

Impacted Mandibular Canines

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Abstract

Aims: The aim of the present study was to investigate the incidence of impacted mandibular canines, the associated pathology of these teeth, and to classify them.

Methods and Materials: This is a retrospective cohort study of 5022 panoramic radiographs taken of patients who presented to the Oral and Maxillofacial Surgery Service of the Faculty of Dentistry at Ataturk University in Erzurum, Turkey between January, 1998 and March, 2006. The panoramic radiographs and clinical data were reviewed. Observations were made on the status of missing permanent mandibular canines; retained deciduous canines; side and number of mandibular canines; sex and age of patients; and any other associated pathology or symptoms as well as treatment methods employed.

Results: The incidence of mandibular canine impaction is 1.29% in the 5022 individuals of this Turkish subpopulation. A total of 65 patients had impacted mandibular canines with 33 being females and 32 males. In this study 41 impacted mandibular canines were extracted. Twenty-three canines were attached to bonded buttons for orthodontic eruption purposes. After surgical exposure, one impacted canine was transplanted and the others were left in place for observation.

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Conclusions: Maxillary canine impaction is more frequent than mandibular canine impaction. Mandibular canine impaction incidence in this study was found higher than in the published literature to date. This result may be evidence of an actual increase of the number of impacted mandibular canine teeth among patients.

Keywords: Impacted canine, mandibular canine impaction, cuspid, incidence

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Introduction

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment.¹ Failure of tooth eruption may be the consequence of local factors. These factors may include mechanical obstruction (by a supernumerary tooth, cyst, or tumor); insufficient space in the dental arch due to skeletal incongruities (micrognathia); or to the premature loss of deciduous teeth or a tooth arch size discrepancy. Systemic factors such as genetic disorders, endocrine deficiencies, and previous irradiation of the jaws are also associated with a failure of tooth eruption. In systemic conditions multiple teeth are usually impacted. In most cases, however, the specific cause of failure of eruption remains unknown.²

All teeth can be impacted, however, third molars, maxillary canines, maxillary and mandibular premolars, and maxillary central incisors are the teeth most frequently involved.³ The prevalence of impacted maxillary canines is 0.9–2.2%, but mandibular canine impaction occurs less frequently.^{4,5,6}

A large number of completely impacted teeth may be retained when asymptomatic.⁷ However, Bishara et al. suggested the following sequelae of canine impaction:^{8,9}

- Labial or lingual malpositioning of the impacted tooth
- Migration of the neighboring teeth and loss of arch length
- External root resorption of the impacted tooth as well as the neighboring teeth
- Infection particularly with partial eruption resulting in pain and trismus
- Referred pain



The aim of the present study was to investigate the incidence of impacted mandibular canines, the associated pathology of these teeth, and to classify them.

Methods and Materials

This is a retrospective cohort study of 5022 panoramic radiographs taken of patients who presented to the Oral and Maxillofacial Surgery Service of the Faculty of Dentistry at Ataturk University in Erzurum, Turkey between January, 1998 and March, 2006. The status of missing permanent mandibular canines, retained deciduous canines, side and number of mandibular canines, sex and age of patients, any other associated pathology or symptoms, as well as treatment methods were evaluated with radiographic and clinical data. Radiographic and clinical data from this study are presented.

In the present study impacted mandibular canines were classified based on angulations and depths of the involved teeth. In terms of angulation impacted mandibular canines can be classified as mesioangular, distoangular, vertical, or horizontal. Depth of the impactions were classified as Level A, Level B, and Level C as follows:

Depth Classifications of Impactions



- **Level A.** The crown of the impacted canine tooth is at the cervical line of the adjacent teeth.
- **Level B.** The crown of the impacted canine tooth is between the cervical line and root apices of the adjacent teeth.
- **Level C.** The crown of the impacted canines is beneath the root apices of the adjacent teeth.

Results

A total of 71 impacted mandibular canine teeth were found in 65 of the 5022 patients (1.29%) with 33 being in females (ages 12-73) and 32 in males (ages 13-60). Impacted canine teeth were bilateral in six patients and the others were unilateral. Thirty-three of the impacted canines were located on the left side and 38 canines located on the right. Twelve patients had retained deciduous canines, and the remainder had exfoliated deciduous canines (Figure 1).

Only one patient had a history of trauma when he was eight years old. Two impacted canines were associated with giant cell granulomas. Six impacted canines were located in the mandible and enveloped within cystic lesions (Figure 2).



Figure 1. A vertically impacted mandibular canine tooth and primary canine retained.

