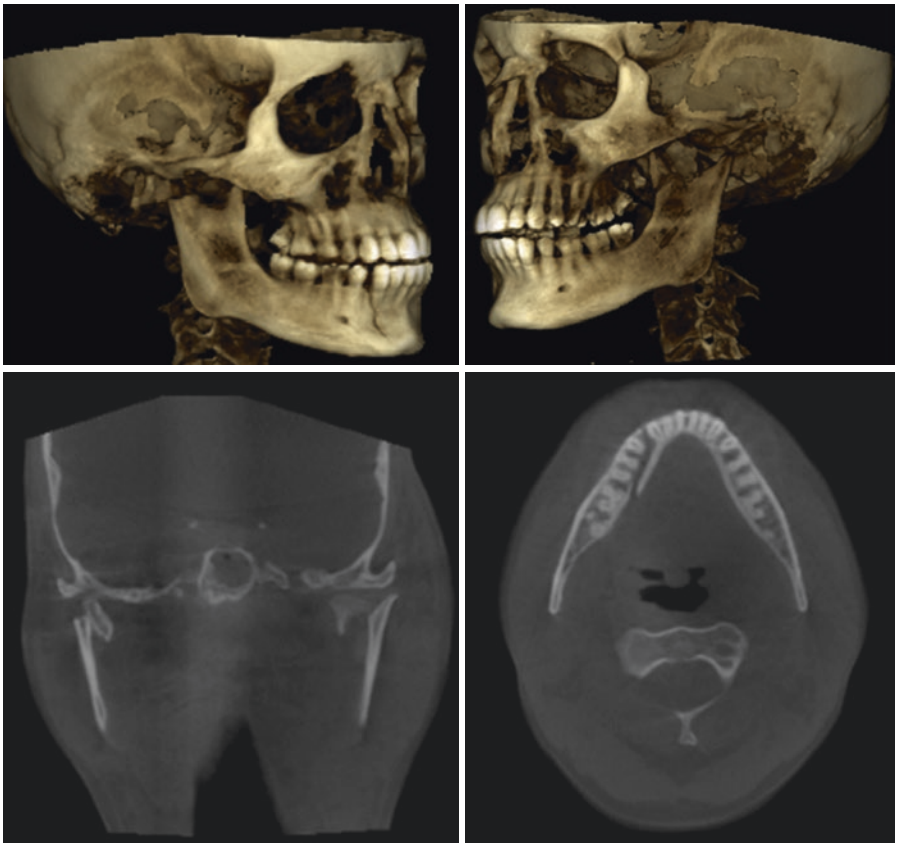

Fig. 11.2 This large field of cone beam computed tomography was taken on an 18-year-old man, who celebrated his day after his 18th birthday in hospital after being kicked in the face at a party. He suffered multiple jaw fractures: bilateral condylar neck fractures (especially well visible on the coronal view), right body of mandible fracture (especially well visible on the axial view), and a left-hand-side coronoid process fracture (upper right-hand-side image)

11.2 Dental Trauma

Figures 11.3 through 11.11 are all examples of dento-alveolar trauma cases. Some of them were diagnosed with only two-dimensional image techniques and others were assisted with cone beam computed tomography scans.

Fig. 11.3 This is an occlusal radiograph (for technique see Chap. 3) of a 3-year-old boy that was taken after dentoalveolar trauma on the maxillary primary central incisors. Both central incisors have a fractured root and their coronal parts are displaced lingually. The coronal parts were removed and the root fragments were given a chance to resorb. Radiographic follow-up was indicated for this case

