



EXPERIENCES WITH UNERUPTED ANTERIOR AND POSTERIOR TEETH



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The causes of tooth impaction are as numerous as are ways to manage the problem. Treatment is usually instituted only after an unfavourable eruption prognosis of the impacted tooth has been established from radiographic and clinical examination. Advantages of guided eruption and surgical removal have to be weighed. Fifteen cases of various degrees of impaction, difficulty of treatment, complications and failures of eruption are discussed.

Key Words

Impaction, uneruption, assisted eruption, primary failure of eruption.

Short Title

Unerupted anterior and posterior teeth.

Experience with Unerupted Anterior and Posterior Teeth

Localized failure of tooth eruption can be attributed to two main causes: mechanical obstruction in the path of eruption and a lack of eruptive force of the tooth.¹² Impaction occurs when the tooth is prevented from erupting by some physical barrier in its eruption path. The maxillary and mandibular third molars and maxillary canines are most frequently impacted.^{2,15} Examples of some mechanical interference with eruption are cysts, odontomes and tumours.⁸ Impaction could also be caused by lack of space¹⁴ or premature loss of deciduous teeth.^{9,15} However, some teeth may erupt in spite of these factors, while non-eruption may occur without any evidence of obstruction.¹⁴

Unerupted upper incisors and canines

Treatment of the unerupted and/or impacted upper central incisors and canines cannot be ignored for aesthetic reasons. The aetiology of their non-eruption is numerous. A correct diagnosis of the cause of impaction and location of the unerupted tooth will determine the correct approach of treatment. Diagnostic radiographs^{12,14} have been recommended to localize accurately the position and angulation of the anterior tooth in relation with its neighbouring teeth as well as to determine the presence of any mechanical obstruction. Treatment of unerupted teeth has been categorized into surgical and orthodontic management.¹⁰

The upper central incisor is one of the first permanent teeth to erupt. Failure of eruption is often associated with the

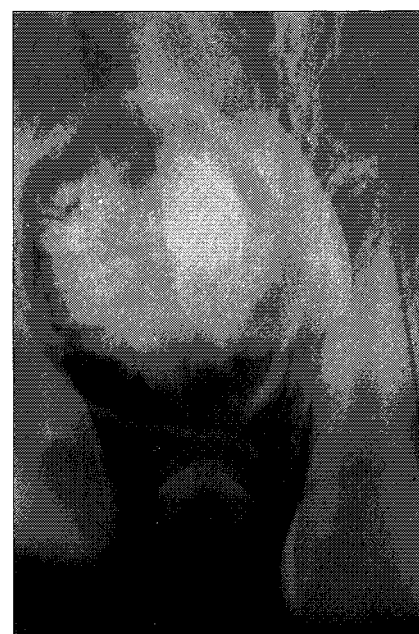


Fig. 1. The presence of an odontome has prevented eruption of the central incisor.

presence of odontomes (Fig. 1), supernumeraries or mesiodens. Dilaceration and ankylosis¹¹ of the root to the alveolar bone, are other causes of non eruption.

On the other hand, the permanent canine is one of the last tooth in the dentition to erupt. It has a long and tortuous path of eruption, and often encounters insufficient space for alignment once it appears in the oral cavity.⁹ Therefore, this tooth has been reported to have a high incidence of impaction¹⁵ after the third mandibular molars.¹⁶ The diminutive peg shaped or absent lateral incisor (Fig. 2) has also been blamed for the canine impaction as the erupting canine has been reported to follow the distal surface of the root of the lateral incisor.^{7,8} Guidelines for the assessment of prognosis for eruption of the impacted tooth have been suggested.^{6,8,14} Arbitrary



Fig. 2. The impacted canine is associated with a malformed lateral incisor.

grades of severity have been assigned to the impacted tooth based on the position of apex, the position of the crown and direction of its longitudinal axis.^{8,14}

