From: The University Hospital ("Rigshospitalet") Copenhagen, Dental Clinic and Department of Head and Neck Surgery,
and The Royal Dental College, Copenhagen, Department of Histology

ON INJURY BY FRACTURES OF THE JAWS TO TEETH IN COURSE OF FORMATION

by

KAREN LENSTRUP

It appears from the copious literature on fractures of the jaws and their treatment that, especially in recent years, jaw fractures occur rather frequently in children. *Bjerrum* (1932) states the percentage of children among patients with jaw fractures as 13 per Cent., *Reichenbach* (1946) 8 per Cent., *Kazanjian & Converse* (1949) 10 per Cent. Several authors maintain that, on account of the presence of tooth germs, the child's jaw has a greater predisposition to fracture than that of the adult person. [*Knerr* (1950), *Fischer* (1951), and *Freid & Baden* (1954).] Further, it is mentioned by *Wöhlert* (1950) that a full dental arch and normal occlusion are of great importance for preventing the occurrence of fractures, and that there is therefore a great risk of fracture during the eruption of the permanent teeth.

The present paper sets out to clarify the late effects of such fractures to teeth in process of formation which have been lying in (or in close relation to) the line of fracture, by examining patients who have had fractures of the jaws in childhood. It will be of interest to see whether such teeth continue their development in a normal way, or whether they show disturbances of formation owing to the trauma.

PREVIOUS INVESTIGATIONS

Little information on these problems is found in the existing literature. *Friederichs* (1940) reports two cases of fracture of the mandible in children where there were tooth germs in the

line of fracture. In one of these cases the germ in question was found after two years in a normal position and in continued development; and in the other case a process of granulation and resorption was found around the germ, the growth of which had been checked. He further reports a case where a woman aged 24 sought treatment for an inflammation with a fistula on the chin, stating that she had had a fracture of the jaw at 5 or 6 years of age. Roentgen examination revealed that the germ of 3—,[1] the growth of which had stopped at an early date, was surrounded by an osteitic process.

Waldron et al. (1943) report a case of fracture in the canine region, in a child aged 19 months, which healed in spite of infection and suppuration in the line of fracture; but on examination 18 months later a dentigerous cyst around the crown of the permanent canine was found.

Parfitt (1946) reports a case of fracture in the region —4, 5, where although two teeth erupted and came into occlusion, the root formation had stopped prematurely, the root of —4 being somewhat shorter than normal, and the root —5 not longer than the crown.

Knerr (1950) reports a case of fracture in a patient aged 16, where 8— was in the line of fracture. When 4 years later the patient was examined, the tooth was normally and fully developed, and vital.

Wöhlert (1950) reports four cases where tooth germs have been in the line of fracture, in children 4 to 6 years of age. In two of these cases a bend of the root of the tooth in question is seen, and moreover in one of them the tooth had erupted prematurely and in a rotated position. In the other two cases the teeth show normal form, but premature eruption and abnormal position.

Fischer (1951) reports 25 cases of fractures of the mandible in children. In 23 of these cases the fracture had involved teeth in process of formation. In five of the cases the germs had to be removed during the treatment. On re-examination of the other 18 patients nine showed nothing abnormal, while in four cases

[1] In this report the teeth are designated according to the *Haderup* system, + signifies location of tooth in the upper jaw, — in the lower jaw. If the symbol is placed to the right of the figure the location of the tooth in the right side of the jaw is indicated and vice versa.

there was a dilaceration of the tooth, two orthodontic anomalies, two cases of reduced vitality, one of retarded eruption, two teeth were unerupted, and in two cases the root formation had stopped prematurely.

The Writer's own Investigations.

In the Department of Head and Neck Surgery at the University Hospital (Rigshospitalet) in Copenhagen there were in 1944—1953 in all 546 admissions for fractures of the mandible and/or fractures of the maxilla. 54 of these were children under 15 years of age. In 32 of these children there were teeth in process of formation in the line of fracture. Further, there were 15 cases of fractures affecting unerupted teeth in adults. These cases are not included in the present investigation.

In three of the 32 children the tooth germ lying in the line of fracture was removed during the treatment. In six of the other 29 cases the radiographs taken immediately after the accident were not available. These children were not, therefore, included in the re-examination. The rest of the children, 23, were called in for re-examination. 22 appeared. A general clinical examination was made, and radiographs were taken of the teeth involved in the fracture. Further, in most cases a vitality test of the teeth in question was made, impressions of the dental arches of the maxilla and mandible taken, and models for study purposes made.

Table 1.

Shows the sex and age distribution at the time when the fracture occured

Number of children examined	♂	♀	Age distribution at the time when the fracture occured			
			0—2 years	3—5 years	6—10 years	11—15 years
22	15	7	1	9	10	2

Table 2.

Shows the distribution of fractures in respect of location of the fracture.

