

Migracja kła w żuchwie – problem wielospecjalistyczny

Migration of canine in the mandible - a multidisciplinary problem

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## Streszczenie

Dolne kły stałe są jedynymi zębami człowieka, które mogą ulec migracji w miejsce odległe od położenia zawiązka. Transmigracja jest zjawiskiem związanym z przekroczeniem linii pośrodkowej żuchwy przez zatrzymanego kła przy współistniejących czynnikach patologicznych.

Wśród przyczyn prowadzących do zatrzymania kłów wymienia się czynniki miejscowe takie jak brak miejsca w łuku, nieprawidłową kolejność wyrzynania zębów, zęby nadliczbowe, zębiaki, przetrwałe zęby mleczne oraz urazy w okolicy wyrostka zębodołowego. Do przyczyn ogólnych zaliczono między innymi dziedziczność, awitaminozy, zaburzenia endokrynologiczne oraz zwyrodnienie włókniste kości. Wprowadzenie do łuku transmigrującego kła jest możliwe jeżeli wierzchołek jego korzenia nie przemieści się dalej niż obszar wierzchołka sąsiadującego z nim zęba siecznego bocznego lub gdy jego korona nie przekroczy okolicy wierzchołków zębów siecznych po stronie przeciwnej. Przyjęto również, że w przypadkach kiedy zachowana jest odpowiednia ilość miejsca dla zatrzymanego kła można wykonać jego autotransplantację.

## Summary

The lower canines are the only permanent human teeth, which may be migrating in a place distant from the location of the germ. Transmigration is a phenomenon associated with crossing the midline of the mandible by the detainee canine concurrent pathological factors. Among the reasons leading to the impaction of canines are mentioned local factors such as lack of space in the arch, an incorrect sequence of eruption of teeth, supranumerary teeth, odontomas, persistent deciduous teeth and trauma in the area of the alveolar process. General factors included, inter alia, general heredity, vitamin deficiency, endocrine disorders and degeneration of fibrous bone. Insertion of transmigrating canine to the dental arch is possible if the root tip moves no further than the top area of the adjacent lateral incisor crown, or if its vertices does not exceed the area of teeth incisors on the opposite side. Also assumed that in cases when preserved is adequate space for the detainee canine, autotransplantation is possible.

Słowa kluczowe: zęby zatrzymane, transmigracja kła, pantomogram

Keywords: impacted teeth, canine transmigration, pantomographic

Teeth development disorders are a quite frequent anomaly, which may contribute to complications as regards the development of the masticatory organ or the formation of dental occlusion. Researchers treat these complications as qualitative and quantitative changes which can be divided into five groups: supernumerary teeth (hyperdontia), lack of tooth buds (hypodontia), untypical teeth, missing elements in the tooth structure development, improper placement of tooth buds and their migrations. [1].

Mupparapu classified transmigrated mandibular canines into the 5 following transmigration types: type 1 (accounting for 45.6 % of cases) – canine impacted mesio-angularly, labial or lingual to the anterior lower teeth, a part of the canine crown crosses the mandibular midline; type 2 (20% of cases) – canine located below the apices of lower incisors in the vicinity of the lower boarder of the mandible; type 3 (14% of cases) – canine erupted either mesial or distal to the opposite canine; type 4 (17% of cases) – canine horizontally impacted near the lower boarder of mandible, below the apices of either lower premolars or molars on the opposite side; type 5 (1.5% of cases) – canine is positioned vertically in the midline of the mandible [2]. Studies have shown that the dominant cases were related to retained canines in the maxilla (3.29%), while retained canines in the mandible represented only 0.44% of cases. It is also sex-dependent, i.e. women are more prone to this disorder than men [3].

According to the authors, canine migration in the mandible is usually a one-sided phenomenon and concerns most often the left-side canine (53.6%) rather than the right-side one (32.1%). The other cases include bilateral migration of canines. The clinically diagnosed lack of a permanent tooth in the lower dental arch at the time of its physiological eruption suggests the occurrence of a retained or transmigrating canine. The changed placement of a permanent canine can prevent the resorption of its deciduous equivalent which strongly suggests transmigration [4].

In the presented case, it was impossible to conduct a clinical examination and the transmigration process was symptomless. Consequently, pantomographic or periapical radiological images were regarded the basic diagnostics method [5].

Among the reasons of canine retention, researchers indicate such space-related factors as insufficient arch space, improper order of teeth eruption, supernumerary teeth, odontomas, persistent deciduous teeth as well as injuries near alveolar ridge. The main reasons of this phenomenon include, among others, heredity, avitaminosis, endocrinological disorders as well as fibrous degeneration of bones. It was also highlighted that except pantomographic and periapical radiological images, also other roentgen images can be used for diagnosing retained canines: occlusal images, lateral and posterior-anterior teleroentgenograms as well as recently applied computer tomography [6].

Mandibular canine transmigration is often accompanied by teeth abnormalities such as: lower lateral canine or second lower premolar hypodontia, enamel development disorder, stunted teeth and upper canine retention. In order to diagnose the transmigration at an early stage, it is necessary to evaluate the inclination angle of the retained canines in a pantomographic image. An angle in the range of  $25^{\circ}$  to  $30^{\circ}$  against the midline should not contribute to transmigration. Canines inclined at  $30^{\circ}$  to  $50^{\circ}$  can potentially transmigrate. If the angle exceeds  $50^{\circ}$ , transmigration becomes the rule [7,8,9].

