Recognition And Interception Of Aberrant Canine Eruption*

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"Eruption" of a tooth has two meanings. Although commonly used to denote appearance in the mouth, each tooth traverses, normally, a well defined path through the maxilla or mandible. This double meaning of tooth eruption has been emphasized by Broadbent[3],[4] by Noyes, Schour and Noyes[8] and by others. Aberrant eruption of the canine tooth means deviation from its usual path during migration from its site of orgin at about the end of the first year of life. This site in the maxilla is immediately above the root ends of the deciduous first molar.[3] As pointed out by Dewel[6], the maxillary canine's path is unusually lengthy in time consumed as well as in distance traversed for assumption of its place in the dental arch.

Numerous references in our literature testify to orthodontic interest in this tooth. Blum[5] has stated the incidence of canine impaction is second only to that of the mandibular third molar and as recently as 1952-53 we find this statement: "The general practitioner should x-ray the entire mouth routinely and be suspicious when the deciduous teeth are retained after the age of twelve or where permanent teeth are missing".[8]

This characteristic preoccupation with impacted canines implies that such developmental problems can not be prevented and partakes of the ignominy of locking the barn door after the horses have entered the corn patch. Recognition of potential canine impactions was implicit in the first reference to "the ugly duckling stages of normal development" in 1930.[1] Here was presented a charting of normal relationships; the roentgenographic technique had been described earlier but published subsequently.[2] Broadbent also emphasized the role of the general dentist in this problem during the Illinois Telephone Extension Program of 1951-52 and illustrated these ugly duckling stages in the manual issued to subscribers.[4]

It is, then, my hope to interest you in the routine serial use of both lateral and posteroanterior head films, prior to appliance intervention, as a means of recognizing these potentialities and intercepting them by dental surgery. I realize that they can be handled by the use of dental x-rays[4] although this usually involves referring the patient. I also realize that one can sometimes recognize symptoms of cuspid aberrancies prior to clinical eruption.

Figure 1 is the frontal view of the plaster casts of a girl nine and one-half years old. Neither dental nor cephalometric x-rays are needed in this instance to alert the orthodontist to the acutely anterior location of the maxillary canines.

At the opposite end of the scale, for contrast, the orthodontist may be confronted with the problem pictured in Figure 2. These plaster reproductions of a boy of almost thirteen years show a total lack of the labial alveolar bulge

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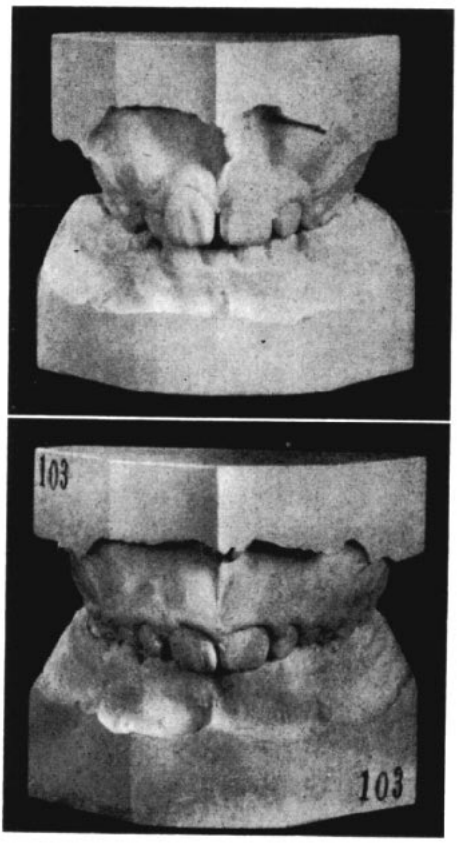

Fig. 1 above, Fig. 2, below.

of the maxillary canines seen in the first illustration. Obviously, there is an acute retardation of this patient's dental maturation and the relationships of the maxillary cuspids need investigation. Roentgenographic examination revealed, among other problems, potential palatal impaction of these teeth; this evidence will be demonstrated later.

