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CASE REPORTS
PRIKAZI SLUČAJEVA

SURGICAL TREATMENT OF A DENTIGEROUS CYST AND ECTOPIC MAXILLARY MOLARS INVOLVING THE MAXILLARY SINUS – A CASE REPORT

HIRURŠKO LEČENJE ODONTOGENE CISTE MAKSILARNOG SINUSA SA EKTOPIČNIM GORNJIM MOLARIMA – PRIKAZ SLUČAJA

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Abstract

Introduction. This article aims to report a rare case of dentigerous cyst involving the left maxillary sinus and two unerupted ectopic teeth located in the lateral nasal cavity wall and pterygopalatine fossa. **Case Report.** A 13-year-old male patient was referred to our clinic due to a dentigerous maxillary sinus cyst with two unerupted ectopic teeth located in the lateral nasal cavity wall and pterygopalatine fossa. Radiographic investigation using cone-beam computed tomography was performed to determine the precise location of the ectopic teeth and the extension of the lesion. A differential diagnosis of dentigerous cyst, odontogenic keratocystic tumor, or odontogenic tumor involving the left maxillary sinus was considered. Surgical treatment comprised modified Caldwell-Luc approach, enucleation of the cyst, and extraction of ectopic teeth. Histopathological analysis confirmed the diagnosis of a dentigerous cyst. The postoperative period was uneventful. **Conclusion.** Caldwell-Luc procedure remains the preferred method for removing ectopic teeth in the maxillary sinus, whether or not associated with dentigerous cysts. Further refinement of intraoral endoscopy linked with the Caldwell-Luc technique should be particularly considered as it may lead to its establishment as the gold standard for such interventions.

Key words: Molar, Third; Tooth Eruption, Ectopic; Maxillary Sinus; Endoscopy; Dentigerous Cyst; Treatment Outcome

Sažetak

Uvod. Cilj ovog rada bio je da se predstavi redak slučaj odontogene ciste maksilarnog sinusa sa dva neizrasla ektopična zuba u bočnom zidu nosne šupljine i pterogopalatinskoj pterigopalatinskoj jami. **Prikaz slučaja**. U radu je prikazan pacijent muškog pola, starosti 13 godina, sa odontogenom cistom koja u potpunosti zahvata levi maksilarni sinus i dva ektopična zuba u bočnom zidu nosne duplje i pterigopalatinskoj jami. Preoperativno je učinjena kompjuterizovana tomografija konusnog zraka gornje vilice radi preciznog određivanja odnosa promene sa okolnim anatomskim strukturama. Na osnovu kliničkog i radiološkog pregleda postavljena je radna dijagnoza promene koja je ukazivala na odontogenu razvojnu cistu, odontogenu keratocistu ili odontogeni tumor. Operativni zahvat obuhvatao je modifikovan *Caldwell-Luc* pristup, enukleaciju ciste i ekstrakciju ektopičnih zuba. Histopatološki nalaz išao je ukazivao na folikularnu odontogenu cistu. Postoperativni tok je protekao bez komplikacija. **Zaključak.** *Caldwell-Luc* tehnika je i dalje tretman izbora za evakuaciju ektopičnih zuba u maksilarnom sinusu sa odontogenim cistama ili bez njih. Posebna pažnja se može posvetiti daljim modifikacijama *Caldwell-Luc* tehnike, posebno primenom intraoralne endoskopije, kako bi se smanjile postoperativne komplikacije.

Ključne reči: treći molar; ektopični umnjak; maksilarni sinus; endoskopija; odontogena cista; ishod lečenja

Introduction

Ectopic teeth most commonly involve mandibular third molars and maxillary canines [1]. However, ectopic maxillary third molars within the maxillary sinus are a rare clinical presentation. When located in the sinus cavity, these teeth may manifest with classical sinusitis symptoms such as facial pain, swelling, headache, and nasal obstruction or they may remain asymptomatic [1]. Symptoms usually occur when a dentigerous cyst is present in the sinus cavity. The development of dentigerous cysts in the maxillary sinus related to an ectopic tooth is rare. These cystic lesions are characterized by constant growth, leading to bone resorption and the displacement of surrounding structures and teeth [1].

The diagnosis of ectopic maxillary third molars and dentigerous cysts in the maxillary sinus is made through clinical and radiological examinations. Preoperative planning for the treatment of maxillary sinus pathologies is important due to the close proximity of vital anatomical structures [2]. Surgical extraction of ectopic third molars in the maxillary sinus is indicated for symptomatic patients as well as asymptomatic patients with dentigerous cysts [1, 2]. The Caldwell-Luc procedure (CL), first described in

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Abbreviations

CL – Caldwell-Luc procedure
ESS – endoscopic sinus surgery
PPF – pterygopalatine fossa
CBCT – cone-beam computed tomography
CT – computed tomography
MRI – magnetic resonance imaging

1893, was the treatment of choice for approaching maxillary sinus lesions until the introduction of endoscopic sinus surgery [2]. The CL approach is associated with frequent complications such as postoperative swelling, infraorbital nerve paresthesia, damage to the roots of adjacent teeth, oroantral fistula formation, and postoperative anterior maxillary wall defects [3, 4]. Since the introduction of endoscopic sinus surgery (ESS), many authors have reported successful endoscopic management of ectopic teeth in the maxillary sinus, highlighting the reduced risk of injury to adjacent anatomical structures and less invasive nature of the procedure [3, 4].

This article aims to report a rare case of dentigerous maxillary sinus cyst with two unerupted ectopic teeth located in the lateral nasal cavity wall and pterygopalatine fossa (PPF).

