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Transmigration of mandibular canine – case report

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Summary

Background:

Transmigration is a phenomenon of movement of an unerupted tooth in the bone across the midline. This anomaly is not often found. Transmigration is more prevalent in females than in males, and more often encountered in the mandible than maxilla, it affects mostly canines.

Case Report:

The aim of this study was to present a case report of a mandibular canine transmigration in a patient aged 12. Intraoral examination determined hypodontia of right second premolar and delayed eruption of left second premolar in maxilla, as well as persistent deciduous teeth: right second molar, left canine and second molar. The patient was referred for a Cone-Beam CT examination, which allowed precise visualization of the transmigrating canine as well as ruled out resorption of roots of mandibular incisors.

Results:

The treatment with a maxillary fixed orthodontic appliance was finished after obtaining a satisfactory result. Proper alignment of the incisors in the anterior-posterior plane and correct midline position were accepted by the patient. Transmigrating canine after consultation with the surgeon was designed to further radiological observation.

Keywords:

transmigration • dental anomalie • CBCT

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Background

Transmigration is a phenomenon of movement of an unerupted tooth in the bone across the midline. This developmental anomaly is relatively rare. Patients with canine transmigration are often characterized also by lower lateral incisor hypodontia or lower second premolar hypodontia, enamel developmental defects, reduced teeth and impacted upper canines.

Impacted lower canines are even less often observed than impacted upper canines. They are estimated to be 5% of all impacted teeth, including third molars. The prevalence of impacted lower canines depends on the studied sample and varies from 0.1% to 0.46% of the analyzed cephalograms [1–3]. The etiology of this phenomenon is still unknown. Possible etiologic factors include: genetics, premature loss of the deciduous teeth, persistent deciduous teeth, incorrect position of the dental lamina, hyperdontia, crowding,

spacing in the dental arches, odontoma and alveolar crest trauma [4]. The general causes of teeth impaction include: genetic factors, avitaminoses, endocrine disorders and bone fibrous dysplasia. Local causes of transmigration are similar to local factors responsible for teeth impaction. Resorption disorders and bone apposition disorders along with metabolic activation of a different area of dental follicle in the canine germ that causes a different eruption pathway are recognized to be direct cause of transmigration [5]. Some phenomena may indicate the presence of transmigrated tooth: sensory disorders, paresthesia, neuralgia, lack of lower permanent canine after 12 years of age, deciduous canine retention, fistula on the alveolar process caused by chronic inflammation of the follicular cyst, lower incisor protrusion, increased (in the sagittal plane) width of the mandibular symphysis [6].

Analyzing the degree of canine inclination on a panoramic radiograph is useful in early diagnosis of transposition.



Figure 1. Panoramic radiograph demonstrates the transmigrating canine below the apices of mandibular incisors. However, precise evaluation is not possible due to superimposition of ghost shadow of cervical spine in the midline.

The angle of inclination between 25 a 30 degrees to mid-line should not cause transmigration. The angle of canine inclination between 30 and 50 degrees may indicate the presence of transmigration. When the inclination angle is larger than 50 degrees the presence of transmigration is certain [7].

In 2002 Mupparapu [8] classified lower canine transmigration based on the analysis of 127 clinical cases. There are 5 types of transmigrated canines according to his classification:

1. Mesially inclined impacted canine lying lingually or buccally to the lower anterior teeth, a certain part of the canine crown crosses the midline;
2. The impacted canine lies below the apices of lower incisors close to the base of the mandible;
3. The canine erupted mesially or distally when compared to the canine on the opposite side;
4. The canine is positioned horizontally below lower premolars or molars on the opposite side, close to the base of the mandible;
5. The canine is positioned vertically in the midline.

Type 1 was observed in 45% cases, type 2 in 20% cases, type 3 in 14% cases, type 4 in 17% cases and type 5 in 1.5% cases.

There are different treatment options for transmigrated canines. These include: orthodontic canine placement in the dental arch, autotransplantation, tooth extraction and clinical observation [9]. Placing a canine in the dental arch is possible when its apex is located no further than the periapical area of the adjacent lower lateral incisor or when its crown does not cross the incisal periapical area on the opposite side. If there is enough space, autotransplantation of the canine is possible. Preservation of tooth vitality and development of neurovascular bundle is possible only when root formation is incomplete. The most common option is prosthetic treatment following the extraction of the transmigrated canine [10].

Clinicians require a method of imaging of impacted and transpositioned canines, which enables correct treatment planning. Learning the exact anatomical morphology of the patient's oral cavity reduces the risk of uncontrolled tooth eruption and thus the number of changes in the treatment plan. It also helps to avoid both the patient's and clinician's discomfort.



Figure 2. Coronal (tangential) view of the canine in CBCT.

Cone Beam Computed Tomography (CBCT, Dental Volumetric Tomography, DVT) is a relatively new diagnostic method used in dentistry, but the number of options of its application is still increasing. CBCT is useful in all aspects of dentistry. Orthodontists employ CBCT for accurate analysis of the impacted, additional, supernumerary teeth position, developmental defects, external resorption and ankylosis assessment. It allows to assess the possibility of implanting orthodontic mini dental implants and facilitates treatment planning with the use of three-dimensional cephalometric analysis. Dental volumetric tomography allowed for computer analysis of spatial data, digital image fusion and controlling of results. This type of examination is indicated mostly in cases of bone pathologies: cysts, craniofacial morphological malformations, presence of ankylosis, dental malformations concerning morphology, amount and position, assessment of three-dimensional relations of teeth, teeth and adjacent roots and anatomical structures [11]. Computed tomography imaging facilitates an exact assessment of impacted teeth. However, this type of examination exposes the patient to higher doses of radiation in comparison to the standard X-ray examination or CBCT. This is a significant problem because the majority of impacted teeth is diagnosed in adolescents, who are particularly sensitive to adverse effects of X-rays. Furthermore,