Incisor region	Canine and premolar region	Molar region
7	16	6

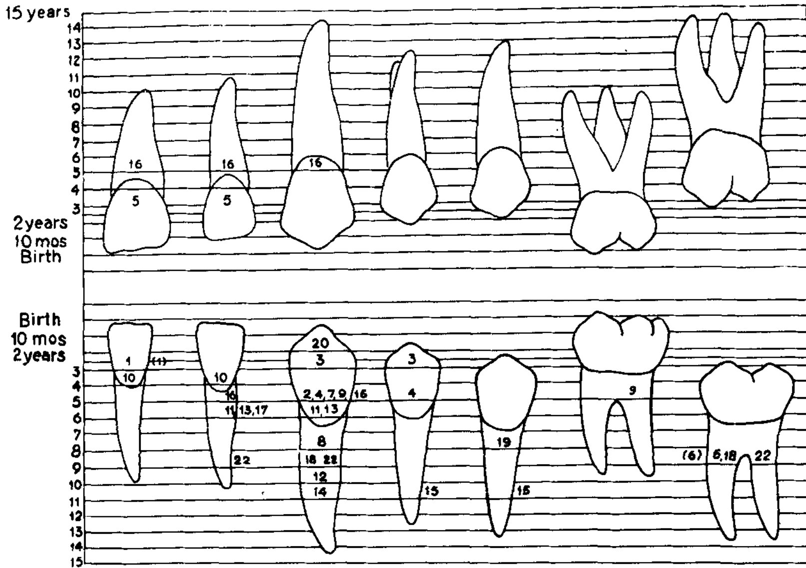


Fig. 1. This diagram illustrates at what stage of development the teeth were hit by the trauma. The figures indicate case numbers. The figures are placed according to the age at which the fractures occurred.

The distribution of children in respect of sex and age at the time when the fracture occurred, and the distribution in respect of location of the fractures are shown in Tables 1 and 2. The total number of fractures is 29, seven patients having more than one fracture in tooth-bearing regions of the jaw. Out of the 22 children, 19, or 86 % were between 3 and 10 years of age at the time of fracture. Table 3 gives a survey of the patients and the results of the re-examination. Fig. 1 illustrates at what stage of development the several teeth were involved by the trauma. (Drawing after *Massler, Schour & Poncher,* Am. J. Dis. Child. *62*: 33—67, 1941).

Teeth in the maxilla:

Of four incisors in the upper jaw two were traumatised before, and two after their crowns were fully mineralized. In the examination the two teeth to which the fracture occurred before the crowns were fully mineralized showed disturbances of the mineralization and an abnormal position (Fig. 2). One of the

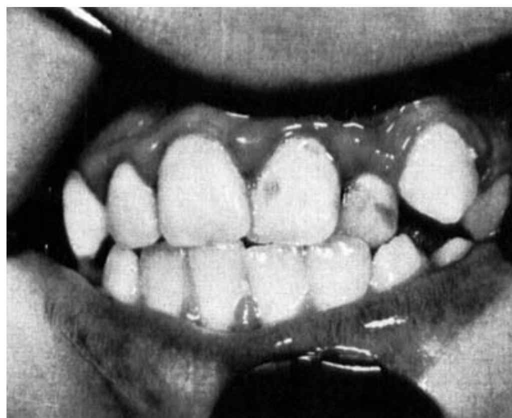


Fig. 2. Case no. 5 ♀ aged 12 years. Fracture of the maxilla (regio + 1,2) when the patient was 4 years of age. The illustration shows the state 8 years after the fracture. Note palatal deviation and poor mineralization of + 1,2.

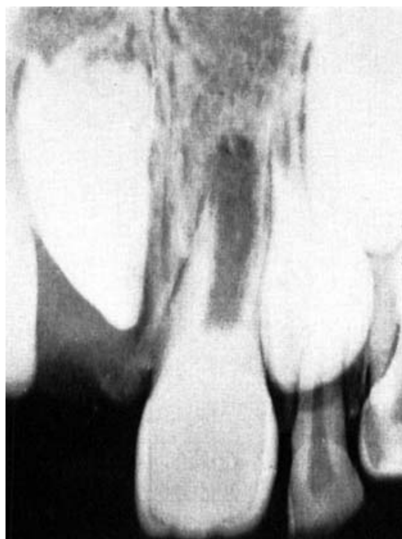


Fig. 3. Case no. 16. ♂ aged 7 years. Fracture of the maxilla (regio 3,2,1 +) when the patient was 5 years of age. The illustration shows the state 2 years after the fracture. Note the unerupted rotated 1 +, which also shows arrested root development.

No.	sex	age at trauma	area affected	description of fracture	period from accident to treatment	fixa
1.	♀	3 years	1—1	Linear fracture in the median line	9 days	Arch wires in the n dible. Elastic int
2.	♂	5 »	3—	Vertical line of fracture. Dislocation of 3—	5 »	Arch wires in the n dible. Elastic int
3.	♀	3 »	4,3—	Oblique fracture through 3—	8 »	Arch wires in the n dible. Elastic int
4.	♂	5 »	—3,4	Inverted Y-formed line of fracture through —3,4	2 »	Arch wires in the m dible. Elastic int
5.	♀	4 »	+1,2	Wedgeshaped in region of +1,2	2 »	Arch wire in the
6.	♂	9 »	7—7	Both fractures follow a vertical course. 7— lies horizontally	13 »	Arch wires in the n dible. Elastic int
7.	♂	5 »	3—	Oblique fracture through 3—	same day	Arch wires in the n dible. Elastic int
8.	♂	8 »	—3	Vertically through —3		No fixation
9.	♂	5 »	3—, —6	Vertically through 3— and —6	24 days	Arch wires in the n dible. Elastic int
10.	♀	4 »	—1,2	Vertically between —1,2	same day	Arch wire in the
11.	♂	6 »	—2,3	Oblique fracture	5 days	Arch wire in the
12.	♂	10 »	7—, —3	Vertically between —3,4		No fixation
13.	♂	6 »	3— 2,3	Vertically in regions of 3— and —2,3; —2 dislocated	8 »	Arch wires in the n dible. Elastic int
14.	♂	11 »	—3	Oblique fracture	6 »	Arch wires in the r dible. Elastic int
15.	♂	11 »	—4,5	Oblique fracture	same day	Arch wires in the n dible. Elastic int
16.	♂	5 »	3,2,1+ 3,2—	Comminuted fracture in region of 3,2,1+, Vertically in region of 3,2—		No fixation
17.	♀	6 »	—2	Oblique fracture		No fixation
18.	♂	9 »	3—, —7	Vertically in region of 3— and immediately behind —7	7 days	Arch wires in the r dible. Intermaxil
19.	♀	8 »	5—	Vertically through 5—	4 »	Arch wires in the dible. Intermaxi
20.	♂	$1^3/_4$ »	—3	Oblique fracture	8 »	Acrylic splint ligat tial wiring
21.	♀	6 »	—2	Vertically through —2	13 »	Arch wires in the n dible. Elastic int
22.	♂	9 »	7—2,3	Vertically through 7— Fissure in region of —2,3	21 »	Arch wire in the the mandible. In