Generally, a combination of both surgery and orthodontics is necessary for complete management. Orthodontic management includes space opening for passive eruption, guided eruption with gold chain^{4,5,10} and space closure after removal of the impacted tooth.⁶ Surgical treatment includes surgical exposure of the tooth, removal of obstruction, excision of the impacted tooth¹⁴ and transplantation.^{8,10} Failure of treatment has led to adverse consequences, including resorption of roots of neighbouring teeth and the development of dentigerous cysts.¹⁵ However, in other cases, no harm has arisen by leaving the impacted tooth alone.⁶ The duration of treatment has been found to be influenced by the position of the ectopic tooth. Treatment at an early age does not reduce the complexity nor the duration of treatment.³



Fig. 3. High impaction of the canines occurred without adverse consequences. Note that the lateral incisors are well developed.

Case reports

Nine cases of impaction are presented. They represent a wide range of treatment options of unerupted teeth with various degrees of impaction and their associated complications. At the time of diagnosis, the prognosis for disimpaction was assessed as good and guidance of eruption of the impacted tooth was planned. The majority of impacted canines in this sample did not exhibit peg-shaped or congenitally missing lateral incisors (Fig. 3).

Orthodontic opening of space for passive eruption

In Case 1, the impacted canine was discovered during a routine dental checkup. A periapical radiograph revealed no mechanical obstruction to its path of eruption, but showed insufficient space for eruption (Fig. 4a). A space was created orthodontically, and the canine erupted after four months into good alignment (Fig. 4b,4c).

Case 2 had a lower central incisor which was impacted because of an overlying thick fibrous gingiva (Fig. 5a). A space was opened orthodontically and the incisor erupted uneventfully after surgical exposure was carried out (Fig. 5b).

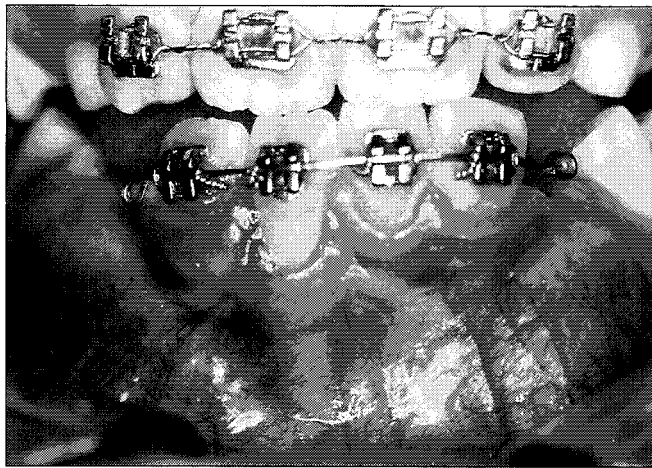
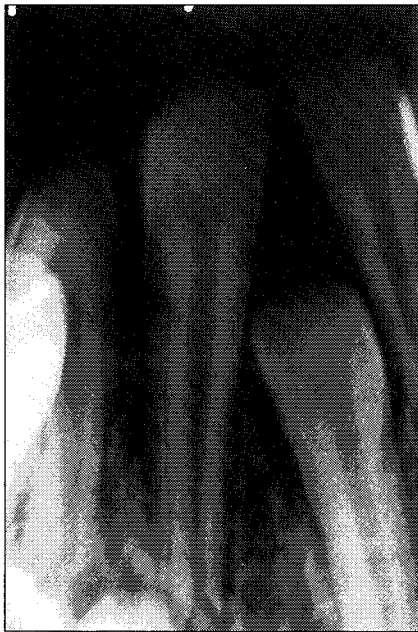
Active traction of teeth with attachments

In all three cases, odontomes (Cases 3 and 5) and a supernumerary (Case 4) were responsible for the impaction. Surgery was indicated for their removal, and an attachment was bonded to the impacted tooth for assisted eruption during the surgery. Gold chain preparation for bonding as an attachment was carried out whenever available because of its associated advantages.⁵ Eruption occurred successfully in all three cases.

Many theories of eruption exist. Lengthening of



Figs. 4a, 4b, 4c. Case 1. The canine erupted once a space is made available.