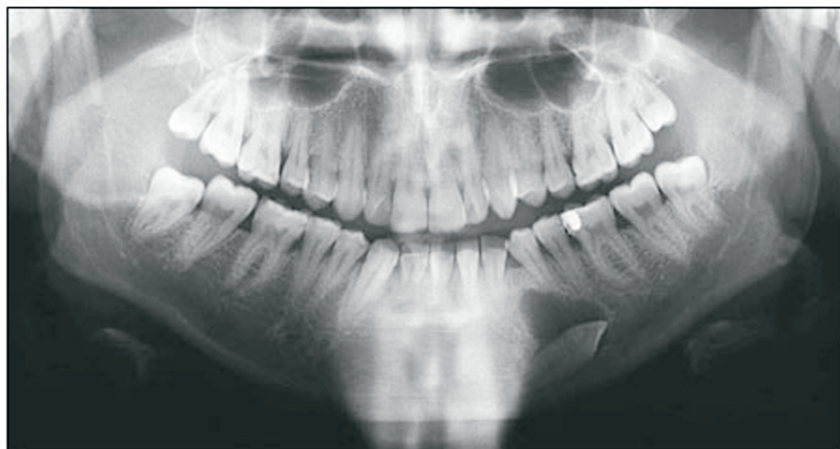


Figure 2. Impacted mandibular left canine associated with a dentigerous cyst.

All of these cysts were infected and two of them with fistula formation were removed extra orally. Besides that, seven patients had painful impacted mandibular canines without any cyst or tumor. Four of these painful teeth were infected while the others were not present any infection symptom. The remainders of the mandibular canines were asymptomatic (Table 1).

Out of the 71 teeth in the present study, the depths of 11 canines were classified as Level A (15.5%), 33 (46.5%) as Level B (Figure 1), and 27 of the canines were classified as Level C (38%) (Figures 2, 4, and 5).

In the present study 23 of the impacted mandibular canines were surgically exposed for orthodontic treatment. Forty-one impacted canines were extracted surgically. Of the surgical extractions, only six canines were removed using a lingual approach, while the rest of 41 impacted canines were extracted via the labial approach and two were removed extraorally. One impacted canine tooth was transplanted into normal position while six impacted canine teeth were left to be observed.

Discussion

Failure of eruption of the mandibular canine is an unusual event.¹⁰ Mandibular canine impaction is regarded as a much rarer phenomenon, and there are limited numbers of studies revealing its frequency of occurrence.⁵ Grover and Lorton¹¹ found only 11 impacted canines (0.22%) in the mandible in 5000 individuals. Chu et al.¹² reported five mandibular impacted canine (0.07%) teeth in 7486 patients. A study by Rohrer¹³ examining 3,000 patients radiographically found 62 impacted maxillary canines (2.06%) and only three impacted mandibular canines (0.1%), a 20:1 ratio. In another study by Aydin et al.⁵ involving 4500 Turkish patients, the incidence of mandibular canine impaction was 0.44%. The ratio in the present study (1.29%) has been found higher than the published literature to date. Definitely, maxillary canine impaction is more frequent than is mandibular canine impaction.^{4,5,6}

There are limited numbers of studies revealing mandibular canine impaction with regard to the frequency of gender and side of occurrence ratios. Aydin et al. reported a ratio of 1 male to 1.22 female in impacted mandibular canines but

Table 1. Incidence, age, gender ratio for impacted mandibular canines.

	Cases	Incidence	Bilaterally impacted	Males	Females	Mean Age	Age Range (years)
Impacted Mandibular Canines	65	1.29%	6	32	33	25.3	12-73



Figure 3. Panoramic radiograph showing distoangularly impacted mandibular canine on the left side.



Figure 4. A horizontally impacted canine near the inferior border of the mandible, removed using an extra oral surgical approach.



Figure 5. Panoramic radiograph showing transmigrated bilateral mandibular canines.

Table 2. Angulations and depths of impaction of mandibular canines.

Angulations	No. of teeth	(%)	Depth of impaction	No. of teeth	(%)
Mesio-angular	23	32.4%	Level A	11	15.5%
Disto-angular	6	8.5%	Level B	33	46.5%
Vertical	29	40.8%	Level C	27	38%
Horizontal	13	18.3%			

did not report a ratio of between right and left side occurrences in impacted mandibular canines.⁵ A total of 65 patients (33 females ages 12 to 73 years and 32 males ages 13 to 60 years) had impacted mandibular canines in the present study. Sex predilection was not noticeably different from the Aydin et al.⁵ study. Most of the impacted mandibular canines are unilateral, however, six patients had bilaterally impacted mandibular canines.

There are many reasons why canines fail to erupt.¹⁴ Most surgeons agree the reasons may include a suspected pathological condition, infection, interference with prosthetic devices, disturbance of the existing dentition, pain, and ectopic eruption.¹⁵ Many authors have also speculated about the cause of impacted mandibular canines.¹⁵ These causes include inadequate space, supernumerary teeth, premature loss of the deciduous dentition, retention of the deciduous canine, excessive crown length, hereditary factors, functional disturbances of the endocrine glands, tumors, cysts, and trauma.^{10,14-18} Mitchell¹⁷ reported trauma also has an effect on the impaction of a tooth as an etiologic factor. In the patient group of the present study only one patient had a history of trauma when he was eight years old. While 12 primary canines were not exfoliated or extracted in this case, the authors do not think that trauma can be an etiologic factor for impaction of teeth.