sturbances following jaw fractures.

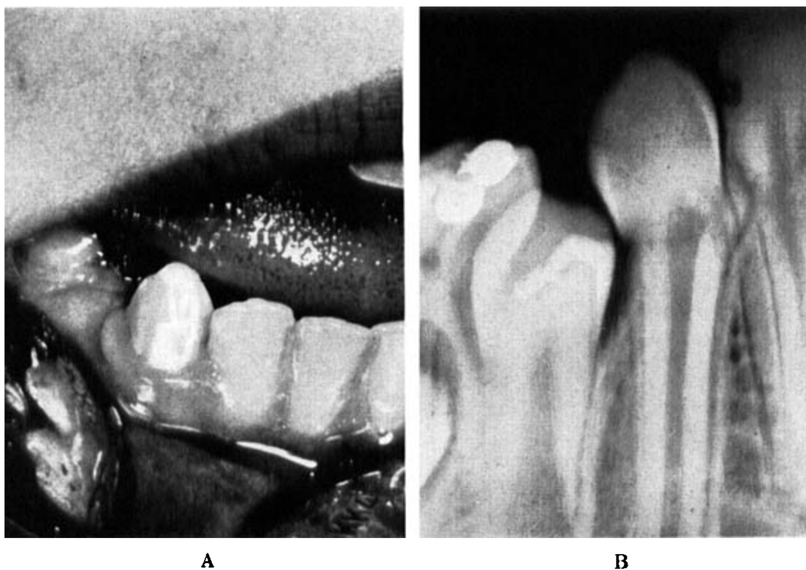
	complicating infection	reexa-mined after	findings
he man- traction	—	9 years	Nothing abnormal
he man- traction	On admission suppuration from the socket of right mandibular deciduous canine	9 »	3— unerupted in oblique position, dilacerated
he man- traction	2 months after the trauma sequestrum in region of 3—	9 »	4— mineralization disturbed, 3— unerupted, the crown malformed
he man- traction	—	8 »	—2,3 oral deviation, 3— checked growth of the root
	—	8 »	+1,2 oral deviation, localized occurrence of enamel hypoplasia
he man- traction	Recurring abscesses at 7— for several years after the trauma	7 »	7— arrested root formation, —7 hard tissue in the pulp cavity
he man- traction	—	6 »	3— unerupted, dilacerated
	—	6 »	—3 unerupted, obliteration of pulp cavity, arrested root formation
ie man- traction	—	5 »	—6 checked growth of root 3— dilaceration, disturbed mineralization
	—	5 »	Nothing abnormal
	—	5 »	—3 nothing abnormal —2 pulp chamber obliterated
	Abscess at 7—, nothing at —3	5 »	7— removed after accident —3 nothing abnormal
ie man- raction	—	3 »	3—3 unerupted, —2 embedded, dislocated, slight resorption
ie man- raction	—	2 »	Nothing abnormal
e man- action.	—	2 »	Nothing abnormal
	—	2 »	1+ unerupted, rotated, arrested root formation. 2— reduction of pulp cavity
	—	2 »	—2 coronal pulp cavity obliterated
ie man-	—	1 »	Nothing abnormal
ie man-	—	1 »	5— root formation stopped prematurely, hard tissue in the pulp cavity
nferen-	—	1 »	Nothing abnormal
e man- raction	—	1 »	—2 root formation delayed as compared to that of 2—
plint in wiring	—	1 »	7— nothing abnormal. —2, 3 reduction of the pulp cavity. —2 resorption on distal surface of the root.

two teeth which were affected after the crowns were fully mineralized was impacted in a rotated position, and the root development had stopped (Fig. 3). The other tooth showed nothing abnormal.

One canine in the maxilla was affected after the formation of the crown was completed. It was still unerupted at the time of the re-examination, but nothing abnormal was shown in the radiograph.

Teeth in the mandible:

Four incisors were involved by the trauma before their crowns were fully mineralized, and five after mineralization was completed. In the re-examination the first four showed nothing abnormal. Four of the five which were involved after full formation of the crowns showed reduction or obliteration of the pulp cavity, while one was unerupted, displaced, and with slight resorption.



