Canine Impactions- surgical and orthodontic considerations

Abstract
The permanent canines are the foundation of an esthetic smile and functional occlusion. Factors that interfere with its development and eruption had serious consequences on esthetics, function and stability of stomatognathic system. This paper reviews its diagnosis and treatment plan in an orthodontic and surgical aspect.

Key Words: Canine Impaction; Orthodontics; Surgical Management

Canines are considered the cornerstones of the dental arch. Impacted canines are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment.(1-3) Abnormal eruption paths within the dentoalveolar process may result in impactions and serious clinical ramifications.(1) This paper reviews its diagnosis and treatment plan in an orthodontic and surgical aspect.

Many authors speculated about the cause of impacted mandibular canines. These causes include inadequate space, supernumerary teeth, and premature loss of the deciduous canine, excessive crown length, hereditary factors, and functional disturbances of the endocrine glands, tumors, cysts and trauma. Impacted mandibular canines are also more likely to be located on the labial aspect of the dental arch than are maxillary canines.(4) Shafer et al. suggested the following sequela of canine impaction: labial or lingual malpositioning of impacted tooth, migration of the neighboring teeth and loss of dental arch length, internal resorption, dentigerous cyst formation, infection particularly with the partially erupted tooth. Partly erupted or impacted cuspids may increase the risk of infection and cystic follicular lesions and compromise the lifespan of neighboring lateral incisors due to root resorption.(1)

The prevalence of maxillary permanent canine impaction is 1-2% in the general population.(1, 2, 5-9) This is most likely due to an extended development period and the long, tortuous path of eruption before the canine emerges into full occlusion.(1, 5) Failure of eruption of the mandibular canine is an unusual event.(10) The incidence of maxillary canine impaction is in the range of 0.8 to 2.8% and the prevalence is 0.9 to 2.2%.(11) Clinical studies have determined that 12% of lateral incisors that are adjacent to ectopically erupted canines have some degree of external root resorption, while the prevalence of lateral incisor root resorption in 10-13 year olds is 0.7%.(11, 12)

The different methods of diagnosis that may allow for early detection and prevention should include a family history, visual and tactile clinical examinations by the age of 9-10 years and a thorough radiographic assessment.(1, 13, 14) Because there is a high probability that palatally impacted maxillary canines may occur with other dental anomalies, the clinician should be alert to this possibility.(1, 13) When the condition is identified early, extraction of the deciduous canines may, in specific cases, allow the impacted canines to correct their paths of eruption and erupt into the mouth in relatively good alignment.(11) Clinical signs that may indicate ectopic or impacted cuspids include lack of a canine bulge in the buccal sulcus by the age of 10 years, over retained primary cuspids, delayed eruption of their permanent successor and asymmetry in the exfoliation and eruption of the right and left canines.(11)

Palpation of the buccal and lingual mucosa, using the index fingers of both hands simultaneously, is recommended to assess the position of the erupting canines.(11) Eruption time of a maxillary canine varies from 9.3 to 13.1 years. Because canines are palpable from 1 to 1.5 years before they emerge, the absence of the canine bulge after the age of 10 years is a good indication that the tooth is displaced from its normal position, and ectopic eruption or impaction of the maxillary cuspids is possible. In patients older than 10 years, an obvious palpable bilateral asymmetry could indicate that one of the permanent cuspids is impacted or erupting ectopically.(5, 15-17) According to Ericson and Kurol, for an accurate diagnosis the clinical examination should be supplemented with a radiographic evaluation.(18)

Periapical films relate the canine to the neighboring teeth both mesio-distally and superior inferiorly. To assess the canine buccolingually, a second periapical film should be obtained using Clarke’s rule or the buccal object rule. Occlusal
films determine the buccolingual position in conjunction with the periapical film, provided that image of the impacted canine is not superimposed on the other teeth.(11) Extra oral films frontal and lateral cephalogram can sometimes aid in the determination of the position of the canine in relation to the maxillary sinus or floor of the nose. Panoramic films are used to localize impacted teeth.(11) A panoramic radiograph taken in conjunction with 2 periapical views obtained using Clarke’s Rule or a 60% maxillary occlusal film allows the impacted teeth to be located either palatally or buccally relative to adjacent teeth.(1)

Computed tomography (CT) is more accurate in terms of locating the impacted cuspids in 3 dimensions and for diagnosing associated lesions such as root resorption of adjacent teeth.(1, 11, 18)

There are several treatment options proposed for impacted mandibular canines including surgical removal, exposure and orthodontic alignment, transplantation and observation.

Orthodontic movement of an impacted tooth depends on a variety of factors, such as the position of the impacted tooth relative to neighboring teeth, its angulation, the distance the tooth has to be moved, and the possible presence of ankylosis.(15)

The extraction of primary cuspids can be beneficial in specific cases; inappropriate extraction of primary maxillary cuspids must be avoided, due to the increased potential for arch collapse and arch crowding, which could lead to a buccal impaction.(19) Power and Short showed that interceptive extraction of the primary canine completely resolves permanent canine impaction in 62% of cases; another 17% show some improvement in terms of more favourable canine positioning.(1, 13, 17) Ericson and Kurol found that, in 78% of palatally erupting cuspids, the eruption paths normalize within 12 months. However, extraction of the primary cuspids does not guarantee correction or elimination of the problem. If there is no radiographic evidence of improvement one year after treatment, more aggressive treatment, such as surgical exposure and orthodontic eruption, is indicated.(1, 18)

Some authors believe asymptomatic impacted teeth can be left in place, but in these patients a series of successive radiographs should be taken periodically.(1, 4, 11) Surgical extraction is indicated in the following situations. a) The existence of infection, cyst, or tumor related to the impacted canine, b) impacted tooth causes the periodontal disturbance of the adjacent teeth, c) presence of neuralgic symptoms, d) crowding of the mandibular arch requiring therapeutic extractions to correct crowded incisor teeth, e) impacted canine is ankylosed and cannot be transplanted, f) root resorption affecting the adjacent teeth, g) root of impacted canine is severely dilacerated, h) severe impaction of canine tooth and i) patient’s unwillingness to orthodontic treatment or transplantation.(1, 4, 11, 20)

In conclusion, the management of impacted canines has a multidisciplinary approach as it plays a vital role in esthetics and function. Surgical exposure and orthodontic correction is the most preferable treatment unless contraindicated. Extraction of the impacted canine should be the last resort, as every impacted canine should be treated in a hostile way to prevent its complications.

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