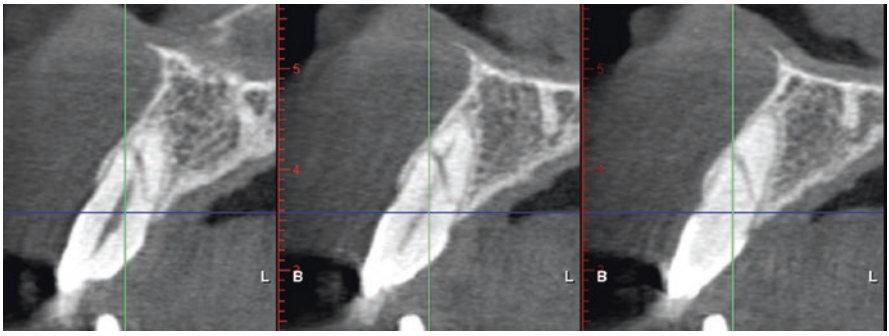

Fig. 11.4 This is a cropped image of a small-field-of-view cone beam computed tomography of the right-hand-side maxillary permanent central incisor, which had been hurt in a bicycle accident 2 months prior to this exposure. Since the tooth was slightly mobile and the periapical radiograph (not included) was inconclusive the CBCT was taken and revealed an oblique fracture line from cervico-palatal to apico-buccal. Since there were no complaints from the patient it was decided to leave the tooth as it was

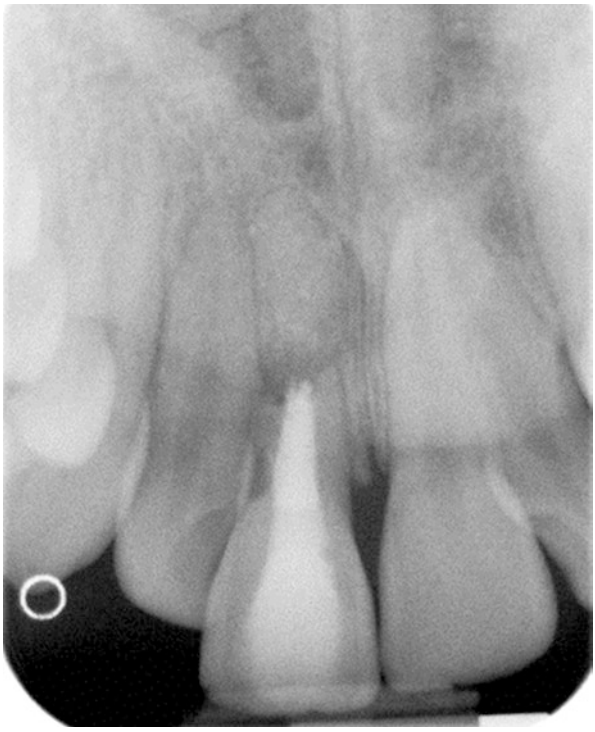

Fig. 11.5 This periapical shows the right-hand-side maxillary permanent incisor with a finished root canal treatment and a fractured apical third that appears to have an obliterated pulp canal. At the distal cervical margin one can also appreciate a saucer-shaped resorption. This tooth was avulsed 6 years prior to the date of this radiograph. The tooth was avulsed during a skateboard accident. The patient immediately picked up the tooth and ran to a dental office nearby. The dentist unfortunately cleaned and dried the tooth very thoroughly, destroying the root sheath and the cementum. Replantation and splinting were performed and subsequently the patient was referred to a pediatric dentist, who then executed pulpotomy with calcium hydroxide paste. After 12 months, the apical third of the root appeared to have separated from the rest of the tooth, due to resorption. It was assumed that cellulose of the paper napkin the dentist used to dry the tooth had caused the apical third to resorb partially. The coronal section of the root was then filled with Ketac-Molar® at the time to preserve the rigidity of the root. An implant was placed successful 7 years after the initial trauma. Keeping the tooth as long as possible facilitated the preservation of the alveolar ridge