A B

Fig. 4. Case no. 9. ♂ aged 10 years. Fracture of the mandible (regio 3—) when the patient was 5 years of age. The illustrations A and B show the state 5 years after the fracture. A, Note the internal enamel hypoplasia in 3—. B, 3— shows considerable dilaceration.

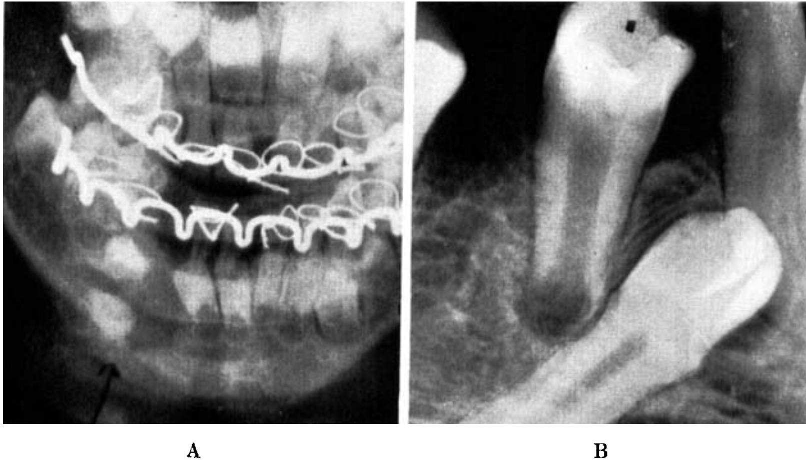


Fig. 5. Case no. 2. ♂ aged 14 years. Fracture of the mandible (regio 3—) when the patient was 5 years of age. A shows the state 5 days after the fracture. B is a radiograph 9 years after the fracture. Note the embedded and dislocated 3—, which also shows slight dilaceration. A section of the same tooth is seen in fig. 9.

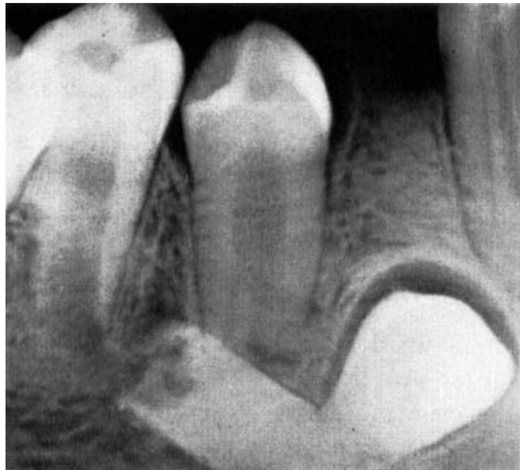


Fig. 6. Case no. 7. ♂ aged 11 years. Fracture of the mandible (regio 3—) when the patient was 5 years of age. The illustration shows the state 6 years after the fracture. Note the embedded and dilacerated 3—.

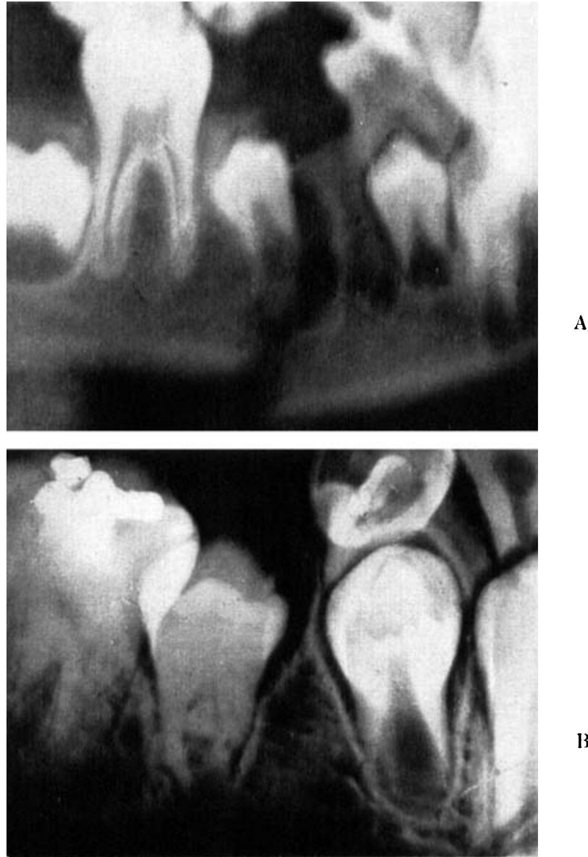
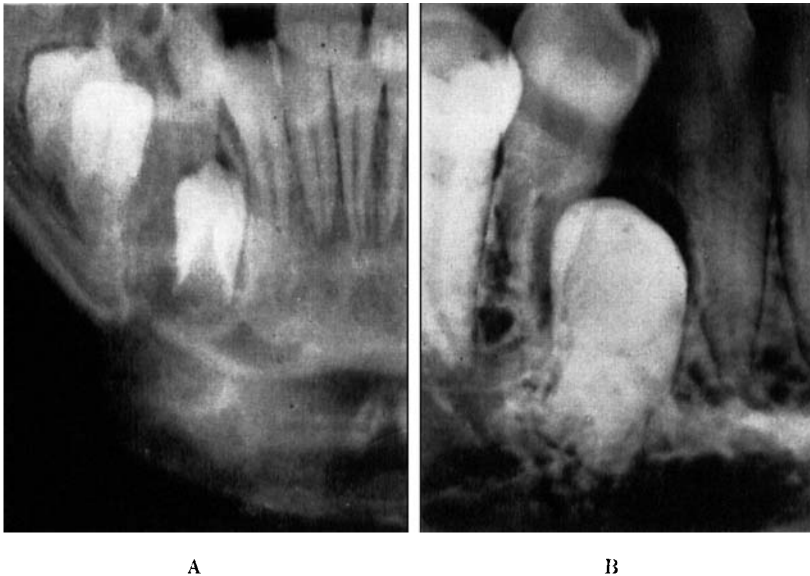