Other researchers claim that the etiology of canine transmigration is still not fully clear. Among the factors causing transmigration are incorrect location of tooth buds or malfunction of eruption forces. Furthermore, tubers, cysts, early loss of deciduous teeth, crowding and supernumerary teeth are also specified as etiological factors of transmigration. At present, it is believed that the co-existing pathological factors may also be connected with canine transmigration. Transmigration is defined as a progressing condition in the form of physiological movement of a retained tooth across the mandibular midline, excluding other pathological factors [10].

The above argument is evidenced by a patient observed for the period of seven years (own case).

A 10-year old patient visited orthodontic practice with mandibular dental arch disorders on the right side. The pantomographic view [Fig.1] revealed that the lower right canine is positioned horizontally, the crown of the retained tooth is near the apex of a right lateral incisor and root

formation is incomplete. The inclination angle of the retained canine against the midline is 50°. Such inclination angle makes tooth eruption doubtful. The canine was left for observation. The following pantomographic view revealed insignificant migration of the lower right canine. The crown of the retained tooth is located in the line between root apices of central and right lateral incisors. The inclination angle of the retained canine against the midline is 60°. As the patient's parents did not consent to any dental treatment, over the years, canine undergoes further migration. A pantomographic image from 2011 showed retained first upper premolars as well as further lower right canine transmigration, positioned with its root apex facing towards the root apex of the right lateral incisor and with its crown facing towards the edge of the mandible body in the line of the root apex of the lower left canine. The radiological image does not reveal any features of the resorption of root apices of lower incisors [Fig 2].

The patient's treatment plan included extraction of the retained lower canine, extraction of deciduous maxillary canines, closing of post-extraction gaps, forced eruption of retained upper premolars, correction of the position of crowded and rotated teeth in order to obtain correct occlusion, i.e. orthodontic treatment with the use of upper and lower fixed orthodontic appliances. The patient accepted the treatment plan only partially - he did not agree to the extraction of the retained mandibular canine. This decision may be the cause of many unforeseen circumstances in the event of any injury in the area of the mandible. The patient is aware of the risks, it expects further radiological observations.

Surgical extraction, transplantation, radiological observation as well as surgical uncovering of the impacted tooth along with orthodontic treatment are the methods of treating canines migrating in the mandible which are most frequently mentioned in the literature [11]. The authors emphasised that in the case of tooth extraction, although the tooth migrated to the other side, the tooth is innervated by nerves originating in the side it migrated from. Therefore, it is extremely important to anaesthetise the nerve on the appropriate side [12]. Another described method is transplantation of the migrated canine. According to the researchers, transplantation is possible only

when lower incisors are placed correctly and there is enough space for autotransplantation of the canine [13]. It was said that in order to ascertain tooth vitality and the development of neurovascular bundle, root development should not be completed [14]. Orthodontic treatment with fixed light-wire orthodontic appliances following surgical uncovering of the migrating canine crown is possible only when the canine is located labially and its crown does not cross the area of lower incisors on the opposite side or when the root apex is not displaced beyond the area of the neighbouring lower lateral incisor apex. The most frequently applied method is, however, the extraction of the transmigrating canine and its prosthetic restoration. Hence, it is important to leave the deciduous canine as long as possible in order to maintain correct features (width) of its alveolar area in the mandible and thus enable implant-prosthetic treatment [15]. A narrow alveolar process is one of the limiting factors for implant treatment procedures. Often in such a clinical situation, it is necessary, at first, to reconstruct the missing bone tissue by way of autogenous bone graft or the use of bone substitute materials. Alternatively, splitting of the narrow mandibular alveolar area is applied. Piezoelectricity is a method applied to facilitate the procedure. In this method, traumatising of bone tissue while cutting is much more limited as compared to other traditional cutting tools, such as drills, gouges or saws [16].

Comparison of different results of radiological examination and the evaluation of their importance in diagnosing transmigration of mandible canines conducted in the group of 7 patients aged 12-19 (evaluation included: 7 pantomograms, 2 lateral head images, 4 mandible occlusal images at the angle of  $45^{\circ}$ , 3 mandible occlusal images at the angle of  $90^{\circ}$ , 2 periapical images of the area of lower deciduous canine and 1 mandible tomographic examination) proved that the basic diagnostic image in the case of transmigrating canines is the pantomogram. However, this type of radiological image does not allow for diagnosing the resorption of lower incisors' roots in the area of the migrating canine. The authors emphasised that the lateral head images as well as the mandible occlusal images at the angle of  $90^{\circ}$  show lingual vestibular positioning of the retained canines. The images taken inside the mouth cavity were found by authors least useful diagnostically, as

transmigrating canines that are low are often not visible in the images, which could wrongly suggest hypodontia [17].

Canine transmigration is a rare dental anomaly and its early diagnosis is crucial for later treatment. Intraoral roentgen images tend to be insufficient and do not allow for correct diagnosis. Authors of many publications emphasised that the most efficient diagnostic method is a pantomographic image taken in particular in the mixed dentition period, when a fixed canine did not erupt in and after the physiological eruption period. When referring to treatment methods, researchers most often point to surgical treatment in the form of migrated canine extraction. At the same time, the authors highlighted that defects and bone deformation are significant dental problems occurring in the maxillary alveolar process area and mandibular dental alveolus as a consequence of early extractions and surgical procedures such as resection, resection, extraction of retained teeth, benign tumours, retained roots, cyst enucleation, pathological processes around teeth (endo-perio syndrome) as well as incorrect prosthetic restoration and aging processes. Atrophy of bone structure has an adverse impact on prosthetic foundation and hampers the later implant-prosthetic treatment [18].

Autotransplantation can be carried out only in very few cases similarly to the orthodontic treatment which is recommended only when the retained canine is located labially and its crown or apex is correctly located (from the anatomical point of view) against lower incisors.

## Literature

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