Impacted mandibular canines are also more likely to be located on the labial aspect of the dental arch than are maxillary canines,² and the removal of impacted teeth routinely involves an intraoral surgical approach. But Plumpton¹⁹ suggested that some extractions of the impacted mandibular canine teeth may be done via an extraoral surgical approach. In the present study six canines were removed using a lingual approach, while the remainder of the removed canines were extracted via a labial approach and two impacted mandibular canine teeth removed extraorally. In the present study the most common angulation of impaction of the canine teeth was vertical (40.8%), followed by mesioanguler (32.4%), horizontal (18.3%), and then distoanguler (8.5%).

The mandibular canines are affected by pathology in a lower ratio than the third molars and premolars,^{10,12} However, some authors reported a

few cases such as dentigerous cyst, squamous odontogenic tumors, and ameloblastoma were associated with impacted mandibular canine teeth.^{20,21,22} Dentigerous cysts caused by impacted mandibular canine teeth were found in six cases, and two impacted canines were associated with reparative giant cell granulomas in the present study. All of these cysts were infected and painful with two of them having fistulas developing extraorally below the mandible.

Removal of the entire cyst along with the impacted tooth is the principle treatment to prevent recurrence of the cyst.²³ The reparative giant cell granulomas found were asymptomatic. The impacted mandibular canines associated with dentigerous cysts and giant cell granulomas in this study were removed surgically.



Most impacted teeth are asymptomatic, but chronic infection with fistula formation and some symptoms such as pain and swelling have been reported in the literature.^{10,12} In the present study seven patients had pain but these patients had no tumor or cyst formation. Only four impacted canines of these seven patients were infected. The remainder of the impacted mandibular canines were asymptomatic.

There are several treatment options proposed for impacted mandibular canines including surgical removal, exposure and orthodontic alignment, transplantation, and observation.²⁴

If adequate space for alignment of an impacted mandibular canine exists and it is mechanically possible to reposition an impacted mandibular

canine into proper position, then orthodontic treatment is indicated.^{24,25} Following surgical exposure, the impacted tooth may be allowed to erupt passively, especially if it has a favorable angulation. Alternatively, forced eruption may be carried out in conjunction with orthodontic alignment.^{9,25} As a third alternative, if an impacted canine cannot be positioned favorably but there is space for its full eruption, then orthodontic treatment may help align the adjacent teeth in their migrated order followed by crowning or recontouring of some teeth to improve esthetics.²⁶ It should be noted orthodontic treatment of impacted canines started after the conclusion of the pubertal growth spurt are likely to be protracted.²⁷

If the mandibular incisors are in a normal position, space for the impacted canine is sufficient, and the patient is symptom free, then transplantation may be a reasonable treatment choice.^{16,19} Autogenous transplantation of teeth with complete root formation may be considered as a viable treatment option to conventional prosthetic and implant rehabilitation for both therapeutic and economic reasons.²⁸ This procedure is relatively quick but has an uncertain long-term prognosis.

Some authors believe asymptomatic impacted teeth can be left in place, but in these patients a series of successive radiographs should be taken periodically.¹⁹ Observation of impacted mandibular canines may be indicated in the following circumstances:

- A systemic contraindication to a surgery exists.
- There is a deeply impacted asymptomatic mandibular canine with no associated pathology, particularly in an older patient.²
- Whenever the patient has a satisfactory dental appearance and does not want surgical intervention.^{9,25}

- If the deciduous canine has a good root length and it is esthetically acceptable, observation of an asymptomatic mandibular canine can be recommended.²⁴

Surgical extraction is necessary in the following situations:

- The existence of infection, cyst, or tumor related to the impacted canine.⁶
- The impacted tooth causes the periodontal disturbances of the adjacent teeth.⁶
- The presence of neuralgic symptoms.⁶
- Crowding of the mandibular arch requiring therapeutic extractions to correct crowded incisor teeth.¹⁰
- The impacted canine is ankylosed and cannot be transplanted.
- There is evidence of root resorption affecting the adjacent teeth.
- The root of impacted canine is severely dilacerated.
- Severe impaction of canine tooth.
- Patient rejection of orthodontic treatment or transplantation.⁹

In this study 41 impacted mandibular canines were extracted, 23 were attached to buttons for orthodontic treatment following surgical exposure, one was transplanted, and the others were left in place for observation.

Conclusion

Although maxillary canine impaction is more frequent than mandibular canine impaction, the impaction ratio of the mandibular canine teeth has been found to be higher than the published literature to date. The reason for this higher incidence may be related to the patient selection from the surgery clinic. However, this result may also be evidence of the increase of the number of impacted mandibular canine teeth.

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