In line with Todd's dictum that to recognize the abnormal we must first know the normal, I quote Broadbent's remarks about the "ugly duckling" stages of the developing dentition.

"The shedding of the baby incisors and the eruption of their successors marks the advent of the one very striking example of these ugly duckling stages. This stage when viewed from the frontal aspect - - - - -, after the age of six and one-half years, finds the upper centrals erupting in a relatively short period of time and usually with a separation at the midline. The upper permanent laterals follow and the centrals move together into approximal contact. The growth in lateral dimension of the supporting structures, especially the area at the level just below the floor of the nose where the upper cuspids are developing, is relatively slower, which forces the lateral incisors into a fan-shaped pattern that becomes more pronounced until the time when there has been sufficient gain in lateral growth in the apical base. Coincident with the eruption of the cuspids this lateral dimension increases to permit the more erect position of the incisors".[3]

When one examines a patient in his middle teens who has retained a deciduous cuspid, it means that someone has disregarded the developing dental patterns just described. The next illustration, Fig. 3, depicts the tracing of the frontal x-ray of a boy (W.T.) of almost fifteen years where this has occurred. This clearly shows the succedaneous tooth to be in an unfavorable position relative to the

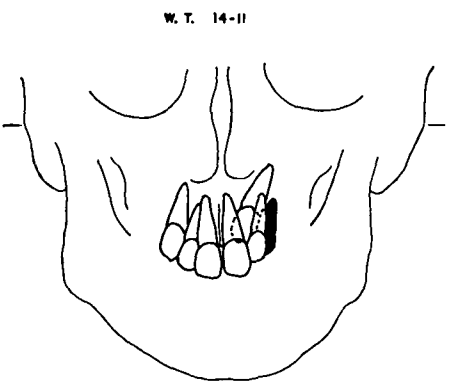

Fig. 3

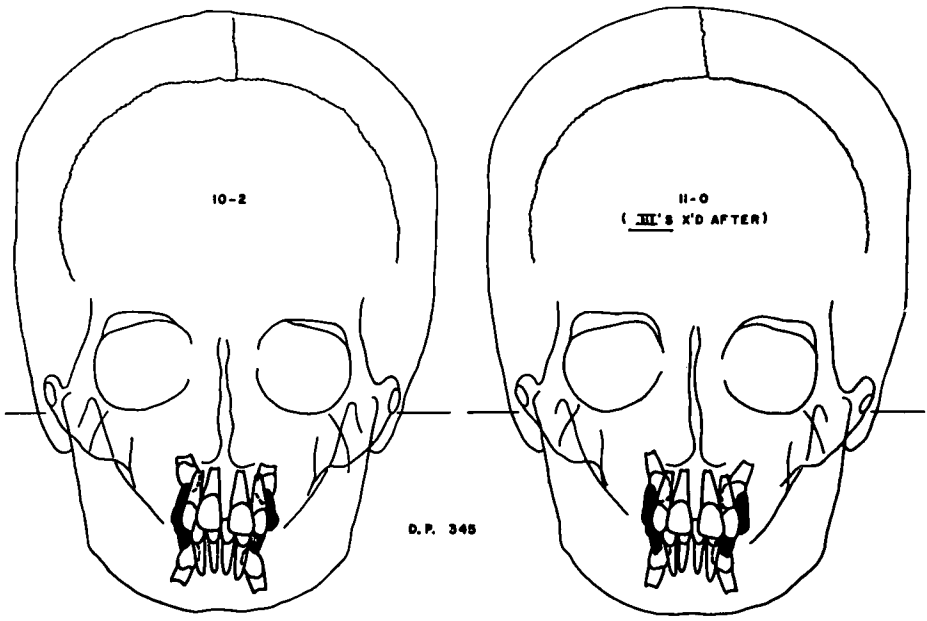

Fig. 4

central and lateral incisors. Immediate removal of the deciduous tooth was advised together with generous removal of alveolar bone[7] to encourage clinical eruption of the permanent canine. Three months after surgical intervention the cuspid was visible clinically although it was lingually positioned. The patient is now under treatment.