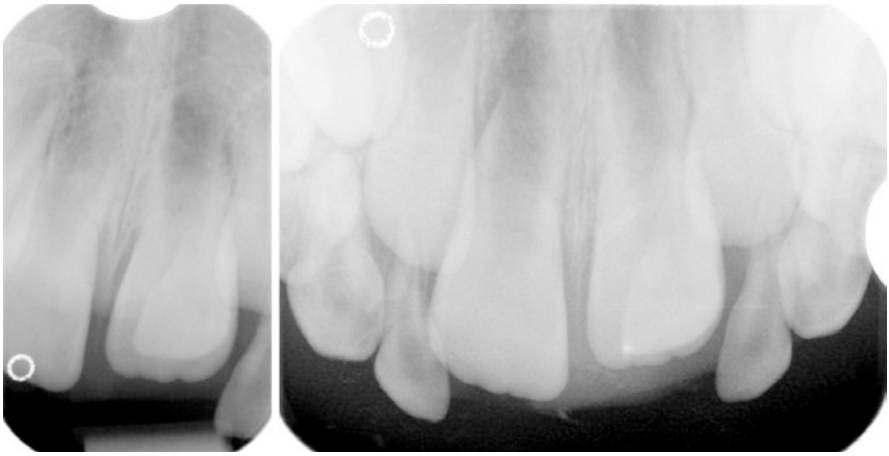

Fig. 11.6 This is a case of intrusion of the left-hand-side maxillary primary central incisor. Both radiographs were taken using the occlusal technique at a 65^0 angle of the X-ray beam to the occlusal plane, while the photostimulable phosphor plate was on the occlusal surface. The child was sitting on the mother's lap, who was wearing a lead-equivalent apron. The mother was also holding a thyroid shield under the child's chin to protect the thyroid gland from being irradiated by the primary radiation beam. The intruded primary incisor was removed under local anesthesia, as the eruption of the permanent teeth was eminent

Fig. 11.7 The periapical radiograph was taken to identify the reason for the ectopic eruption of the permanent left-hand-side maxillary central incisor, as the primary predecessor was very mobile and ready to exfoliate clinically. The radiograph shows that the root of the primary predecessor was fractured off and mesio-apically displaced and caused a physical obstruction for the permanent successor to erupt in its correct place. The dentist then made an attempt to take a lateral radiograph to determine the position of the root fragment; however he did not manage to visualize the fragment as it was much more superior. Nevertheless, this was a good attempt, which also shows the buccal cortical plate of the maxilla (courtesy of Dr. Pieter Van Ingelgem, Belgium)

Fig. 11.8 These two periapical radiographs were taken after the patient was seen at an emergency dental clinic 2 days before. A skateboard accident was the cause of the complicated fracture of the left-hand-side maxillary permanent central incisor. A clear vertical fracture line is visible and close examination shows a horizontal root fracture as well in the middle third of the root. The radiopaque shadow of the nose makes the horizontal fracture a little bit more difficult to depict. One can also see that the image on the left side is taken with a solid-state sensor and the image on the right is taken with a phosphor storage plate and that both images were taken from different angles

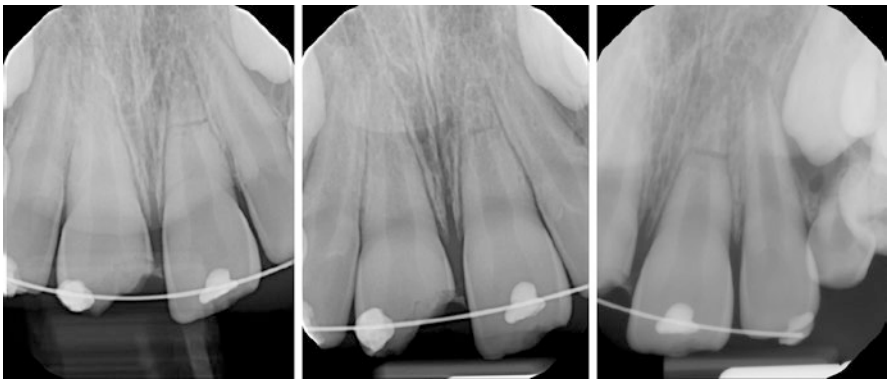

Fig. 11.9 This is another case of a dental trauma to the permanent central maxillary incisors. The 10-year-old boy had been in a bicycle accident a few days before and a splint was placed at the emergency appointment. The right-hand-side central incisor suffered a complicated enamel-dentine fracture and the left-hand-side central incisor a horizontal root fracture in the apical third. Taking radiographs from different angles can be extremely useful in trauma cases to assess and identify root fractures

