



## Endoscopic antrostomy in the treatment of odontogenic maxillary sinusitis – two cases report

### Endoskopska antrostomija u lečenju dentogenog maksilarnog sinuzitisa

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#### Abstract

**Introduction.** Maxillary sinusitis of odontogenic origin is a well-known condition that occurs due to close relationship of the maxillary posterior teeth to the maxillary sinus. We presented two patients with symptoms and signs of chronic inflammation of the maxillary sinus of odontogenic origin. **Case report.** In both patients, after clinical examination, microbiological testing, skin prick tests to inhalant allergens, and endoscopy of the nasal cavity, we performed the cone beam computed tomography (CBCT) of paranasal sinuses, which showed thickening of the mucosal lining of the maxillary sinus. The mucosal oedema resulted in obstruction of the osteomeatal complex in both patients. The presence of a foreign body in the right alveolar recess in the first case and in the left osteomeatal complex in the second case were noticed. The both foreign bodies had densities similar to bone. The alveolar recesses in both cases were below the level of the nasal cavity floor. The patients were treated by endoscopic approach, a combination of lower and middle meatal antrostomy. The thickened mucous membrane was removed in the region of the osteomeatal complex, and then the foreign bodies were removed in both cases. Histopathological analysis proved that both foreign bodies were tooth roots. **Conclusion.** This case report show how be able to successfully surgically remove foreign bodies from the maxillary sinuses using endoscopic approach, a combination of both, lower and middle meatal antrostomy.

#### Key words:

maxillary sinusitis; diagnosis; cone-beam computed tomography; foreign bodies; otorhinolaryngologic surgical procedures; endoscopy.

#### Apstrakt

**Uvod.** Maksilarni sinuzitis dentogenog porekla je dobro poznato stanje koje nastaje zbog blizine korenova gornjih zuba i maksilarnog sinusa. Prikazali smo dva bolesnika sa simptomima i znacima hroničnog zapaljenja maksilarnog sinusa dentogenog porekla. **Prikaz bolesnika.** Kod oba bolesnika, nakon kliničkog pregleda, mikrobioloških ispitivanja, kožnih proba sa inhalacionim alergenima, kao i endoskopije nosne šupljine, urađena je kompjuterizovana tomografija konusnog zraka – [cone beam computed tomography (CBCT)], koja je pokazala zadebljanje sluznice maksilarnog sinusa. Otok sluznice doveo je do opstrukcije ostiomeatalnog kompleksa. Uočeno je prisustvo stranog tela u desnom alveolarnom recesusu u prvom, i u predelu ostiomeatalnog kompleksa, u drugom slučaju. Oba strana tela davala su senku sličnu koštanoj supstanci. Dno alveolarnog recesusa sinusa je u oba slučaja bilo ispod ravni poda nosne šupljine. Bolesnici su operisani endoskopskim pristupom, kombinacijom srednje i donje antrostomije. Odstranjena je zadebljala sluznica u predelu ostiomeatalnog kompleksa, a nakon toga su uklonjena strana tela. Histopatološka analiza je u oba slučaja pokazala da su strana tela bili korenovi zuba. **Zaključak.** Ovim prikazom se ukazuje na mogućnost uspešnog hirurškog uklanjanja stranih tela iz maksilarnog sinusa endoskopskim pristupom, kombinacijom srednje i donje antrostomije.

#### Ključne reči:

maksilarni sinuzitis; dijagnoza; kompjuterizovana tomografija konusnog zraka; strana tela; hirurgija, otorinolaringološka, procedure; endoskopija.

#### Introduction

The maxillary sinus is a horizontally placed three-sided pyramid, with the base facing nasal cavity. Maxillary sinus with its alveolar recess is in close contact with the posterior

teeth of the upper jaw. The bottom of the maxillary sinus, in approximately 70% of the cases, is below the level of the hard palate, in 20% of cases in the level of the hard palate, and only in 10% of cases is above the hard palate<sup>1</sup>. The most common iatrogenic causes of odontogenic maxillary sinusitis

are: placing the instrument too deep into the roots of teeth during the endodontic therapy, interradicular perforations of curved root canals and suppression of canal filling material into the sinus, sinus perforation during tooth extraction, suppression of the root or the whole tooth into the sinus during the extraction, protruded dental implants, etc. Spontaneous causes of odontogenic maxillary sinusitis can be: acute periapical abscesses, infected follicular cysts of impacted teeth and pericoronitis of the third upper molar<sup>2</sup>. The use of cone beam computed tomography (CBCT) allows lowering of radiation to the patient, which is only about 10% of the conventional multi-slice computed tomography (MSCT), and gets precise information about the position and relationships between the maxillary sinus and tooth<sup>3</sup>. CBCT showed considerable advantage in the detection of the periapical lesions in comparison to two-dimensional radiographic procedures<sup>4</sup>.