This problem could have been avoided with the supervision obtained by patient D. P., Fig. 4. This boy was first seen and clinical records made at the age of ten years and two months. The positions of the permanent maxillary cuspids were considered only a potential problem, relative to his retarded dental development, and a second x-ray examination was advised at about the eleventh birthday. The illustration on the right was traced from the P.-A. film made at that age and indicates further medial tipping of the permanent maxillary canines. Immediate extraction of both primary cuspids and removal of alveolar bone was suggested and followed. This patient was examined a year later when it was seen that the left cuspid was visible in the mouth. The right one was not in sight but was definitely labial as shown by the bulge created between the first premolar and lateral incisor on that side. Through a combination of circumstances this patient was not seen again for more

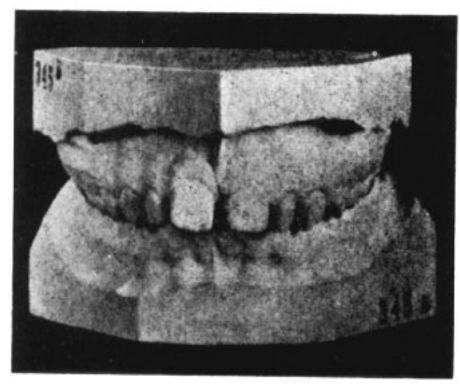

Fig. 5

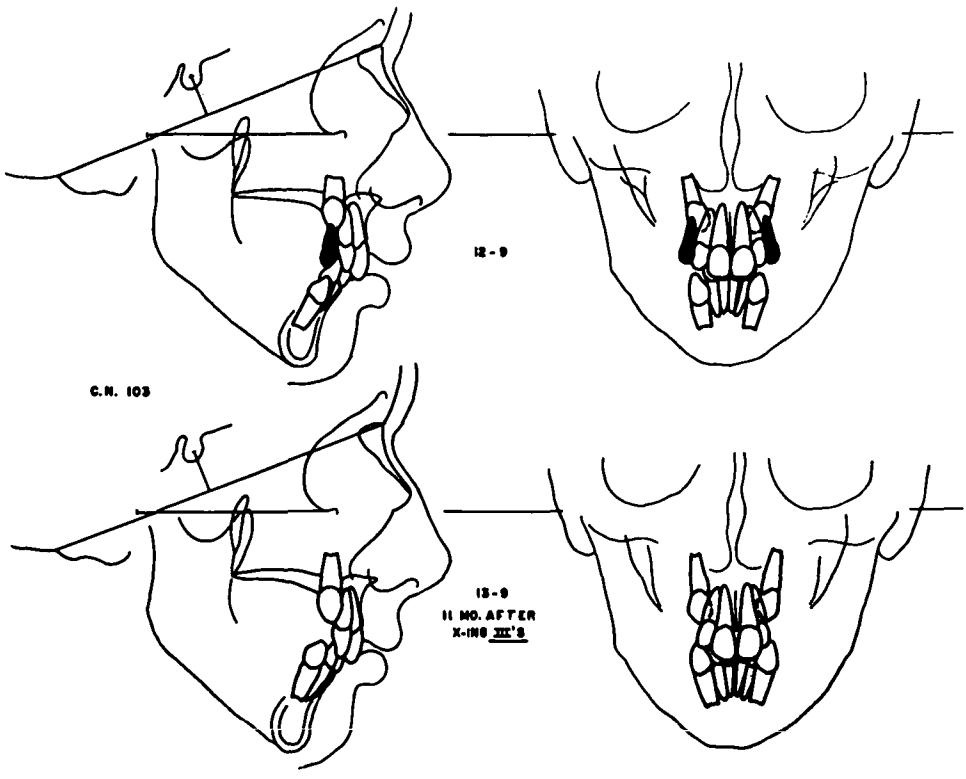

Fig. 6

than two years at which time the plaster records were made which demonstrate a favorable termination for the teeth in question Fig. 5.