Fig. 11.10 This periapical radiograph was taken with a solid-state sensor to verify the primary maxillary central incisors after a trauma that occurred 3 weeks before. The right-hand-side primary central incisor was clinically gray. The radiograph shows a widened pulpal system in that tooth, indicating that the tooth had suffered at least one other trauma sometime before the last one 3 weeks ago. A slightly widened periodontal ligament space was observed on both primary central incisors. Careful examination and interpretation of the radiograph are necessary to put the radiographic findings of the pulp canals and the clinical appearance into perspective

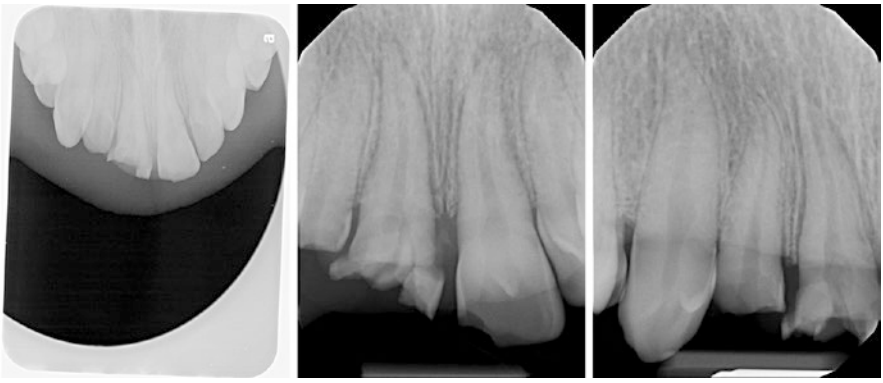

Fig. 11.11 These radiographs were taken immediately after this teenager suffered a dental trauma, injuring his right-hand-side permanent maxillary lateral incisor and both his central incisors. An attempt was made to take a true maxillary occlusal, but a lot of useless radiation was aimed at his chest. More accurate periapical radiographs were subsequently obtained using a solid-state sensor. One can appreciate the widened periodontal ligament space around the right-hand-side central incisor, indicating that the impact on that tooth must have been tremendous. The shattered tooth crown is evidence of that. The occlusal radiograph should have been taken more carefully though (see Chap. 3)

Dental traumatic injuries are diagnostic challenges as these injuries have a huge array of presentations. Correct identification of the traumatic injury will have a huge impact on the treatment and hence the success of the treatment and the outcome for the patient. Correct and appropriate choice of imaging is essential and will benefit the patient. Justification is required to use three-dimensional imaging. If fracture lines are running mesiodistal, they cannot be depicted with periapical or occlusal radiographs and cone beam computed tomography is crucial in identifying the issue. It is essential to keep an open scope when assessing dental trauma and not to focus on the teeth only. The mouth opening should always be checked even if the chin was supposedly not involved in the impact. Temporomandibular joints, range of motion of the mandible, and displacement of articular discs should be assessed and based on the findings appropriate imaging should be performed. Three-dimensional imaging can also be beneficial in cases of luxation of teeth, as it will visualize the buccal cortical plate of the jaw better and provide information about its position and status.

11.3 Follow-Up and Assessment After Trauma

Radiographic follow-up after trauma treatment or as a follow-up when no treatment was carried out is important. One can take two-dimensional as well as three-dimensional images, which may prove to be beneficial after all. For instance the true extent of a nonhealing periapical lesion can be visualized with CBCT. The same holds for destruction of bony barriers when inflammation spreads after a traumatic impact with necrosis of the pulp of the affected tooth. Figures 11.12 through 11.15 are examples of follow-up of dento-alveolar trauma with the use of two dimensional imaging and cone beam computed tomography.