We presented two cases of successful surgical removal of foreign bodies from the maxillary sinuses using endoscopic approach as well as a significance of using CBCT diagnostics in preparing patients for surgery, which proved to be sufficiently reliable and safe for the patients.

## Case report

### Case 1

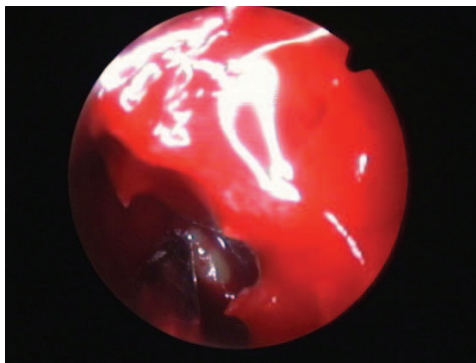
A 25-year-old female patient visited the hospital because of history of 18-months difficult breathing through the nose, followed by a reduced sense of smell and deficient postnasal secretion. The patient had headache in the frontal area. Because of difficult nasal breathing, the patient often used decongestant nasal drops. About two years ago, the patient had an intervention of tooth extraction in the upper jaw on the right side. She denied that she had difficulties after tooth extraction. By anterior rhinoscopy, we noticed the

presence of swollen mucosa of the right inferior turbinate and the right nasal cavity, which was confirmed by endoscopic examination of the nasal cavity. CBCT of the paranasal sinuses showed thickening of the mucosa of the right maxillary sinus as well as obstruction of the right ostiomeatal complex (Figure 1). In the alveolar recess of the same sinus, a hyperdense lesion was seen, which, by its properties, corresponded to the tooth root. That lesion seemed to be a foreign body. Defects of bone structures were not observed. The intensity of inflammation, graded according to Lund-Mackay scoring system, was 3 (1 unilateral incomplete shadows of the maxillary sinus and 2 complete unilateral obstruction of ostiomeatal complex). Skin prick tests showed sensitization to inhaled allergens and microbiological analysis of swabs of the nasal mucous membranes showed normal nasal flora. In consultation with the oral surgeon, we ruled out the presence of oroantral fistula in the alveolar ridge gingival area.

The patient was operated, in general anaesthesia, by endoscopic approach using functional endoscopic sinus surgery (FESS), combining the middle and inferior antrostomy. After infiltration of the mucosa of the uncinete process with solution of epinephrine (dilution 1 : 100 000), we made an uncinectomy and bulectomy. Then, we dilated the natural maxillary sinus ostium. Due to the position of the foreign body, an opening was made in the medial wall of the maxillary sinus at the level of the inferior nasal meatus, directly in front of the nasolacrimal duct. Finally, we removed the foreign body through the inferior antrostoma (Figures 2 and 3). Foreign body was sent to pathohistological analysis, which showed that it was a tissue of tooth root. The nasal pack was placed in the right nasal cavity and removed after four days. Postoperatively, the patient received peroral antibiotic therapy, and started nasal washing with 0.9% solution of sodium chloride. At follow-up examinations, the patient was free of symptoms and nasal finding was normal.



**Fig. 1 – Cone-beam computed tomography (CBCT) of the paranasal sinuses shows the opacification of the right ostiomeatal complex, thickening of the right maxillary sinus mucosa and a hyperdense lesion inside the alveolar recess of the right maxillary sinus which corresponds to the root of the tooth (the first presented patient).**



**Fig. 2 – Intraoperative endoscopic view of the right maxillary sinus: it can be seen a part of the tooth through the inferior antrostoma (the first patient).**