Figs. 5a, 5b. Case 2. Surgical exposure of the overlying mucosa and orthodontic space opening allowed spontaneous eruption of the lower central incisor. Note the gingival recession of this tooth.

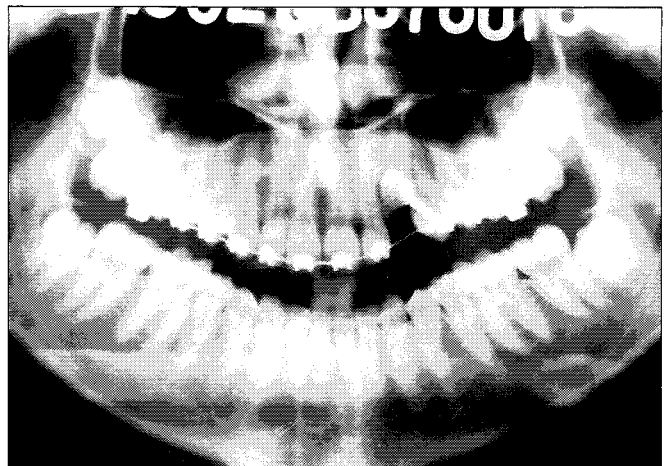


Fig. 6a, 6b. Case 3. A gold chain was bonded to the buried canine. Progressive eruption has occurred.



Fig. 7a, 7b. Case 4. A gold chain was bonded to a central incisor.





Figs. 8a, 8b, 8c. Case 5. A bonded bracket with an attached ligature was used in this case.

the root as a mechanism for eruption has been disputed because a tooth will continue to erupt after the apex has been removed.¹² Despite this, several authors^{9,12} believe that once there is complete root formation, it will not erupt spontaneously and traction must be applied. Others^{4,5,10} have also described their rationale for active traction of the unerupted teeth.

Although Case 3 involved a canine (Fig. 6a, 6b) and Case 4 a central incisor (Fig. 7a, 7b), management was similar. In Case 5, a bracket was bonded and a ligature wire was used for traction as a gold chain was unavailable at the time of surgery. Eruption was uneventful (Fig. 8a, 8b, 8c).

Transplantation of impacted tooth

The canine in Case 6 appeared to be impacted as a result of insufficient space. However, on closer examination, the canine was found to be lodged between the roots of its neighbouring teeth (Fig. 9a). This narrow space was aggravated by the dilacerated root of the first premolar with a mesial curve. One year of orthodontic treatment failed to achieve a space sufficiently wide in the apical region for eruption of the canine (Fig. 9b). Therefore, active traction of the canine has been anticipated to be unsuccessful. Transplantation of the canine into the arch was thus indicated^{8,9} and carried out (Fig. 9c). The patient has been informed of possible consequences of root resorption, tooth non-vitality and discoloration.⁸

Failure of assisted eruption

Case 7 was one presenting an ectopically erupted canine on the left and impacted canine on the right. Despite the use of gold chain for active traction, the canine failed to erupt. The chain was observed to be entangled within the surrounding bone as activation of the chain was not commenced soon after the surgery (Fig. 10a). A second surgery was performed where an apically repositioned flap was raised to expose the canine⁷ and obtain an adequate width of attached gingiva. Healing below the canine was by secondary intention. This canine is erupting well (Fig. 10b).

Case 8 had two years of orthodontic treatment to assist eruption of the central incisor into the oral cavity after



Figs. 9a, 9b. Case 6. Various views of the bulbous and mesial curved root of the premolar, obstructing eruption of the canine. Space opening attempts of the apical region failed.