Fig. 7. ♀ aged 9 years. Fracture of the mandible (regio 5—) when the patient was 8 years of age. A shows the state immediately after the fracture. B is a radiograph taken 14 months after the fracture. Note the deficient root formation and the almost obliterated pulp chamber of 5—.

In all 14 canines in the lower jaw were involved in the fractures, nine of these before, and five after the completion of their crowns. In the re-examination four of the first nine showed nothing abnormal. One had erupted in an abnormal position. One showed disturbances of mineralization, and dilaceration (Fig. 4 A and B), and three were unerupted (Fig. 5 A and B). One of the three unerupted teeth was also dilacerated (Fig. 6),



A B

Fig. 8. Case no. 8. ♂ aged 14 years. Fracture of mandible at 8 years of age. A, Fracture immediately after accident. B, Condition 6 years later. A, Note impacted —3 with arrested root development. A photomicrograph of the same tooth is seen in Fig. 10.

and one had an entirely malformed crown. Of the five teeth which were affected after completion of their crowns, three showed nothing abnormal. One showed reduction of the pulp cavity, and one was embedded with arrested root-development and partial obliteration of the pulp cavity.

Of five premolars two were involved before, and three after completion of their crowns. One of the first two showed disturbances of mineralization, one arrested root development. Two of the last three showed nothing abnormal, one arrested root development and deposits of hard tissue in the pulp cavity.

Five molars were all affected after the mineralization of their crowns was completed. Two of these showed nothing abnormal, one showed entirely arrested root formation, one showed the root somewhat shorter than normal, and one had deposits of hard tissue in the pulp cavity.

Table 4 gives a survey of the changes mentioned above.

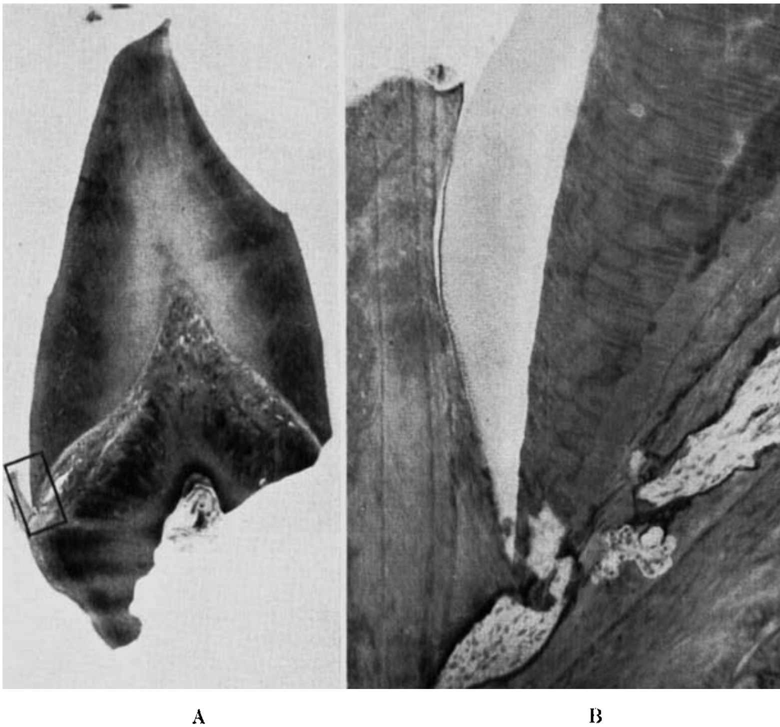


Fig. 9. Photomicrograph of section of 3— from patient no. 2 (Fig. 5). A, The coronal and cervical part of the tooth. Note sharp demarcation between pre-traumatic and post-traumatic formation of hard tissue. B demonstrates the framed area in Fig. 9 A at higher magnification. Note persistence of enamel matrix, upon which a deposit of cementum is seen. (Magnification: × 90).

Table 4

Tabulation of the changes found.

Dilaceration	3	Fig. 4, 5 and 6
Disturbances of root formation	6	— 3 and 7
Disturbances of mineralization	4	— 2 and 4
Entire or partial obliteration of the pulp cavity	8	— 7
Unerupted teeth	6	— 3, 5, 6 and 8
Eruption in abnormal position	3	— 2
Nothing abnormal	17	

HISTOLOGICAL EXAMINATION

Three unerupted teeth, and one erupted tooth, which was non-vital and with arrested root-formation, were surgically removed at the re-examination.

