Dilaceration in the Root Formation of the Upper Second Premolar

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Introduction

The upper second premolars are often known to be interfered with the normal development of their roots by the periapical disturbance of the precursor and its adjacent teeth and, in some cases, by the position of floor of the maxillary sinus. This phenomenon called dilaceration is usually characterized by a crease or bend at the junction of the crown and root[1]. In our 10-year consecutive survey of about 300 school children relative to their teeth, we encountered two cases among the accumulated data which revealed abnormal eruptive processes. These two cases, having gone through similar eruptive interferences, succeeded in final eruption more or less normally. However, while the dilaceration of the root was observed in the one, normal root formed itself in the other.

Difference between the two could be accounted for by the respective positions of root formations and presence or absence of an oppresive force exerted by the approximal tooth which interfered with normal root formation.

Observations of Cases

2.1 Case 1.

The first case, K. Y., was a girl of 7 yrs. 1 m. At the time of our survey, the carious lesion was observed with almost all her molars in both upper and lower jaws. Besides a large carious destruction on C, D and E were found to be in the state of residual root. 4 had already undergone the bone eruption, while 5 was beneath the residual root of E and, as compared with 6, it was in a much higher position overlapping part of the maxillary sinus, being horizontal. Its root formation was hardly observable. The residual roots of D and E were surgically extracted in order to aid the eruption of impacted tooth (Fig. 1-1).

A recommendation was made that, for the purpose of observing this peculiar phenomenon, she should be radiographed once in every 3 months and this was carried out with the cooperation of the parents.

a. 8 yrs 1 m: 4 erupted together with its root formation but it failed to attain to the occlusal plane. 5 approached to the alveolar border nearer than a year before but it was yet horizontally impacted. Its cusp was attached to the neighborhood of distal cervic of 4, with a little root developed. Its bulbous swelling extended into the maxillary sinus (Fig. 1-2).

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Fig. 1.1 7y1m. Initial impaction of 4.

Fig. 1.2 8y1m. Horizontal impaction of 4.

Fig. 1.3 9y. Vertical movement of 4 into eruptive way.

Fig. 1.4 10y. Bone eruption of 4 into normal direction.

Fig. 2.1 7y9m. Bone resorption in periapical region of 4 and conventional location of 5.

Fig. 2.2 8y9m. Carious destruction of 4 and horizontal impaction of 5.

Fig. 2.3 9y9m. Horizontal emergence of 5 and its initial root formation.

Fig. 2.4 10y9m. Two curves presentation in the root of 5.
b. 9 yrs: Root formation of 4| had become clear enough and the crown of 3| was observed above it. The axis of 5| moved from the horizontal to vertical direction with about 1/3 of the root formed. But 5| and 6| had attached to each other and there was no bone structure between the two (Fig. 1-3).

c. 10 yrs: 4| had been more or less normally formed with the exception of its apex and in perfection occlusion with its antagonists. 5| had already finished the bone eruption with its axis in nearly parallel to those of 4|, 6|. It came to have the inter- alveolar bony structure both distally and mesially (Fig. 1-4).

2.2 Case 2.

The second case, I. N. was also a girl of 7 yrs 9 mos. Deep carious destructions were observed with C, D and E. With regard to D in particular, resorption was seen around its root due to a pathologic bone change (Fig. 2-1).

a. 8 yrs 9 mos: D had already shed and 4 began the bone eruption. E had suffered a severe carious lesion but not yet in the state of residual root. 5| was observed to be horizontally impacted above E and just a little of its root formation was noticed (Fig. 2-2).

b. 9 yrs 9 mos: 4| had completed its eruption and was in occlusion with the antagonists. 5| still continued in its horizontal position with its lingual surface on a line formed by linking the cervical portions of 4| and 6|. Its root was formed in the state of dilaceration by attaching itself to the root of 6 (Fig. 2-3).

c. 11 yrs 9 mos: 5| had completely erupted between 4| and 6| and were found in normal occlusion with its antagonists. However, its root was mesially bent directly over the cervix and further it was from this point in parallel to the root of 4| as if indented (Fig. 2-4).

Discussion

With reference to Case 1 described above, 5| had been horizontally impacted as a result of the fact that this yet rootless tooth was oppressed by the aggravation of an ostitis developed in the periapical region of E which was its precursor. However, this horizontally impacted tooth was gradually lifted to be vertical through the development of its approximal tooth, 4|. At the same time, the root formation of 5| doubtlessly aided in the vertical restoration. In a similar way, 5| in Case 2 was oppressed by an ostitis which developed from a carious lesion in the periapical portion of its precursor E. The formation of root in the latter, however, was different from Case 1 in that the root was formed while in the horizontal state. In the bone formation process, since 5| was sandwiched between 4| and 6| with no space in between, it could not develop itself in a normal fashion and, as a consequence, it became bent medially. In a subsequent period presumably for several months, the root formation of 5| had advanced and because of this force, it was restored to a vertical position in which it finally erupted. After this, the rest of root formation continued vertically along the root of 4|. As a result, the indented root as given on Fig. 2-4 was formed.

It is a generally recognized fact that, as compared with the first premolars, the upper second premolars are more susceptible to eruptive disturbances[2]. But there is no adequate explanation for the occurrence of dilaceration except that there is no
sufficient room for bone structure in the maxillary sinus which extends highly over it.

According to Euler [3], dilaceration of the upper premolars is caused by the premature eruption of permanent teeth as a result of the premature loss of precursors and, because of this, either heavier burden is borne by a tooth involved or its eruption is delayed on account of insufficient room for eruption.

But in the first of the cases discussed by the authors a straight root was formed despite the prolonged eruptive period of $5$. With the root formation of $5$ in the second case, however, there were two definable steps. That is to say, part of bent root of $5$ was formed while in a horizontal position in contact with $6$, and the rest of root was later completed after it erupted in a normal fashion.

Conclusions

Two cases of dilaceration of the upper second premolars were studied and, as a result, the following findings were obtained by way of conclusions.

1. In Case 1, the preceding two approximal teeth had narrowed the eruptive path for $5$ and after it had been oppressed horizontally, it restored itself vertically and erupted normally. Although the eruptive period was much prolonged, this state alone was not sufficient to bring about the dilaceration of root.

2. As illustrated by Case 2, the dilaceration of root takes place when direction of the cervix is caused to change at some stage in the period of root formation.

References