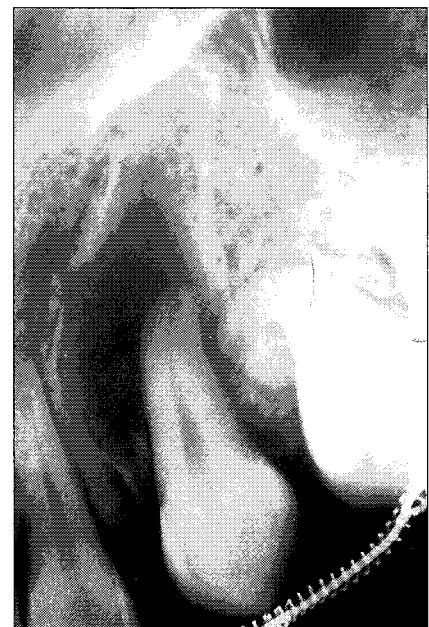
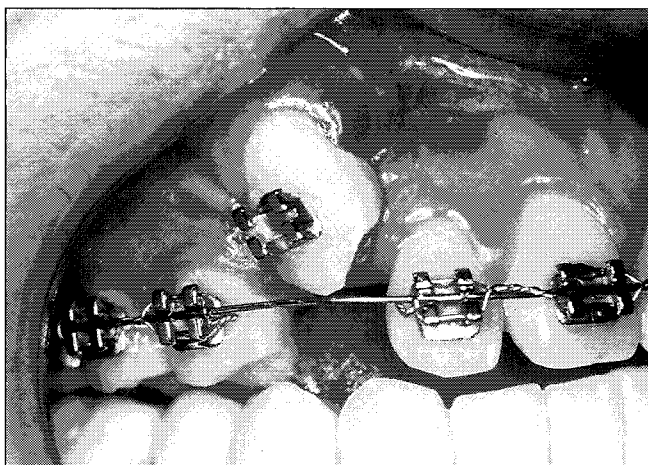
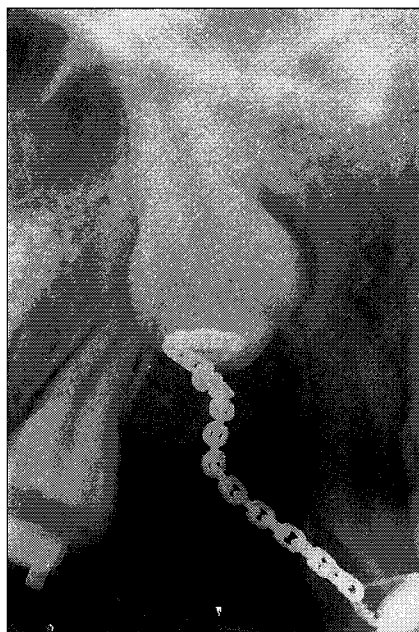


Fig. 9c. Case 6. Radiograph of the transplanted canine two months after surgery.



Figs. 10a, 10b. Case 7. The twisted and tangled gold chain resisted attempts at erupting the canine. An apical repositioned flap operation was performed to expose the canine.

removal of the supernumerary. However, the tooth failed to erupt (Fig. 11a, 11b). The presence of a dilacerated curved root might have resisted eruption, but dilacerated teeth have been known to erupt successfully as the premolar in case 6 (Fig. 9a). Anchylosis could also be a contributory cause of impaction. This tooth was subsequently removed and the lateral incisor moved into its place.

Although Case 9 is not a typical case of impaction, it served as a reminder not to be overly enthusiastic of tracting the unerupted tooth. The central incisor was diagnosed as ankylosed when intrusion of all the adjacent teeth and canting of occlusal plane upwards towards the central incisor occurred (Figs. 12a, 12b). The tooth was eventually removed and a prosthesis placed.

Consequences: resorption and cystic development

Below are three reports of the possible problems with retained buried teeth. They do not represent the typical cases seen.

Case 10

This patient complained of an absent canine and a Class III malocclusion. Radiographs revealed an ectopically positioned canine resorbing two-thirds of the roots of both the central and lateral incisors (Fig. 13a). A Lefort I surgery for advancement of the retrusive maxilla was planned. Presurgical orthodontics was carried out six months after removal

of the ectopic canine when roots of the incisors were found to be stabilized. As support was reduced for the incisors, the upper dental midline was corrected surgically during the Lefort I surgery by rotating the maxilla (Fig. 13b). Care was taken to prevent further resorption by minimising orthodontic movement of the affected teeth.

