**Mesiodens in monozygotic male twins**

**Diagnosis and surgical therapy – Case Report**

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**Introduction**

The incidence of supernumerary teeth reported in the literature is 0.15 - 3.9% and it is five times more common in permanent dentition teeth. Mesiodens is defined as a tooth additional to the normal dentition, commonly seen in the maxillary arch, centrally located between the roots of the upper incisors. The overall incidence is 0.15% - 1.9%, with the ratio men to women being 2:1 [1]. Mesiodens is listed in WHO's ICD-10 classification under hyperodontia, code K00.1.

**Objectives**

The aim of this case report is the presentation of diagnostic and surgical treatment of mesiodens, including etiological factors in monozygotic twins.

**Material and Methods**

We report on two 10-year-old monozygotic male twins, one of whom was referred to our clinic for surgical removal of the mesiodens in the upper jaw, which was diagnosed using digital volume tomography (DVT Sirona Galileos) (Fig.1). Evaluation of the DVT in the upper jaw showed a rudimentary, inverted conical mesiodens centrally located between the root apices of teeth 11 and 21, cranially limited by a thin cortical lamina to the nasal floor. The medical history revealed a monozygotic twin brother and the occurrence of mesiodens in a third-degree relative on his father's side of the family. A monochorionic diamniotic Gemini pregnancy was documented in the 36th week of pregnancy, with the first fetus weighing 300 grams more than the second. Radiographic imaging of the single maxillary anterior region of his twin brother also revealed a mesiodens in the same region. For further diagnosis a DVT (Sirona Galileos) was performed (Fig.2). The findings showed a varied location of the rudimentary, slightly enlarged, inverted and conical mesiodens in the same region, in mirror-symmetrical position relative to the median sagittal plane. Surgical removal of the mesiodens in both twins was performed under local anesthesia, using intrasulcular vestibular incision and minimally invasive osteotomy, (Fig.3-4). Surgical planning and orientation of mesiodens by means of DVT was imperative due to structures in the vicinity (incisor nerve and nasal floor) to reduce surgical trauma.

![Fig. 1](image1)
![Fig. 2](image2)
Results

Radiological diagnosis and evaluation

Findings Twin A: (Sirona GALILEOS DVT HC)
The rudimentary mesiodens was conically shaped, with a coronal translucency and showed no signs of root resorption of adjacent teeth. The mesiodens was inverted and the vestibular root tip with vestibular orientation was covered only by a thin cortical vestibular lamella. The coronal cutting edge of the mesiodens extended cranially into the corticallis of the nasal floor, with upward uninvolved basal nasal mucosa (Fig.5).

Findings Twin B: (Sirona GALILEOS DVT HC)
The rudimentary mesiodens was conically shaped and revealed no root resorption of adjacent teeth. However, coronal translucency was diagnosed. The mesiodens was inverted and the vestibular-oriented root tip was covered only by a thin cortical vestibular lamella. The coronal cutting edge of the mesiodens extended cranially into the corticallis of the nasal floor, with upward uninvolved basal nasal mucosa of the right nasal cavity (Fig.6).

Diagnosis of twin A
• Inverted mesiodens in the upper jaw.
• The distance of the mirror-image-like mesiodens from the center was slightly smaller than in twin B on the left (length 13.57 mm, width 4.85 mm).
• Mixed dentition of the permanent teeth presenting all dental germ.s.

Diagnosis Twin B
• Inverted mesiodens in the upper jaw.
• The distance of the mirror-image-like mesiodens from the center is slightly larger than in the case of twin A on the right (length 14.47 mm, width 5.72 mm).
• Mixed dentition of the permanent teeth presenting all dental germ.s.