It should be noted that the lateral x-ray film provides no guide to these potential impactions. Figure 6 shows tracings of the complementary lateral and posteroanterior x-ray films oriented in the Frankfort Plane. This is the roentgenographic evidence of the patient whose plaster casts, which were seen in Figure 2, gave no clinical sign of the maxillary canine teeth. It is only in the P.-A. image that one can judge the mediolateral positions of the permanent cuspids. In this boy of twelve years and nine months (top row) immediate extraction of the deciduous upper canines was ordered together with generous removal of alveolar bone. A year later, eleven months after the surgery, the tracing of the second lateral film indicates only additional root formation and further descent of the permanent cuspids. In the tracing of the second P.-A. film, however it is obvious that both upper cuspids have reacted favorably: they have moved laterally, are more upright, and thus give assurance that they will eventually assume correct positions in the dental arch.

A similar problem is shown in Figure 7. In this girl of just past eight years both upper lateral incisors had appeared but the lower deciduous laterals were still in place. The upper deciduous right central also remained and had apparently served to deflect the upper permanent centrals. The deciduous upper central

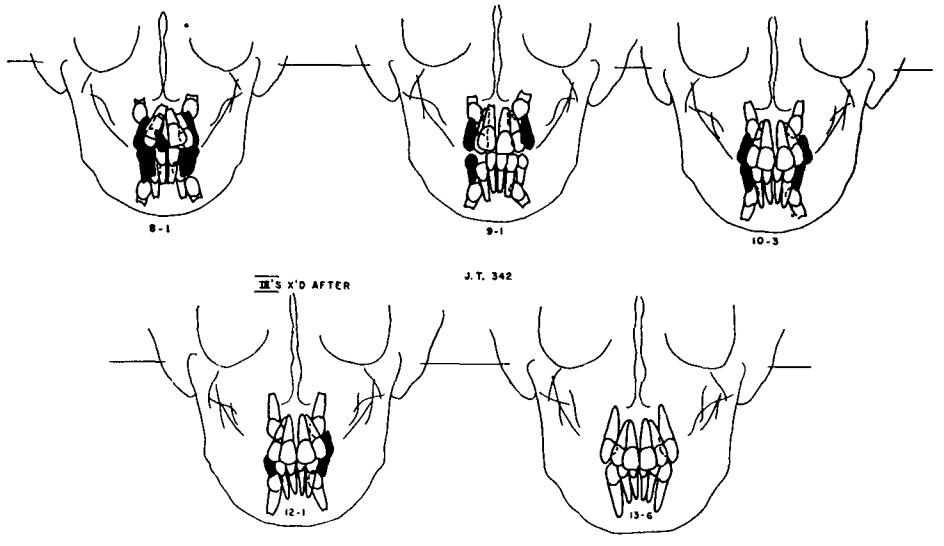

Fig. 7 above, Fig. 8 below.

was exfoliated shortly after this first record and a second set of clinical records was obtained a year later. The tracing of this P.-A. x-ray, taken at nine years and one month, shows improved positions of the eight incisors but medial tipping of the four permanent canine teeth. As already seen in the "ugly duckling" pattern at the nine-year level, this normally is the case but it provides a storm warning for the orthodontist which should not be ignored. A third set of clinical records taken fourteen months later, at the age of ten years and three months, gave further substance to the warning and x-rays were subsequently made at six-month intervals. These also confirmed a significant and progressive retardation in dental maturation. The tracing of the P.-A. film at the twelve year

