Research Article

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Eruption of Canine after Surgical Exposure and its Orthodontic Management

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ABSTRACT

Background: The records of a consecutive series of 30 patients who had undergone excisional exposure of one or both palatally displaced canines were reviewed. The purpose was to ascertain whether the canine(s) erupted spontaneously following surgery, whether orthodontically-assisted eruption was required or whether the procedure failed completely indicating the need for re-exposure. The results of the study suggest that the majority of canines will erupt once exposed and of those that fail to erupt completely most will still remain exposed to a sufficient extent to allow attachments to be bonded to the palatal surface.

Keywords: Unerupted Canine, Surgical Exposure.

INTRODUCTION

Palatal impaction of the maxillary canine is a problem which is frequently encountered in orthodontic clinical practice, although the overall population prevalence is fairly low. Ericson and Kurol[1] (1986) found evidence of abnormal canine eruption patterns in 1·7 per cent of children aged 11 years and over. They quoted several earlier studies which were in broad agreement with this estimated frequency. Once it is established that the canine is displaced from its normal position, management options can be categorized as:

1. No immediate treatment except monitoring
2. Surgical removal of the unerupted canine
3. Accomodating the canine within the arch

The indications for and against these various treatment options have been covered elsewhere (Moss, 1972; Bishara, 1992; Ferguson, 1990)[2]. Accommodation of the canine within the arch can involve procedures of varying complexity, ranging from the simple removal of any impediments to eruption (including retained deciduous canines) up to surgical reimplantation. A strategy which is commonly adopted is surgical exposure followed by orthodontic alignment. The two main surgical approaches are:

1. Replaced flap techniques, whereby the soft tissues are replaced over the exposed tooth after attaching a chain or other device with which to apply traction.

2. Excisional exposure in which mucosa overlying the crown is sacrificed and the wound packed open.

Heaney and Atherton (1976)[3] stated that the latter technique is acceptable provided that the tooth can be exposed within a zone of keratinised mucosa. Kohavi et al[4]. (1984) stressed that such exposure must be conservative and should not involve the cemento-enamel junction in order to minimize potential periodontal complications following tooth alignment.

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INCIDENCE OF CANINE IMPACTION

1. Cumulative prevalence of canine impaction in 7-13 yr old children: 2.2% (Thilander & Myrberg, 1943)
2. Incidence of maxillary canine impaction: 0.92% (Dachi and Howell, 1961) & 1.7% (Ericson & Kurol, 1986).
3. Incidence of mandibular canine impaction 0.35% (Dachi and Howell).
4. Impactions twice as common in females (1.17%) than in males (0.51%)
5. A rate of twelve palatally impacted canines for one labially impacted canines for one labially impacted canine (Jacoby).
6. Of all patients with maxillary impacted canines 8% have bilateral impactions.

MATERIALS AND METHODS

The clinical records of 30 consecutive patients who had undergone excisional exposure of one of more palatal canines were reviewed. The method of surgical exposure and packing employed was that previously described by Ferguson[5] (1992). An approximately circular full-thickness incision was made through the palatal mucoperiosteum overlying the canine crown, (fig 1) the position of which had been assessed from the radiographs and/or by palpation. The segment of mucosa enclosed by the incision line was then dissected off the bone, the bony covering itself being removed either with a Mitchell trimmer (if very thin) or a bur under saline irrigation. Where the canine was covered by soft tissue alone, the Mitchell trimmer was used to scrape the follicular tissue from the palatal surface of the enamel. The cavity was enlarged if necessary, by further soft tissue and/or bone removal as required, in order to expose the entire palatal surface from cusp tip to cingulum, but leaving the cementoenamel junction undisturbed. And in second phase attachment is given as shown in (fig 2).

RESULTS

Out of 30 patients in the study, 13 were male and 17 female. The mean age of the whole sample was 15·9 years (range 11·2–37·7). For cases with a definite outcome, the mean age of the successful subgroup (S) was 15·1 years, compared to 17·1 years for the partially successful and failed groups combined. These groups were compared by means of a *t* test, but the difference was not statistically significant.

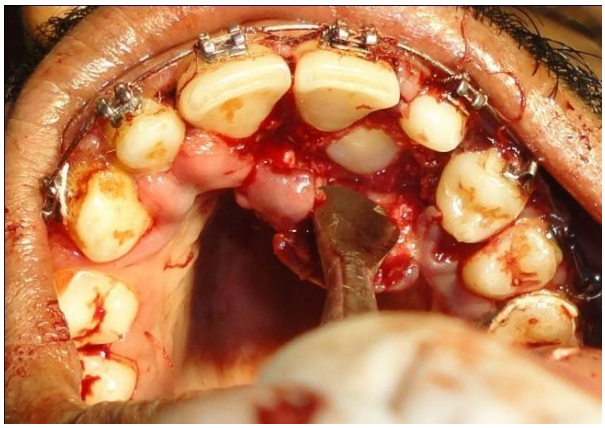

Fig 1: Circular full-thickness incision was made through the palatal mucoperiosteum overlying the canine crown.