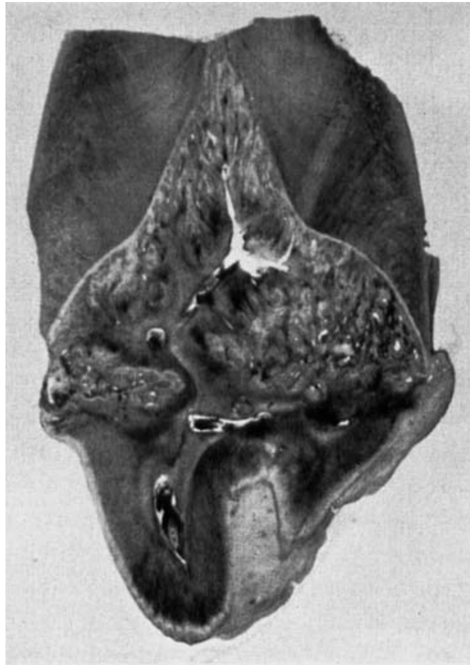


Fig. 10. Low power magnification (× 8) of section of —3 (patient no. 8). Note sharp demarcation between pre-traumatic and post-traumatic formation of hard tissue.

In two cases (nos. 2 and 8) a histological examination of the unerupted teeth was made. The teeth were fixed in 10 per Cent. formalin, decalcified in formic acid, embedded in celloidin, cut and stained with hematoxylin-eosin.

Patient no. 2 (Right mandibular canine).

In order to remove the tooth it was necessary to cut it in two. For histological examination the coronal part was cut labiolingually. In the crown a distinct marking of the trauma, which occurred when the patient was 5 years of age, is seen in the dentine. (Fig. 9). Apart from small areas of interglobular dentine the pretraumatic dentine is well mineralized, and with no signs of disturbances of tooth formation. The trauma has first caused a complete arrest of normal dentine formation. A narrow zone of predentine dates from that period. From that area follows in the

direction of the pulp a region of extremely irregular deposits of hard tissue; in this tissue inclusions of cells and vessels are seen. Still more pulpally-apically this irregular hard tissue is gradually replaced by dentine of normal structure. The pulp shows normal structure with regular odontoblasts in both the coronal and the radicular part. Where the irregular hard tissue formation meets the surface of the tooth, a small area with intact enamel matrix is seen. Above that is a deposit of cementum.

Patient no. 8. (Left mandibular canine).

This tooth also had to be removed in two parts. The major fragment is seen in Fig. 10. It appears from the figure that the pre-traumatic dentine is clearly different from the post-traumatic hard tissue. The latter is of similar structure as that in the previous case. Immediately after the trauma an almost atubular hard tissue of a coarsely fibrillar structure and with some vascular inclusions has been formed. It is obvious that odontoblasts have again been differentiated, a deposit of nearly normal dentine being seen. In the apical region a rather large area of osteo-cementum is seen, firmly connected with the dentine. Peripherally this tissue is surrounded by a capsule of connective tissue.

DISCUSSION

21, or 55 %, of the 38 teeth, which during their development were directly affected by a fracture of the jaw, show deviations from normal. This must be said to be rather a high ratio. When we consider the number of children examined, we see that only 7, or 32 %, of the 22 children showed nothing abnormal at all. Be it mentioned for comparison that 9, or 50 %, of Fischer's 18 patients showed no changes in the teeth. The average age at the time of the fracture is much the same for the two groups of patients. It would appear that in the department from which Fischer obtained his material they were somewhat more radical than in the University Hospital in removing unerupted teeth in cases of fractures of the jaws. It is possible that if a greater number of these teeth had been preserved, they, too, at the time of their eruption would have shown deviations from normal.

The changes in the teeth which are found in the present material, are, broadly speaking, the same as have been reported by Fischer though no case of retarded eruption was registered. As in many cases the re-examination took place a long time after the eruption of the teeth in question, the possibility remains, however, that in some of the patients minor irregularities in respect of the time of eruption have occurred, which have not come to the knowledge of the examiner. As to the manner in which the various injuries have arisen, only conjectures can be made.

Dilaceration is an abnormal bend of the crown or root in consequence of a trauma during the development of the tooth. It occurs when trauma brings the mineralized parts of the tooth into abnormal position to those that are not yet mineralized. In the present material only three cases of dilaceration are found, whereas among Fischer's 18 patients there are no less than four such cases.

Disturbances of root formation occur in various forms. In a few cases root formation had stopped entirely at the stage which it had reached at the time when the fracture occurred. In the other cases little growth of the root had taken place after the trauma; the apical foramen was closed, but the root was considerably shorter than normal, and than the corresponding tooth on the opposite side. No explanation of this fact can be given. As mentioned above, a similar case has been reported by *Parfitt* (1946).

As was to be expected, *disturbances of mineralization* were found only of teeth which were affected at an early stage of development. In one case internal enamel hypoplasia was found. This must be taken as evidence of a disturbance of the secondary mineralization, probably in consequence of local changes in the calcium metabolism after the fracture. In another case external enamel hypoplasia of +1,2 after a fracture of the upper alveolar process was found. These phenomena were localized to the facial surfaces. It is supposed that the enamel epithelium was injured by the trauma, possibly by the deciduous teeth being struck upwards and backwards, so that their roots damaged the germ. The most pronounced disturbance of tooth formation in our material was found in a patient who following the fracture had

suffered from infection with expulsion of bone sequestra; the tooth in question had the character of a Turner-tooth with major defects of the enamel of the crown, and deposits of osteocementum.