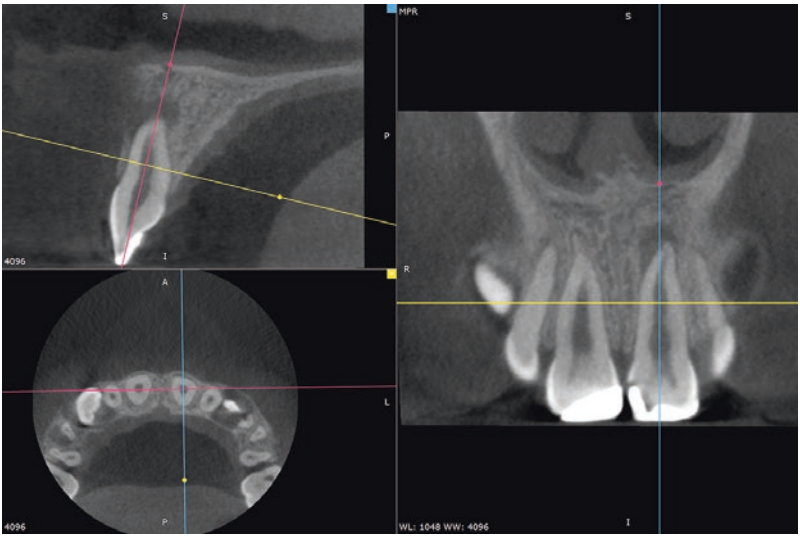

Fig. 11.12 This is a case of trauma to both permanent central maxillary incisors. They were restored previously but clinically the left-hand-side central incisor showed a buccal fistula at the level of its apex. A periapical radiograph cannot show the true extent of the inflammatory lesion and as such a small-field-of-view cone beam CT was made, which showed clearly the three-dimensional characteristics of this lesion. Destruction of the buccal cortical plate is evident. Note that the slices shown in this image are carefully chosen and follow the long axis of the tooth. This is necessary to avoid misinterpretation of the length of the tooth (courtesy of Dr. Stephane Diaz, France)

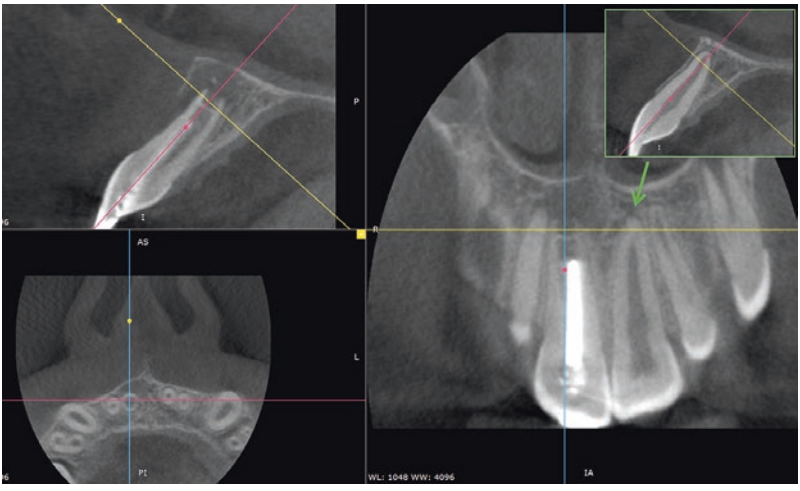

Fig. 11.13 This is a case of trauma in the permanent dentition with open apices. The right-hand-side maxillary central incisor was not healing according to plan and a large inflammatory lesion developed at its apex, destroying almost the entire buccal cortical wall anterior to that tooth's root. A conventional two-dimensional radiograph would never be able to show the extent of the bone destruction. As such this CBCT is definitely beneficial as proper assessment of the situation can take place and an appropriate treatment can be executed. In the upper right corner of the image, the left-hand-side central incisor is shown and one can appreciate the nice image of the thin layer of buccal cortical bone over the root of that tooth (courtesy of Dr. Stephane Diaz, France)

Fig. 11.14 This is a periapical radiograph, taken with a solid-state sensor of an 8-year-old child who suffered a dental traumatic injury earlier. One can appreciate the external resorption that has started on the distal aspect of the root of the right-hand-side permanent maxillary central incisor (courtesy of Dr. Stephane Diaz, France)

Fig. 11.15 Traumatic injury to the left-hand-side permanent maxillary incisor with open apex. Pulp capping and reattachment of the fractured crown fragment performed (second from the left) and followed up after 3 months (middle), 9 months (second from the right), and 18 months (right). One can appreciate that the apex is further developing and the dentinal walls of the pulp canal are increasing in thickness (courtesy of Dr. Stephane Diaz, France)

Further Reading

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