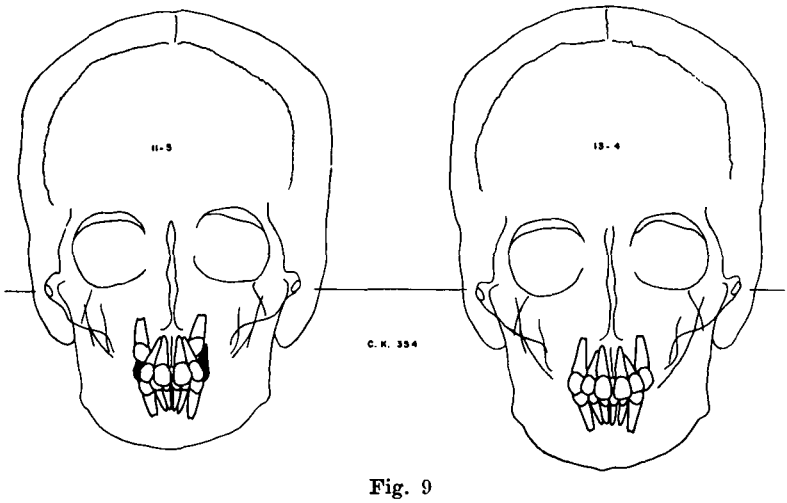

Fig. 9

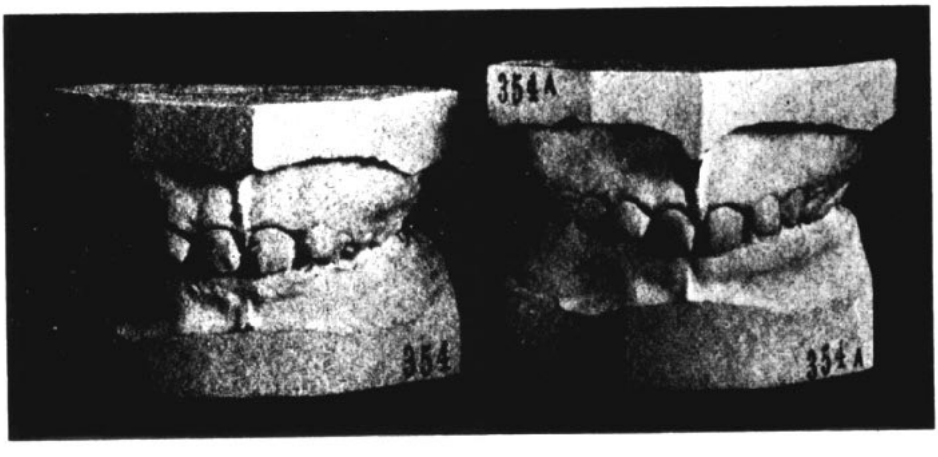

Fig. 10

and one month stage, combined with the dental x-rays, led me to order extraction of the remaining three deciduous canine teeth. Finally, at the age of thirteen and a half, the four permanent canines were visible clinically and approaching satisfactory positions with the exception of the rotation of that on the lower left side. Figure 8 shows frontal views of the plaster casts at the ages of eight/one, nine/one and thirteen/six.

In this instance the cuspids might have appeared without the roentgenographic supervision and the deciduous extractions. It should be added that between the age of nine years and one month and that of ten years and three months, there was six months of treatment and a short retention period.