Histopathology
Tissue biopsy taken from regio 11-21 (8x5x3mm) of twin A exhibited a cyst-like cavity lined by a 2-layered cubic epithelium with oval nuclei and eosinophilic cytoplasm (reduced enamel epithelium). Keratinization of the epithelial surface was not observed. The cyst wall was composed of a myxoid connective tissue with several small nests of odontogenic epithelium with no signs of inflammation. The finding was consistent with a follicular cyst (dental follicle) of a mesiodens (Fig.7).
The cyst 10x7x5mm of twin B from regio 11-21 was lined by a 2-layered cubic epithelium with oval nuclei and eosinophilic cytoplasm (reduced enamel epithelium). Neither keratinization of the epithelial surface nor horn lamellae in the cyst lumen were observed. The cyst wall consisted of matrix-rich connective tissue with morphologically normal fibrocytes. Within the cyst wall small nests of odontogenic epithelium with no signs of inflammation were noticed.
Conclusion
The occurrence of mesiodentes in twins is rare, only few case reports depicted in the literature can elucidate the etiology and a presumed genetic component. The absolute incidence of monozygotic twins is 3.5 - 4 per thousand pregnancies and is independent of maternal age or race and is similar in all populations [2]. The occurrence of mesiodentes in Asia and Sub-Saharan Africa is comparatively higher (2.7% to 3.4%) [3] [4]. An Australian study on 278 monozygotic twin pairs showed 9 cases of mesiodentes (3.2%), of which only one case showed concordant features. The review identified 11 case reports [5].

Regarding the etiologic background, a zygote that divides prior to lateral differentiation will produce identical monozygotic twins. The division of the blastocyst at a later stage can lead to increased levels of asymmetry. The different relationship of twins to each other within the membranes of the placenta has an impact on the respective axial asymmetries [5] [6]. The mirror image of unilateral mesiodentes occurring in twins has been described [7] [8] [9]. An autosomal dominant disorder with incomplete penetrance genes may play a role in the increased incidence among first-degree relatives [6]. Even small differences of epigenetic influences on tooth development may be responsible for differences in the expression in monozygotic twins [10] [11]. So far, several theories have been put forward for the formation of mesiodentes. These include the theories of atavism, the dichotomy / schizodontia, hyperactivity of the dental lamina, family history, asymptomatic autosomal dominant holoprosencephaly and environmental factors such as radiation, and the influence of exogenous epidermal growth factor [12] and vitamin A [13] [14].

Supernumerary teeth may occur in isolation or in combination with syndrome disorders such as cleidocranial dysostosis, associated with cleft lip and palate and the Gardner's syndrome. Anderson syndrome, Ellis-van Creveld syndrome, Ehlers-Danlos syndrome, Bloch-Sulzberger syndrome, Langer-Giedion syndrome [15] and Nance-Horan syndrome [16] are less common. Only 25% of the supernumerary teeth erupt spontaneously. So far, 278 cases of inverted mesiodentes have been reported in the literature [17]. Complications related to mesiodentes are eruption in the nasal cavity, retention and abnormal root development of permanent front teeth, crowding and development of diastema, as well as the emergence of follicular cyst or keratocystic odontogenic tumour, which may lead to root resorption and rotation of the adjacent teeth. Early diagnosis and treatment is required to avoid complications [18] [19].

A study comparing the diagnostic accuracy value for supernumerary teeth between traditional radiography and digital volume tomography (DVT) images showed a statistically significantly greater information content of DVT for the localization of pathological findings, signs of root resorption and for therapeutic planning [20]. In monozygotic twins with a positive family history of supernumerary tooth germs, a radiological examination of the twin sibling may reveal a similar condition. A DVT is helpful for three-dimensional diagnostics and surgical planning. DVT is an excellent tool for the surgical removal of the mesiodentes in terms of protecting adjacent structures and for deciding whether surgery should be performed before or after the commencement of the completed root development of permanent incisors.

**Literature**


This Poster was submitted by Simon Meißner.

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Mesiodens bei monozygoten männlichen Zwillingen: Diagnostik und chirurgische Therapie – Ein Fallbericht

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Einführung
Das Auftreten von Zahnexostosen in der Literatur wird mit 0,1% - 0,16% angegeben. Innerhalb von monozygoten Zwillingen liegt der Prozentsatz bei 0,01%. Dieser Fallbericht zeigt die Problematik von Diagnostik und Therapie bei Mesiodens bei einem 19-jährigen Patienten.

Fallbericht

Radiologische Diagnostik und Behandlung
Die radiologische Untersuchung zeigt eine ausgedehnte Verknöcherung des Mesiodens. Der Patient wurde mit einer Kieferorthopäden behandelt.

Histopathologie
Die histopathologische Untersuchung zeigt eine Verknöcherung des Mesiodens. Der Patient wurde mit einer Kieferorthopäden behandelt.

Diskussion

Schlussfolgerung