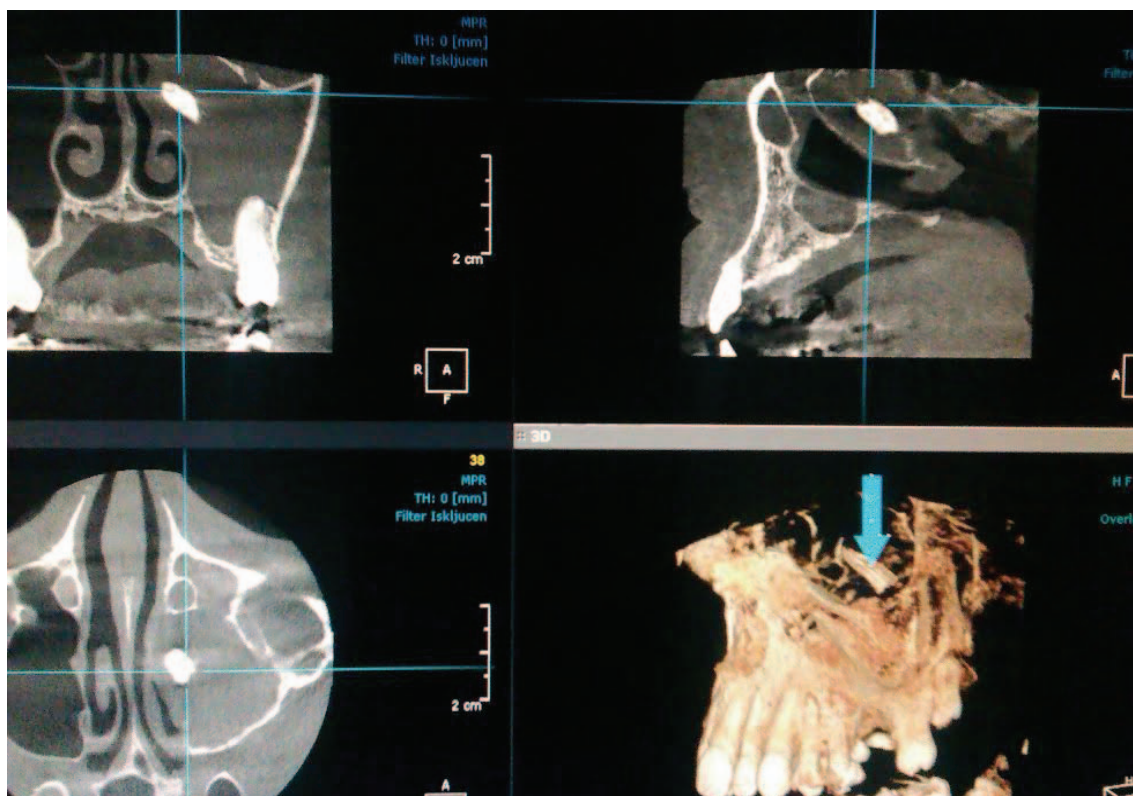


**Fig. 3 – Removed part from the tooth root of the first patient.**

### Case 2

A 36-year-old patient came to the otorhinolaryngologist with the sense of facial pressure on the left side and discrete swelling of the left side of the face. The patient explained that he had the extraction of both upper molars long ago, with opening of both maxillary sinus and procedures of conservative and surgical closing of oroantral openings. Examination was completed with endoscopic examination of nasal cavities. The allergy tests were negative. Bacteriological examination of the throat and nose showed the presence of physiological flora. Fungi were not isolated by mycological analysis. CBCT of paranasal sinuses showed the presence of a foreign body of tooth density inside the left maxillary sinus as well as total opacification of the same sinus. In the area of the alveolar ridge, a dehiscence of sinus floor was seen and it was completely covered with mucous membrane, without signs of oroantral fistula (Figure 4).

The patient was treated endoscopically, under general anaesthesia, combining the middle and inferior antrostomy. The foreign body and hypertrophic mucosa were removed from the sinus and sent for pathohistological analysis which showed that it was the tissue of tooth (Figure 5) surrounded by hypertrophic and chronically inflamed mucosa of the maxillary sinus.



**Fig. 4 – Cone-beam computed tomography (CBCT) of the paranasal sinuses shows the complete opacification of the left maxillary sinus. A foreign body, a part of tooth with intracanal filling, is seen in the area of osteomeatal complex (the second patient).**



