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Yuliya M. Melnichenko[1], Sergey L. Kabak[1], Nina A. Savrasova[2], Ruslan S. Mekhtiev[1]

[1]Belarusian State Medical University, Minsk, Republic of Belarus
[2]Medical center "LODE", Minsk, Republic of Belarus

ECTOPIC TEETH IN THE MAXILLARY SINUS

Abstract. Dental ectopia is a rare developing anomaly characterized by a change in the normal eruption pathway of a deciduous, permanent or supernumerary tooth. In some cases, ectopic teeth are present in the non-dentate area like maxillary sinus. The article presents cone beam computed tomography data of 7 asymptomatic patients with teeth totally or partially located inside the maxillary sinus. Dentigerous cysts and odontomas can cause displacement of impacted teeth into ectopic positions.

Keywords: ectopic tooth, maxillary sinus, dentigerous cyst, odontoma, cone beam computed tomography

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Ю. М. Мельниченко[1], С. Л. Кабак[1], Н. А. Саврасова[2], Р. С. Мехтиев[1]

[1]Белорусский государственный медицинский университет, Минск, Республика Беларусь
[2]Медицинский центр "ЛОДЭ", Минск, Республика Беларусь

ЭКТОПИЯ ЗУБОВ В ВЕРХНЕЧЕЛЮСТНУЮ ПАЗУХУ

Аннотация. Эктопия зубов – аномалия развития, связанная с изменением нормального пути прорезывания молочного, постоянного или сверхкомплектного зуба. В некоторых случаях зубы обнаруживаются далеко от места их закладки, например в верхнечелюстной пазухе. В статье представлены данные конусно-лучевой компьютерной томографии 7 пациентов, у которых один или несколько зубов были полностью или частично расположены в полости верхнечелюстной пазухи. Во всех случаях клиническая симптоматика отсутствовала. Смещение ретенированных зубов в верхнечелюстную пазуху могут вызывать фолликулярные кисты и одонтомы.

Ключевые слова: эктопический зуб (эктопия зуба), верхнечелюстная пазуха, фолликулярная киста, одонтома, конусно-лучевая компьютерная томография

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Introduction. Dental ectopia is rare developmental anomaly characterized by a change in the normal eruption pathway of a deciduous, permanent or supernumerary tooth [1]. The prevalence of ectopic impaction is different for individual teeth and differs across regions [2]. Ectopic teeth can be located in the dentate and non-dentate regions of upper and lower jaw such as maxillary sinus (MS), mandibular condyle, coronoid process, or located near the orbital floor, the floor of the nasal cavity or in the mental region [3].

Detection of tooth/teeth in the MS occurs during radiological examination for any reason and is often unexpected [4]. Such teeth usually cause sinonasal or ophthalmic symptoms, but asymptomatic cases are less reported [3].

Dentigerous cysts surrounding impacted teeth often displace teeth into ectopic positions [5]. Odontomas are odontogenic benign tumors composed of different dental tissues, including enamel, dentin, cementum and, in some cases, pulp tissue [6]. Odontomas of intraosseus location can cause impaction of neighboring teeth [4].

Materials and research methods. Seven cone-beam computed tomography (CBCT) scans of dental patients of outpatient clinics of Minsk, Belarus, with ectopic teeth in maxillary sinus for the years 2020–2021 were studied in this article. All cases were subdivided into two groups: 1) cases with ectopic permanent or supernumerary teeth (ectopic eruptions) in the maxillary sinus (cases 1–5); 2) cases with odontoma or odontogenic cyst associated with ectopic permanent teeth in the maxillary sinus (cases 6, 7).