It is often difficult to delineate the extent of root absorption on the deciduous canines in either the lateral or posteroanterior film. In the instance of C.K., a girl of eleven years and five months, it was apparent from the P.-A. film that the upper left permanent canine represented a potential impaction, Fig. 9. The den-

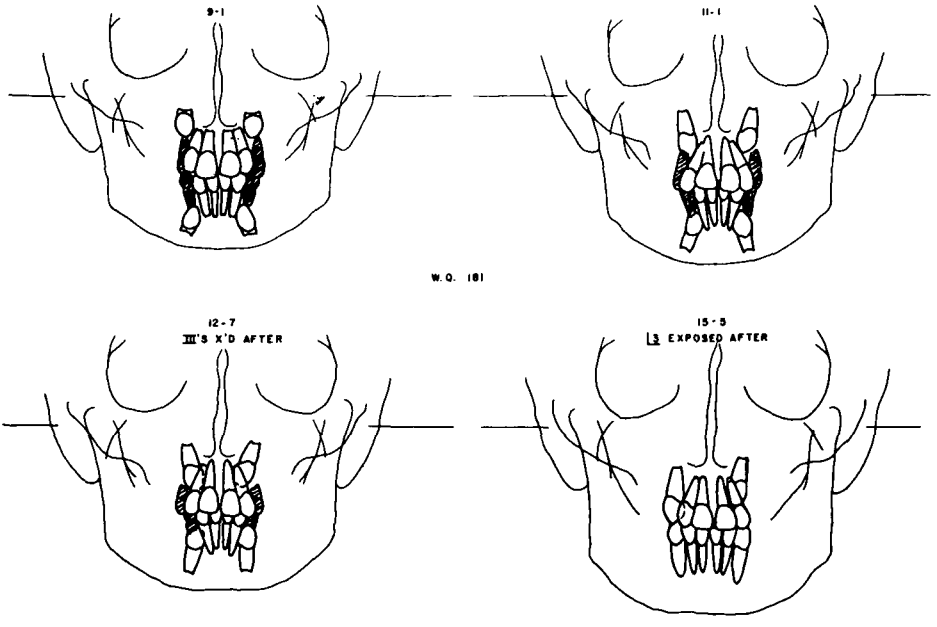

Fig. 11

tal x-rays confirmed that the deciduous upper left cuspid was unfavorably influencing its successor and its extraction was ordered. The patient was examined at six month intervals until both cuspids were well positioned two years later, Fig. 10. Treatment was then started without the tedious effort to position the same tooth required in the instance of patient W. Q., whose frontal tracings are seen in Figure 11.

These show that this program of supervision is not infallible. The first x-rays were made at the age of nine years and one month. In view of the patient's acutely retarded development the positions of the permanent canines were not considered to be a potential hazard. Two years later, however, they were viewed with suspicion and, when compared with their more unfavorable positions at twelve years and seven months, the upper deciduous canines were seen to require extraction. This patient's treatment, for a severe Class II, Div. 1 malocclusion, was started at fourteen and one-half years, after the upper right cuspid had appeared. When he was almost fifteen and a half, the P.-A. x-ray showed impaction of the upper left cuspid. It was surgically exposed and moved to its proper position during the last half of an unduly long period of active treatment covering more than two years. The increasingly oblique positions of the upper canines in the x-rays prior to treatment should have constituted sufficient warning to require free alveolar bone removal rather than simple removal of the deciduous tooth, thus probably avoiding the impaction.

With few exceptions in my experience, potential impaction of permanent canine teeth is seen in patients exhibiting moderate to severe retardation of dental maturation. By that I mean a slow rate of permanent tooth formation as well as retarded exfoliation of the deciduous teeth. It would

be useful, if one had a sufficient number of such problems, to correlate dental and bone ages. The incidence of potential cuspid impactions also needs investigation; in my own case it is estimated to be in the ten to fifteen per cent range. The relatively small number of patients in a one-man office does not attach reliability to this estimate.

In summary, early recognition and interception of potential canine impactions is a highly useful by-product of routine cephalometric x-ray examination. The lateral film alone can not fill this function; the P.-A. film provides the necessary information and may require supplementary dental x-rays. The proper time for removing the deciduous cuspids is modified by the dental age of the patient. When extraction of the deciduous cuspid is ordered, it is often wise to ask for removal of a generous amount of alveolar bone to favorably influence the positions of the aberrant permanent teeth and to encourage their ultimate clinical appearance.

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