**Fig. 5 – Removed part from the tooth root from left maxillary sinus (the second patient).**

### Discussion

Chronic rhinosinusitis is a chronic inflammation of the nasal and paranasal sinuses mucosa, characterized by the presence of symptoms for a minimum of 12 weeks<sup>5</sup>. Upon the recommendation of the multidisciplinary working group for rhinosinusitis [Rhinosinusitis Task Force (RTF) American Academy of Otolaryngology-Head & Neck Surgery], the diagnosis is made based on the presence of large, i.e., major symptoms, or by the presence of one large and two small (so-called minor) symptoms<sup>6</sup>. The major symptoms of chronic rhinosinusitis are: nasal obstruction, nasal/postnasal discharge, pain/pressure in the area of the face, a feeling of fullness in the area of the face, and impaired sense of smell (hiposmia/anosmia). The minor symptoms are: headache, bad breathing, weakness/fatigue, pain in the teeth, cough, pain/pressure/fullness in the ears and fever. It should be noted that facial pain/pressure and elevated temperatures are not by themselves sufficient criteria for a clinical diagnosis of chronic rhinosinusitis if not present at least one major factor. Elevated body temperature is a major factor for acute rhinosinusitis, but a minor factor for chronic rhinosinusitis. Occasionally, maxillary rhinosinusitis [chronic maxillary rhinosinusitis (CMRS)] is a clinical entity that occurs in 25.2% of cases of chronic rhinosinusitis<sup>7</sup>, and in about 10%–20% of cases it is of odontogenic origin<sup>8</sup>, although some studies suggest that the incidence of dental factors in pathogenesis of CMRS can be up to 40% of cases<sup>9</sup>. Odontogenic CMRS is mostly of iatrogenic origin (65.7%), and apical dental pathology is the cause of inflammation in 25% of cases<sup>10</sup>. Iatrogenic odontogenic maxillary sinusitis is in 47.5% of cases complicated with oroantral fistula<sup>11</sup>. Inflammatory process in CMRS is leading to the reversible mucociliary dyskinesia, making extremely difficult maxillary sinus drainage and creating favourable conditions for bacterial colonization and infection<sup>12</sup>. CBCT of paranasal sinuses is of great importance for the diagnosis of CMRS<sup>13,14</sup>. Unilateral CMRS is in 55% of cases the consequence of the first molar disease and in 34% of the second molar pathology<sup>14</sup>.

Inflammation of the maxillary sinus mucosa of odontogenic origin usually occurs after injury of the maxillary sinus

during tooth extraction. This especially occurs when chronic apical periodontitis destroy sinus bone tissue floor, when the apex of the tooth is covered only with mucous membrane of the sinus which can be perforated during the extraction. Oroantral communication created this way very often heals spontaneously, without the appearance of sinusitis. Chronic sinusitis is localized mainly in the area of the alveolar recess; if there is an oroantral fistula which cannot heal spontaneously it requires surgical treatment.

In the etiology of odontogenic maxillary sinusitis, the following factors should be considered: whole tooth or part of the tooth as well as other foreign bodies, instrument for root canal treatment and periapical filling which is not absorbed. Infectious contents of the tooth canal that enters the maxillary sinus and irritation caused by a foreign body, rapidly cause inflammation. Removal of foreign body from the maxillary sinus only prevents the development of complications<sup>15</sup>.

FESS can be a treatment of choice for odontogenic maxillary sinusitis<sup>16</sup> in all the cases of sinusitis non-complicated with oroantral fistula. We propose the combination of two approaches: by middle nasal meatus (by osteomeatal complex) and by inferior nasal meatus. A study performed by Hinohira et al.<sup>17</sup> showed normal maxillary sinuses in all patients with chronic sinusitis after middle and inferior meatal antrostomy treatment. Periodontitis, periapical lesions and endodontically treated teeth indicate the possible presence of bacterial infection. As these processes can last for a long time, dental infections are easily overlooked during routine ear, nose and throat examination<sup>18</sup>.

### Conclusion

CBCT imaging technique of the nasal cavity and paranasal sinuses in addition to lower doses of radiation than that the standard computed tomography scan needs, provides a three-dimensional visualising of the anatomic relationships in the nasal-sinus area and better planning of surgical approach.

Compared to classical radical operation of the maxillary sinus by Caldwell-Luc, the combination of inferior and mid-

dle antrostomy preserves the integrity of the anterior wall of the maxillary sinus as well as its floor and shortens recovery time. In our cases, endoscopic approach with the combination of lower and middle antrostomy was selected because of the position of foreign bodies, easier removal of a chronic inflamed mucosa of the maxillary sinus and to ensure good

ventilation and postoperative sinus drainage, while preserving the mucociliary transport. Therefore, the FESS could be a treatment of choice in all the cases of odontogenic maxillary sinusitis that are not associated with the presence of oroantral fistula needing its closure.

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Received on September 21, 2016.

Revised on December 17, 2016.

Accepted on December 27, 2016.

Online First January, 2017.