Formation of hard tissue in the pulp cavity occurred in some cases, judging from the radiographs, as regular deposits on the walls; in one case the pulp cavity in the crown was entirely obliterated, in other cases more irregular formations with the appearance of pulp stones were seen. We must here assume a productive reaction on the part of the odontoblasts to the irritant which the trauma itself or the healing processes in the adjacent parts constitute. In the case of more irregular deposits, it may, however, also be a degenerative phenomenon with calcium precipitations in the pulp tissue.

Failure of eruption of teeth lying in fracture lines occurred both in cases where the fracture had happened at an early stage of development, and where it had taken place at a later stage. *Wöhlert* (1950) is of the opinion that the failure of eruption in such cases is due to the fact that the germ has been dislocated to a position which makes eruption impossible. This would seem to be the case in a few of our patients. There is further the possibility that a partial anchylosis between the tooth and the surrounding bone may have developed.

That teeth in the area affected by a fracture tend to erupt in a *position deviating from normal,* is due, according to Wöhlert, to the fact that they have been dislocated by the trauma, but to such a slight degree that they have nevertheless been able to erupt. In this connection, of course, only such orthodontic anomalies are considered as are distinctly localized to the field of trauma. In those children in the present material who show orthodontic anomalies of this type, the fracture occurred at an early age.

By dislocation of the dental germ *resorption of neighbouring teeth* may occur (No. 22).

In three of the patients examined there was suppuration following the fracture (Nos. 2, 3 and 6). In these cases the question must be left open whether the damage of the germ is caused principally by the trauma itself or by the ensuing infection. All these three children demonstrated rather serious injuries to the teeth

in question; in one case the infection had even lasted for years with recurring abscesses in the region, until the child appeared for re-examination. The tooth was found to be non-vital and had to be removed.

In the other cases the dental injuries must be supposed to have been caused by traumatic factors exclusively.

In cases nos. 2 and 8 unerupted mandibular canines were removed in connection with the examination. These teeth were examined histologically. In both cases a sudden cessation of the normal dentine formation after the trauma was found. In the one patient, who was 5 years of age when the fracture occurred, a regeneration of odontoblasts had gradually taken place, so that normal dentine formation was again seen. In the other, who was 8 years of age, no normal formation of dentine had taken place after the trauma, but the whole pulp chamber of the crown was filled with hard tissue, parts of which, however, had a dentine-like structure. The root formation of this tooth had likewise ceased. It cannot be said with certainty why these two teeth have reacted so differently to the trauma, but it may be supposed that the regenerative power of the pulp is better at the age of 5 than in the somewhat older child. Many other factors may, however, have been involved.

Several authors (*Knerr, Fischer, Wöhlert)* mention the fact that an infected germ in the line of fracture may cause continued inflammation and delay healing.

As to the *treatment* of teeth in course of formation lying in the line of fracture, several authors maintain that a conservative line should be taken, and that the germ should be removed only in such cases where it prevents reduction, or causes protracted inflammations (*Reichenbach* 1940, *Wassmund* 1927, *Knerr* 1950, *Wöhlert* 1950, *Waldron et al.* 1943). *H. Johannsen* (1939) maintains that removal is not indicated when the germ is only slightly affected by the fracture. *Utecht* (1949) is of the opinion that such germs should be preserved only in cases of simple fracture. If infection becomes apparent, she recommends removal of the deciduous tooth as well as the permanent tooth germ from the line of fracture.

Friederichs (1940), as mentioned above, reports two cases where a fracture of the jaw in childhood arrested the growth of

the tooth germs lying in the fracture, whereas a similar fracture in a third patient did not cause any injury to dental germs. *Friederichs* thinks that the cause of the different course of these cases must be sought in the fact that the last-mentioned patient came to be treated immediately after the accident, whereas the two other cases were not treated until later on, when an infection had developed, leading to destruction of the germs.

In contrast to these views, it can be said on the basis of the present material — although it is too limited for drawing inferences with any statistical certainty — that there is nothing in the findings to indicate that the length of time that has elapsed between accident and treatment should be decisive for the injury to tooth germs.

SUMMARY AND CONCLUSIONS

The present paper sets out to clarify the late sequelae of fractures of the jaws in childhood with regard to the development of tooth germs in the lines of fracture.

Following a survey of the literature on the subject the results are reported of an examination made of 22 children who during the years 1944–1953 were admitted to the Department of Head and Neck Surgery of the University Hospital (Rigshospitalet) in Copenhagen with fractures of the jaws, and in whom unerupted teeth were lying in the lines of fracture. The age of the children was between 1 and 15 years at the time when the fracture occurred. 19 (86 per Cent.) of them were between the age of 3 and 10 at the time when the fracture occurred (Table 1). The period of observation ranges from 1 to 9 years. In three cases there had been infection following the fracture.

Upon re-examination only 7 out of 22 children showed normal conditions. In the other 15 children one or several teeth showed deviations from normal. In Table 3 the principal findings are given for each patient. Out of the teeth which during their development had been affected by a fracture of the jaw, 55 per Cent. showed deviations from the normal.

The following conclusions may be drawn from the present study:

(1) The length of time from accident to treatment does not seem to be decisive for the occurrence of changes in the teeth.

(2) One should not be too anxious to remove unerupted teeth lying in a line of fracture. Only if cogent reasons (infection) make it necessary, such germs should be removed.