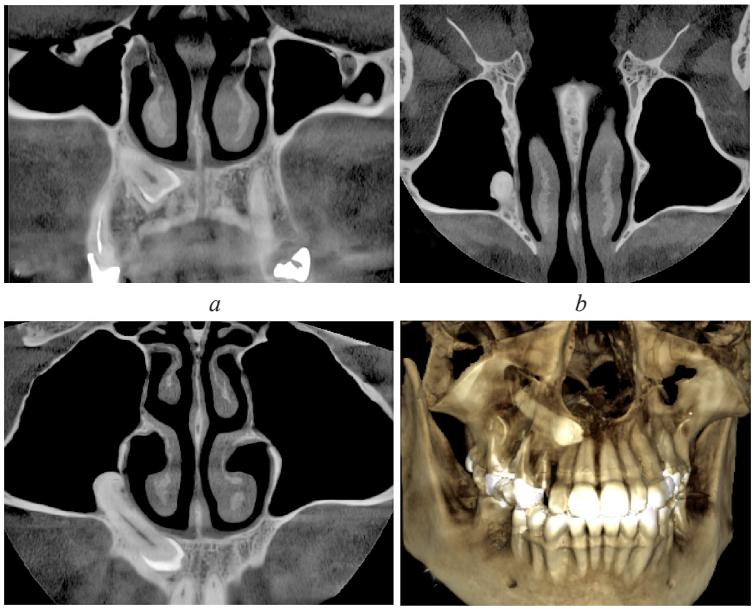
Publication of these case reports was approved by the Ethics Committee of Belarusian State Medical University, Minsk (protocol #3 from January 25, 2021). Informed consents from all patients for the purpose of publication of case details and images were obtained.

Research results. ***Case presentations.*** *Ectopic third molar inside maxillary sinus.* The case presents 50-year-old female examined prior to endodontic treatment. CBCT revealed a fully formed third molar with shortened single root inside the left MS, surrounded by a thin radiopaque layer of compact bone, which was adjacent the posterolateral wall of the sinus in its lower 1/3 (Fig. 1). Left axillary sinus did not show any radiographic signs of sinusitis.

a *b*

Fig. 1. CBCT, coronal (*a*) and axial (*b*) images showing ectopic left maxillary molar inside the maxillary sinus

Ectopic impaction of the upper right canine. The case presents 45-year-old female examined prior to dental implantation of first mandibular molars. CBCT revealed a fully formed mesioangularly impacted right upper permanent canine located in the region of the base of the alveolar process. The apical 1/3 of the root with a curved apex protruded into the lumen of the right maxillary sinus. The crown of the canine adjoined the root apex of the right second incisor. The impacted tooth was totally enclosed inside its bony crypt[1] (Fig. 2). Radiographic features of sinusitis were not present.



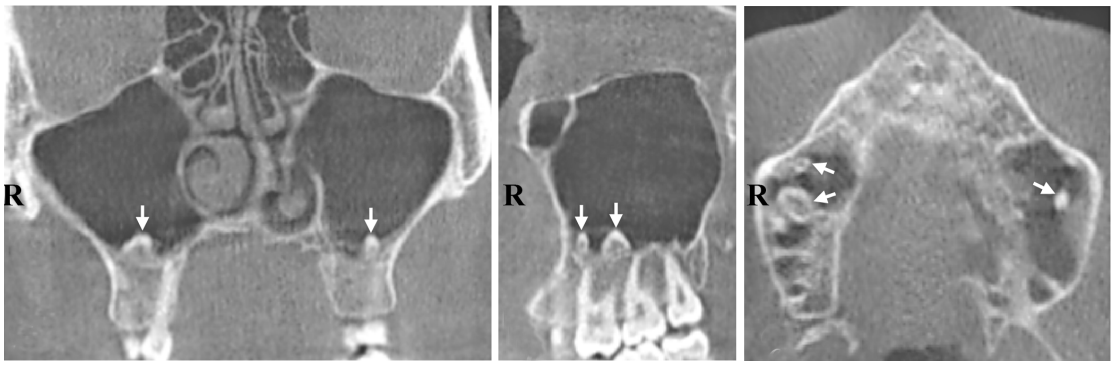
a *b*

c *d*

Fig. 2. CBCT, coronal (*a*), axial (*b*), reformatted axial (*c*), and three-dimensional reconstructed images (*d*) showing impacted ectopic right upper canine

[1] Cortical plate in the developing alveolar bone that encloses tooth germs before eruption.