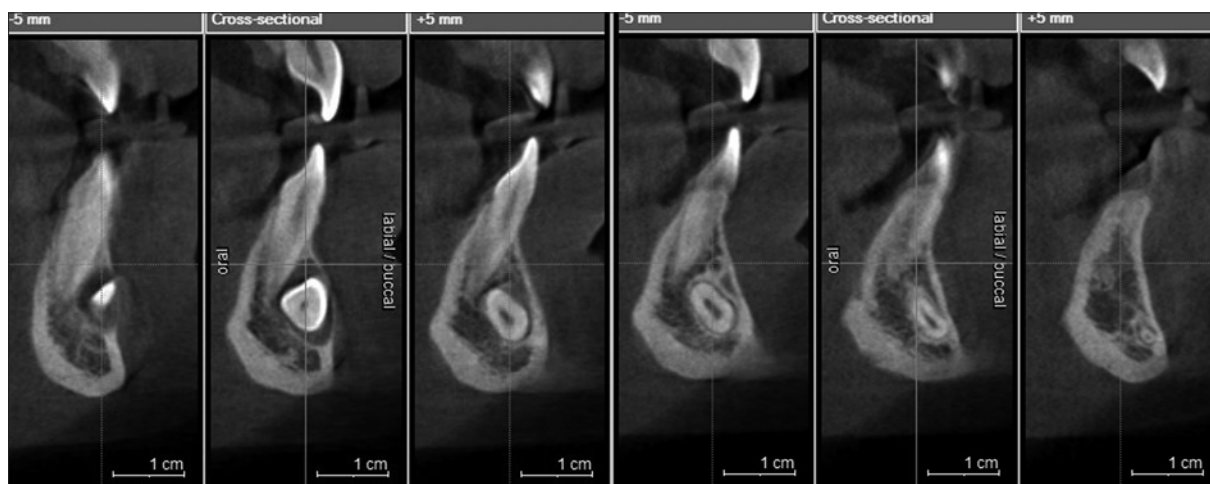


Figure 3. Cone-Beam CT allows precise evaluation of the location of the transmigrating canine and its relationship to apices of incisors.



Figure 4. Panoramic radiograph taken after orthodontic treatment reveals progress of transmigration of the canine.

the total dose, in cases of a few consequential examinations, may be higher in comparison to a single CBCT examination. Moreover, dental volumetric tomography provides greater accuracy of cross-sections compared to classical CT. In dentistry CBCT seems to be the method of choice.

The aim of this paper was to present a case report of a mandibular canine transmigration in a patient aged 12.

Case Report

The patient was referred to an orthodontist due to a lacking left lower permanent canine. The intraoral examination revealed lacking of the upper second right premolar and delayed eruption of the upper second left premolar, retention of the second right deciduous molar and second right deciduous molar and canine. No mobility of the deciduous teeth was observed. The patient had class II malocclusion with coexisting dental midline shift (to the right in the upper arch and to the left in the mandible) and a deeper overbite. Radiological examination revealed the presence of a transmigrated left permanent canine with incomplete root formation together with upper right second premolar and lower left second premolar hypodontia. In the II and IV quadrant, the second premolar germs below the roots of

adjacent deciduous teeth were observed. The patient was referred to a CBCT examination. The transmigrated canine was positioned buccally to the lower anterior teeth and below their apices, its long axis formed a 24-degree angle with the basic mandibular plane (Figure 1). The incisal cusp of the impacted canine was positioned buccally to the lower right canine, its root was situated below lower incisors and the retentive deciduous canine apices. The transmigrated canine crown caused a significant decrease in the width of the external mandible cortical bone, while the apex caused a slight decrease in the width of the external mandible cortical bone (Figure 2). The cortical bone was intact buccally to the middle part of the canine root. One third of the canine crown was visible through a bone window in the area of right canine and first premolar apice. Furthermore in the CBCT examination root resorption of the lower incisors, possibly due to the presence of transmigrated canine, was excluded (Figure 3).

The retentive deciduous molars in the II and IV quadrants were extracted. The patient was given a fixed appliance in the upper arch. After 6 months following the beginning of the orthodontic treatment the patient was referred to undergo a control periapical radiograph of the transmigrated canine area. The appearance of the bone tissue and

lower incisor roots was the same as before treatment. In the panoramic radiograph after 11 months from delivering a fixed appliance in the lower arch a horizontal movement of the transpositioned canine was observed (Figure 4). Orthodontic treatment using the fixed appliance in the upper arch was completed after achieving a satisfactory result. The treatment resulted in a correct position of incisors in the anteroposterior plane and correction of the dental midline position accepted by the patient. The patient was given a removable retention. After a surgical consultation the transpositioned canine was left for further radiological observation.

Discussion

Transmigration is a relatively rare developmental anomaly. Nevertheless the probability of diagnosing this disorder is now greater due to more common CBCT and panoramic

radiograph examinations. Correct diagnostics is crucial for adequate treatment planning. According to Minister of Health regulation from 18th February 2011 on conditions of ionizing radiation safety for all types of medical exposition, all X-ray examinations in Poland must include a written report, except for intraoral radiograms and bone densitometry performed using equipment especially designed for this purpose and lifesaving examinations. This regulation states that "dental radiological examinations, except for intraoral examinations, should include a written report given by a radiologist or a dentist trained in dentofacial radiology". On the other hand according to European assemblies (European Academy of Dentomaxillofacial Radiology and European Commission) CBCT examinations should include a written report by a radiologist (large and medium field of view CBCT) or a specially trained dentist (small field of view CBCT) [12–14]. Hence learning about this developmental disorder is crucial for radiologists.

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