(3) In cases where children have had fractures, in the lines of which there are tooth germs, it is desirable to have the patients appear for control after a suitable time, e.g. one year so as to allow early diagnosis of such disturbances in the development and eruption of the teeth as may occur, and take action where it is possible.

RÉSUMÉ ET CONCLUSIONS

AU SUJET DE LÉSIONS DE DENTS NON PAS ENTIEREMENT DÉVELOPPÉS CAUSÉES PAR UNE FRACTURE MAXILLAIRE

Le but de ce travail est de définir les conséquences tardives d'une fracture maxillaire survenue pendant l'enfance du point de vue du développement des dents non pas entièrement developpées se trouvant dans la fente de fracture.

Après un examen de la littérature antérieure à ce sujet, on rapporte le résultat d'études complémentaires faites sur 22 enfants qui, pendant les années 1944—53, ont été en traitement pour des fractures maxillaires au service de chirurgie maxillaire du "Rigshospitalet" (l'Hôpital de l'Université), et chez qui des dents en voie de formation se trouvaient dans la fente de fracture. L'âge des enfants au moment où est survenue la fracture était de 1 à 15 ans, 19 d'entre eux étaient entre 3 et 10 ans à l'époque de la fracture (Table 1). La période d'observation est de 1 à 9 ans. Dans 3 cas il y avait eu une infection conjointement avec la fracture.

Lors des études complémentaires 7 enfants seulement sur les 22 ne montraient rien d'anormal, chez les autres 15 enfants une ou plusieurs dents présentaient des écarts avec l'état normal. Dans la table 3 on voit les faits les plus importants pour chacun des patients examinés. Parmi les dents qui, pendant leur développement, avaient été affectées directement par une fracture

maxillaire, 55 % présentaient des écarts avec l'état normal. Un aperçu des transformations dentaires trouvées est donné dans la table 4.

On peut tirer les conclusions suivantes de l'examen:

1. Le temps qui passe depuis l'accident jusqu'au traitement ne semble pas être déterminant pour l'apparition des transformations dentaires.

2. Il faut user de réserve quant à éloigner des dents non pas entièrement développées se trouvant dans la fente de fracture. Seulement en cas d'extrême urgence (infection) il faut éloigner de telles dents à l'état d'ébauche.

3. Il serait désirable si, dans les cas où des enfants ont eu des fractures et où des dents en voie de formation se sont trouvées dans la fente de fracture, on pouvait convaincre les patients à se soumettre à un contrôle après un temps convenable, p. ex. 1 an, pour qu'on pût constater à temps des troubles éventuels dans le développement et l'éruption des dents et intervenir là où il est possible.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

ZUR BESCHÄDIGUNG NICHT VOLLENTWICKELTER ZÄHNE DURCH KIEFERFRAKTUREN

Der Zweck dieser Arbeit ist die Klarlegung der späten Folgen, die eine in den Kinderjahren eingetroffene Kieferfraktur auf die Ausbildung der nicht voll entwickelten, in der Frakturspalte gelegenen Zähne hat.

Nach Durchgang der einschlägigen Literatur werden die Resultate einer Kontrolluntersuchung mitgeteilt, die an 22 in den Jahren 1944—53 mit Kieferbruch in der Kieferchirurgischen Abteilung des Reichshospitals behandelten Kindern vorgenommen wurde, bei denen unfertige Zähne in der Frakturspalte lagen. Das Alter der Kinder betrug zu dem Zeitpunkt, als die Fraktur eintrat, 1 bis 15 Jahre, 19 von ihnen waren beim Auftreten der Fraktur 3 bis 10 Jahre alt (Tafel 1). Die Observationszeit betrug 1 bis 9 Jahre. In 3 Fällen war im Anschluss an die Fraktur eine Infektion eingetreten.

Bei der Kontrolluntersuchung zeigten nur 7 von den 22 Kindern keine Abnormitäten, bei den übrigen 15 Kindern waren an einem oder mehreren Zähnen Abweichungen vom Normalen zu konstatieren. Tafel 3 bringt die wichtigsten Befunde für jeden der untersuchten Patienten. Von den Zähnen, die während ihrer Entwicklung direkt von einer Kieferfraktur beeinflusst waren, zeigten 55 % Abweichungen vom Normalen. Eine Übersicht über die aufgefundenen Zahnveränderungen bringt Tafel 4.

Aus der Untersuchung kan man folgende Schlussfolgerungen ziehen:

1. Die Zeit, die vom Unfall bis zur Behandlung vergeht, scheint für das Aufkommen der Zahnveränderungen nicht massgebend zu sein.

2. Man soll mit der Entfernung nicht voll entwickelter, in der Frakturspalte gelegener Zähne vorsichtig sein. Nur wenn zwingende Gründe (Infektion) dafür sprechen, soll man solche Zahnansätze entfernen.

3. Es wäre wünschenswert, wenn in den Fällen, wo Kieferfrakturen im Kindesalter auftraten und wo nicht vollentwickelte Zähne in der Frakturspalte lagen, die Patienten veranlasst werden könnten, nach einer passenden Zeit, z. B. nach einem Jahr, zur Kontrolle zu erscheinen, damit man beizeiten eventuelle Störungen in der Entwicklung und dem Durchbruch der Zähne konstatieren und eingreifen könnte, wo es möglich ist.

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Address: *The Royal Dental College*
4 Universitetsparken
Copenhagen, Denmark