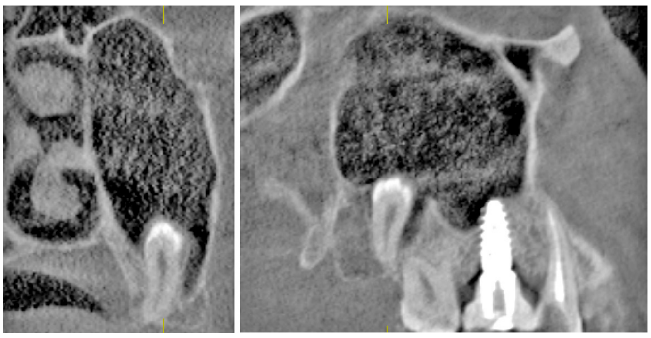
Multiple supernumerary teeth inside maxillary sinus. The case presents 45-year-old male with multiple supernumerary teeth (paramolars) on the level of permanent molars inside maxillary sinus and its floor (Fig. 3). Cortical plates were not visualized around the crowns of ectopic teeth. Spatial resolution of CBCT images does not allow us to state with certainty that eruption of supernumerary teeth into the sinus cavity has occurred. Both maxillary sinuses did not show any radiographic signs of sinusitis.



a *b* *c*

Fig. 3. CBCT, coronal (*a*), sagittal (*b*), and axial (*c*) images showing multiple (three) supernumerary inverted paramolars (arrows) erupted into the maxillary sinus

Ectopic inverted tooth 2.8 in the maxillary sinus. The case presents 29-year-old female examined prior to dental prosthetic treatment. CBCT revealed ectopic inverted fully formed single rooted left third molar (Fig. 4). Tooth crown and cervical third of the root were observed in the maxillary sinus. The tooth was totally surrounded by its bony crypt. Left maxillary sinus did not show any radiographic signs of sinusitis.



a *b*

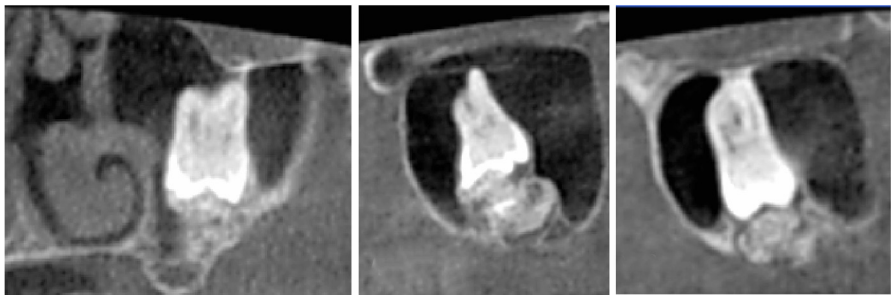
Fig. 4. CBCT, coronal (*a*), and sagittal (*b*) images showing ectopic inverted tooth 2.8

Mesiodens in the maxillary sinus. The case presents 26-year-old female examined for pathology of the temporomandibular joint. CBCT showed the presence of mesiodens in the maxillary sinus. Fully formed microdent tooth (mesiodens) having root dilaceration surrounded by its bony crypt was located horizontally inside bone at the base of alveolar process on the level of teeth 2.1–2.3, the crown of tooth was displaced into palatal recess of maxillary sinus (Fig. 5). Radiographic signs of sinusitis were not present in both sinuses.