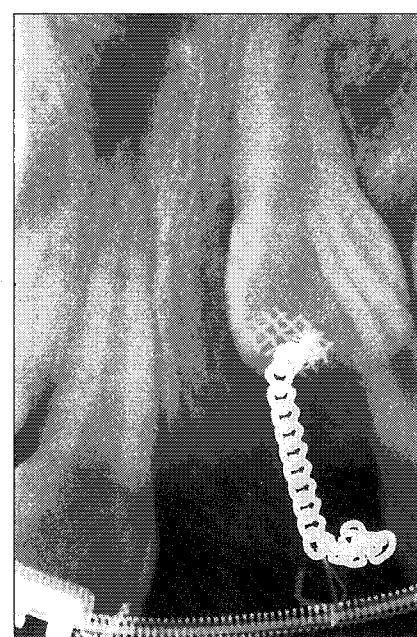
Case 11

A dentigerous cyst displacing roots of adjacent teeth was diagnosed in association with the buried canine (Fig. 14). Removal of the tooth was indicated as crowding of the arches was present.

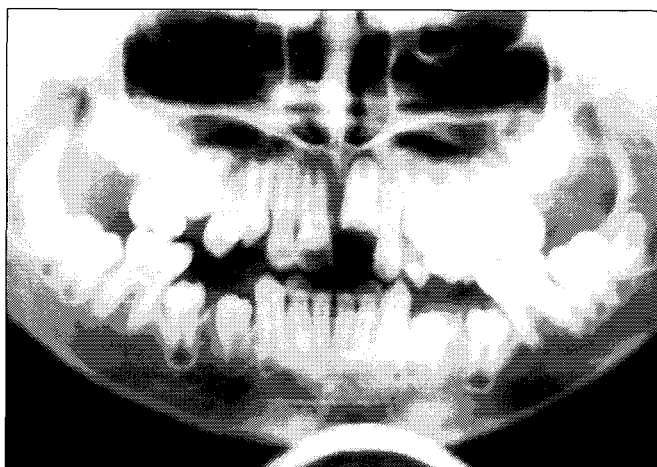
Case 12

This is a rare case of root blunting of an impacted incisor (Fig. 15). The root shortening is characteristic of a tooth undergoing orthodontic movement with excessive forces.¹² The upper arch was well aligned with sufficient space for the buried incisor, therefore active traction of the incisor was planned with removal of the odontome. However, the patient had been informed of the poor prognosis because of the unfavourable crown:root ratio and unpredictable root resorption.

According to Proffit,¹² when eruption is mechanically blocked, the proliferating apical third of the root, which would normally remain at the same level, will now move more apically inducing resorption and causing distortion of the root form. Trauma to the primary tooth may be another possible cause of root blunting.



Figs. 11a, 11b. Case 8. The central incisor with a curved root tip, failed to erupt despite 2 years of active traction. Anchylosis is the most likely cause of this impaction.



Figs. 12a, 12b. Case 9. The traction of an ankylosed upper incisor had resulted in intrusion of all the adjacent teeth. Note the cant of the occlusal plane upward, towards the affected tooth.

Non eruption of posterior teeth

The most frequent cause of third molar impaction is lack of space. With regard to maxillary and mandibular first molars, the aetiology is likely to be disturbance of the eruptive mechanism. Normal eruption can cease spontaneously even without the presence of any mechanical obstacle in the path of eruption. Continual eruption of the adjacent teeth results in infraocclusion of the affected tooth. This is an indication of ankylosis of the root, and the result is a submerged tooth.^{11,13} This condition has been termed primary failure of eruption. Possible aetiologies have been discussed but no definite cause has been established.¹¹ Posterior teeth are more involved than anterior teeth and first permanent molars are most often affected. In addition, all the teeth distal to the first involved tooth may also be submerged.¹¹

Failure of eruption of a single tooth could be treated by its removal. When a series of teeth in a quadrant is affected,

segmental alveolar osteotomy has been suggested to reposition the segment occlusally.¹¹

Case reports

Two cases of varying degrees of severity of primary failure of eruption are presented. In both cases, the molars failed to erupt even after space opening. This is contrary to the case reported by Raghoobar,¹³ where spontaneous re-eruption occurred.