Fig 2: Second phase attachment.

The mean time that surgical packs were in place was 11·7 days, (range 4–20 days). Except for those patients who were already undergoing treatment at the time exposure was carried out, patients were seen for further review after a mean interval of 23·1 days (range 6–101 days). For those cases where eruption had been completely successful and who continued with appliance therapy, the mean interval between exposure and bonding an attachment to the buccal surface of the canine was 67·6 weeks (range 14·9–137·7 weeks).

Radiographs were not available for one patient who had been transferred to another unit during treatment. The radiographic positions of the

teeth in the successful group were compared to the remaining cases with known outcomes by means of x2 tests (with Yates correction factor applied because of small numbers in some cells). The results were statistically significant (horizontal position; *P*,0.01: vertical position *P*,0.001); nevertheless, the numbers of teeth in 'good' positions were still in a minority even for the successful cases.

Complications

Two patients experienced some post-operative bleeding, necessitating a further visit to arrest haemorrhage. One patient developed superficial post-operative infection necessitating early pack removal. In one case, there was some doubt about the eruption potential of the canine at the first review visit and light-cured composite (see discussion) was bonded to the exposed surface to guard against possible further encroachment of soft tissue. In all of the above cases, the eventual outcome was successful in that the canines subsequently erupted. A palatal bracket was also bonded to one canine where eruption was slow, but was subsequently removed (without actually being used to apply traction) as further spontaneous eruption occurred. Three patients (two of whom required bilateral exposures) had the procedure carried out under general rather than local anaesthetic; orthodontic extrusion was required in one of the bilateral cases, but the other teeth eruption without intervention.

DISCUSSION

For those cases with a known outcome, the majority of teeth erupted successfully without further intervention, with most of the remainder still accessible for bracket bonding on the palatal surface at least. Only four teeth (5 per cent of the total) required re-exposure. With regards to the latter, there were problems of access in one instance due to inadequate co-operation at the time of surgery, and this patient required re-exposure of one canine even though the contralateral tooth had been exposed at the same time and erupted without problems. Another patient had been warned in advance that due to the deep position of the canine exposure might not be successful, and therefore decided to discontinue treatment at that stage. In the third case (another bilateral exposure) no specific reason could be identified for the rapid gingival regrowth, but both teeth were successfully re-exposed. Even in the completely successful cases, the mean interval between exposure and bonding of an attachment to the buccal surface was fairly long. This was more indicative of the length of the waiting list rather than being a true representation of the time required for eruption; the shortest interval between exposure and bonding was only 14 weeks. For one of the cases requiring occlusal traction this was due to the failure of natural eruption after an interval of 11 months. For most of the patients where traction was applied to assist eruption orthodontic treatment was already in progress and the procedure was employed to try and reduce the overall duration of appliance therapy; it is not certain whether spontaneous eruption would have occurred in due course had the teeth been left alone. This palataly displaced canine sample was matched according to age and sex with pretreatment dental casts from unaffected orthodontic patients. For the palataly displaced canine and matched control samples, maximum mesiodistal crown diameters were recorded for the four incisors on the right side only. The results showed that, on average, the mesiodistal crown diameters for the maxillary and mandibular incisors measured smaller in the palataly displaced canine sample than in the control sample. These findings of statistically significant tooth-size reductions associated with palataly displaced canine occurrence indicate a generalized pattern of reduced tooth size as a characteristic associated with the palataly displaced canine anomaly. Further, the presence of generalized tooth-size reduction in cases with palatally displaced canines help explain why most orthodontic treatment plans for palataly displaced canine patients are of the nonextraction type.

In only one case was assisted eruption initiated because of the perceived risk of mucosal regrowth. In the group with unknown outcome, eruption was seen to be progressing satisfactorily at the time the patient was last examined (except for one case), but none had reached the stage where the result could be definitely recorded. When considering the radiographic position of the impacted canines there were statistically significant differences between the groups and, as mentioned previously, the numbers of teeth in 'good' positions were still in a minority even for the successful cases.

CONCLUSIONS

1. The results of this investigation suggest that excisional exposure permitting free eruption of palatally displaced maxillary canines is successful in the great majority of cases. The initial attachments can then be placed on the buccal aspect of the crown to allow orthodontic forces to be applied to that area.

2. Even when the procedure is only partially successful sufficient tooth substance usually remains exposed toallow bracket bonding to the palatal surface which will then facilitate assisted eruption prior to buccal movement. Total failure of the exposure is fairly rare.

3. With a suitable exposure technique there would seem to be little indication for bonding brackets at the time.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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