Complex odontoma associated with impacted tooth 2.6. 30-year-old male examined before prosthetic rehabilitation of the edentulous posterior maxilla. CBCT revealed a well-demarcated lesion inside the left maxillary sinus measuring 1.53 cm in greatest dimension, which included fragments of tooth tissues and radiolucent areas (Fig. 6). The impacted inverted first molar was intimately associated with the lesion and surrounded by a thin cortical plate. The apices of the fused molar roots reached the upper wall of the sinus at the level of the infraorbital canal. Drainage of the left maxillary sinus was not disturbed; signs of sinusitis were not present.

a *b* *c*

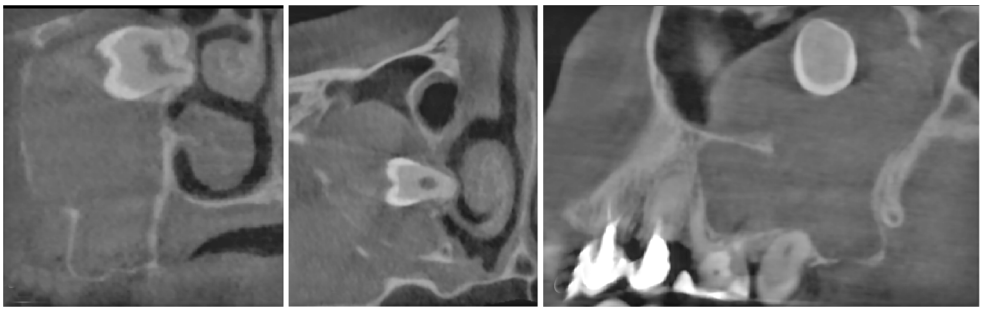
Fig. 5. CBCT, axial (*a*), coronal (*b*), and sagittal (*c*) images showing mesiodens in the maxillary sinus



a *b* *c*

Fig. 6. CBCT, coronal (*a*), and sagittal (*b*, *c*) images showing complex odontoma associated with impacted inverted tooth 2.6

Dentigerous cyst associated with ectopic maxillary third molar. The case presents 46-year-old asymptomatic male examined prior to dental prosthetic treatment. CBCT revealed a well-demarcated radiopaque lesion occupying right maxillary sinus and displacing third maxillary molar to the level of fontanelle (Fig. 7). The lesion was associated with the dental crown of the impacted tooth and attached at the cementoenamel junction. The tooth roots were curved and prolapted into the nasal cavity by 4.4 mm (under the nasal mucosa). According to the imaging features, the diagnostic hypothesis was a dentigerous cyst. The cyst had caused destruction of the alveolar bone at the right maxillary molar region. The right ostiomeatal unit was not obstructed.



a *b* *c*

Fig. 7. CBCT, coronal (*a*), axial (*b*), and sagittal (*c*) images showing soft-tissue mass occupying almost the entire right maxilla R y sinus and involving ectopic third maxillary molar

Discussion. The presence of an ectopic tooth in the non-dentate area like maxillary sinus is very rare [4]. According to Lamb et al. [8], 35 of such cases were reported in English language literature from 1927 to the first decade of the 2000s. Ectopic teeth may or may not be associated with clinical symptoms. Ectopic teeth in the maxillary sinus can cause local sinonasal symptoms [9]. Presented article describes CBCT data of seven asymptomatic patients with ectopic teeth in the maxillary sinus.

A rarity case (#3 of the article) was the presence of multiple supernumerary teeth partially erupted inside maxillary sinus bilaterally without other symptoms of syndromes associated with multiple ectopic

teeth. Search on PubMed utilizing keywords such as "ectopic," "teeth," "maxillary sinus", "supernumerary", "multiple" did not show any similar cases.

Some reports suggest an association of ectopic teeth with dentigerous cysts [10]. Dentigerous cysts are the most frequent type of developmental odontogenic cysts associated with unerupted teeth. They develop due to the accumulation of fluid between the crown of an impacted tooth and the reduced enamel epithelium or between the layers of enamel epithelium. Thus, the cyst encloses the crown and is attaches to the tooth at the cementoenamel junction [11, 12]. The incidence of dentigerous cyst formation around unerupted teeth is about 1.44 % [13]. Dentigerous cyst associated with an ectopic tooth in the maxillary sinus is very rare [1]. Case #7 of the article presents a dentigerous cyst associated with third maxillary molar displaced to the level of the maxillary sinus fontanelle. The sinus cavity was subtotally occupied with lesion but the patient had no any sinonasal complaints.