Case 13

This boy presented with a Class III malocclusion. Submerged and impacted permanent molars on the upper right quadrant were detected. Facemask therapy was indicated for protraction and also to create a space distally for eruption. Although there was radiographic evidence of a space distal to the right second premolar, this did not permit eruption of the teeth distal to the premolar (Fig. 16). Surgical removal of all three molars has been indicated.

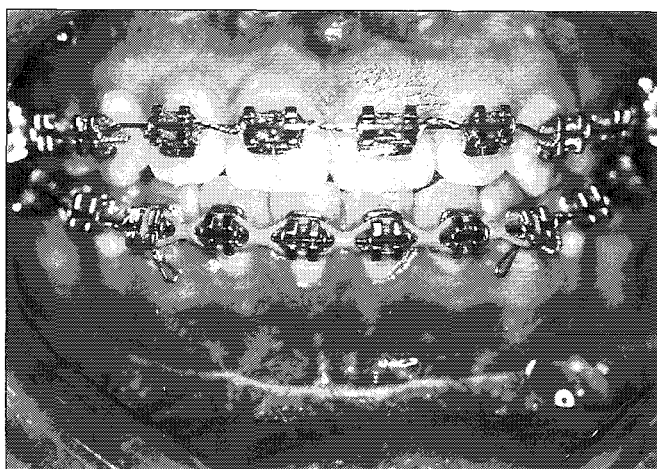


Fig. 13a, 13b. Case 10. The roots of the central and lateral incisors were resorbed by the ectopically erupting canine. Upper midline correction was done with Lefort 1 surgery.



Fig. 14. Case 11. A dentigerous cyst associated with the buried canine.



Fig. 15. Case 12. Note blunting of the root of the central incisor impacted by an odontome.

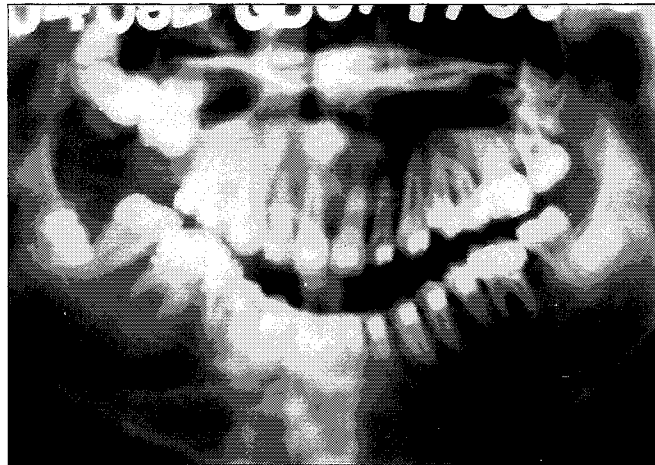


Fig. 16. Case 13. An orthopantomogram showing a space distal to the upper right second premolar and the unerupted molars on the same side.



Figs. 17a, 17b. Case 14. Orthopantomograms showing a submerged lower molar. Opening of space did not help with its eruption.



Figs. 18a, 18b. Case 15. Various views of mesial root resorption of the lower first molar.

Case 14

The presence of a submerged molar suggested ankylosis (Fig. 17a). Treatment was planned to open a space orthodontically to evaluate the eruptive capacity of the submerged molar. Active traction was attempted, but failed to erupt the molar (Fig. 17b). This tooth has been planned for removal and orthodontic space closure.

Case 15

The impacted tooth may cause root resorption of anterior (Fig. 13a) as well as posterior teeth. In the presence of any unerupted tooth, care has to be taken to ensure that the tooth with the worst prognosis will be removed. Extraction of the lower first premolar to allow eruption of the impacted second premolar was planned in this patient. Various views of periapical radiographs reveal root resorption on the mesial root of the first molar, which was eventually removed (Figs. 18a, 18b).

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