Odontoma is a benign calcified odontogenic tumor composed of odontogenic epithelium and odontogenic mesenchyme and constitute about 22 % of all odontogenic tumors of the jaws [14]. Complex odontoma is a malformation in which all tooth tissues are presented, but located in a more or less random order; whereas a compound odontoma is a malformation in which all tooth tissues form a set of tooth-like structures [15]. Odontomas are usually asymptomatic and frequently revealed incidentally during x-ray examinations [6]. Case # 6 presents a complex odontoma, which made the process of eruption of the permanent upper molar impossible, and the continued growth of the tumor caused its displacement inside maxillary sinus.

Those parts of the ectopic teeth, which were located inside the maxillary sinus from cases #1–5, were surrounded by their bony crypts (except crowns of supernumerary paramolars from case #3). This fact indicates that ectopic teeth did not erupt into the maxillary sinus.

Conclusion. The article presents seven cases of ectopic teeth that were diagnosed within maxillary sinus as an accidental radiological finding, since they were not accompanied by maxillary sinusitis symptoms. CBCT is crucial for determining the exact location and morphology of such teeth, as well as their relationship with the surrounding anatomical structures. Surgical removal of such teeth is preferred due to the tendency of impacted teeth to form odontogenic cysts or tumors.

Conflict of interest. The authors declare no conflict of interest.

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Information about the authors

Yuliya M. Melnichenko – Ph. D. (Med.), Associate Professor. Belarusian State Medical University (83, Dzerzhynski Ave., 220116, Minsk, Republic of Belarus). https://orcid.org/0000-0002-8742-6973. E-mail: mjm1980@yandex.ru

Sergey L. Kabak – Ph. D. (Med.), Professor, Head of the Department. Belarusian State Medical University (83, Dzerzhynski Ave., 220116, Minsk, Republic of Belarus). https://orcid.org/0000-0002-7173-1818. E-mail: kabakmorph@gmail.com

Nina A. Savrasova – Ph. D. (Med.), Associate Professor, radiologist. Medical center "LODE" (58A, Nezavisimosti Ave., Minsk, Republic of Belarus). https://orcid.org/0000-0003-1297-0226. E-mail: ninasavrassova@tut.by

Ruslan S. Mekhtiev – Assistant. Belarusian State Medical University (83, Dzerzhynski Ave., 220116, Minsk, Republic of Belarus). https://orcid.org/0000-0003-0146-6841. E-mail: mekhtiev.r.s@gmail.com

Информация об авторах

Мельниченко Юлия Михайловна – канд. мед. наук, доцент. Белорусский государственный медицинский университет (пр. Дзержинского, 83, 220116, г. Минск, Республика Беларусь). https://orcid.org/0000-0002-8742-6973. E-mail: mjm1980@yandex.ru mjm1980@yandex.by

Кабак Сергей Львович – д-р мед. наук, профессор, заведующий кафедрой. Белорусский государственный медицинский университет (пр. Дзержинского, 83, 220116, г. Минск, Республика Беларусь). https://orcid.org/0000-0002-7173-1818. E-mail: kabakmorph@gmail.com

Саврасова Нина Александровна – канд. мед. наук, доцент, врач-рентгенолог. Медицинский центр «ЛОДЭ» (пр. Независимости, 58А, г. Минск, Республика Беларусь). https://orcid.org/0000-0003-1297-0226. E-mail: ninasavrassova@tut.by

Мехтиев Руслан Салманович – ассистент. Белорусский государственный медицинский университет (пр. Дзержинского, 83, 220116, г. Минск, Республика Беларусь). https://orcid.org/0000-0003-0146-6841. E-mail: mekhtiev.r.s@gmail.com