Case Report

A 13-year-old male patient was referred to Clinic for Maxillofacial Surgery at University Clinical Center of Vojvodina with a primary complaint of intraoral swelling on the left side of the upper jaw persisting for two months. His past medical and dental history was unremarkable. Extraoral examination revealed no facial swelling. Intraoral examination showed expansion of the buccal cortical plate in the posterior region, along with the absence of teeth #27 and #28. A panoramic radiograph revealed ectopic eruption of teeth #27 and #28 in the maxillary sinus, accompanied by a hyperdense lesion obliterating the maxillary sinus cavity.

Further radiographic investigation using cone-beam computed tomography (CBCT) was performed to determine the precise location of the ectopic teeth and the extension of the lesion. The CBCT scan showed that ectopic tooth #28, with incompletely developed roots, was located in the antero-inferior aspect of the left PPF, while ectopic tooth #27 had been displaced into the lateral wall of the nose, in close proximity to the left orbital floor and nasolacrimal duct. The left maxillary sinus was completely obliterated by a well-defined, corticated hyperdense lesion measuring 40×30×30 mm, causing mediolateral expansion of the maxilla and slight elevation of the orbital floor **(Figure 1).** A differential diagnosis of dentigerous cyst, odontogenic keratocystic tumor, or odontogenic tumor involving the left maxillary sinus was considered. After analyzing the CBCT images, we were able to plan sur-

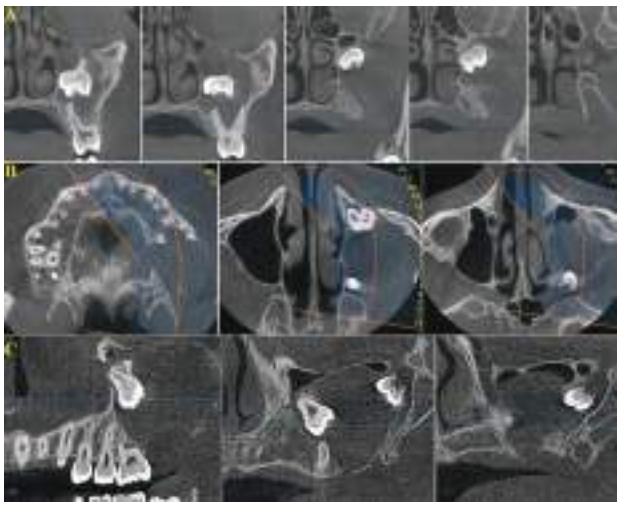

Figure 1. Preoperative cone-beam computed tomography of a dentigerous cyst in left maxillary sinus with two ectopic teeth. Axial (A), coronal (B) and sagittal (C) images of radiolucent cystic lesion filling the entire maxillary sinus and ectopic teeth #27 in the lateral nasal wall and #28 in pterygopalatine fossa

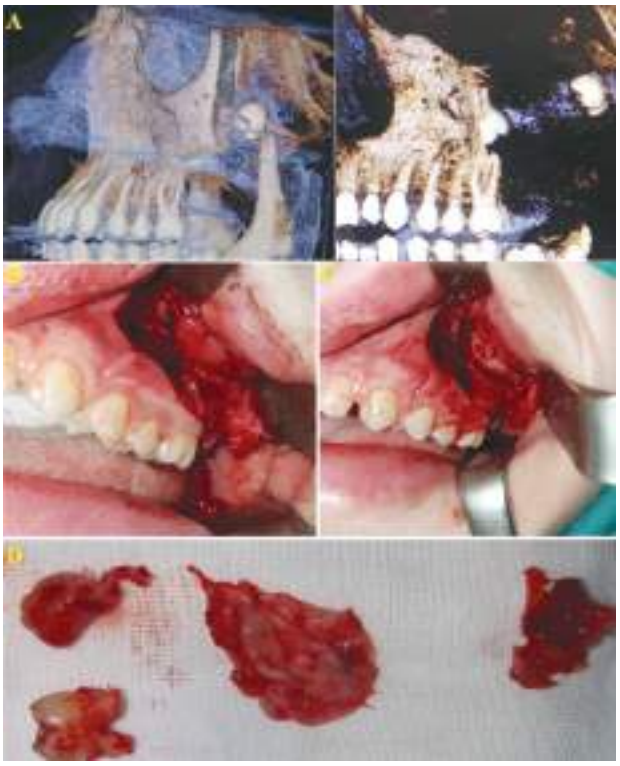

Figure 2. A) 3D reconstruction of the left maxillary sinus lesion; B) Surgical procedure – elevated mucosal-submucosal flap with the periost left attached to the anterior wall of the maxilla; C) bony flap with the periost left attached was marked and raised to enucleate the sinus cyst; D) enucleated dentigerous cyst and the enveloped teeth #27 and #28

gical treatment through a modified Caldwell-Luc approach. A vestibular incision was made from the canine to the first molar, and instead of a full-thickness mucoperiosteal flap, a mucosal-submucosal flap was raised, leaving the periosteum attached to the maxilla. Instead of creating a bony window, we elevated a 2.0 x 1.5 cm bony-periosteal flap with a superiorly placed base. The infraorbital nerve was carefully preserved. The bony-periosteal flap was carefully moved superiorly, and the ectopic teeth were extracted along with the enucleation of the cyst. The sinus cavity was irrigated, the bony-periosteal flap was repositioned, the periosteum was sutured, and the vestibular incision was then closed **(Figure 2).** Histopathological analysis confirmed the diagnosis of a dentigerous cyst. The postoperative period was uneventful.

Discussion

The most commonly reported surgical procedures for the extraction of ectopic teeth and maxillary sinus cysts were the Caldwell-Luc procedure, endoscopic sinus surgery, and endoscopic sinus surgery combined with the Caldwell-Luc approach [4]. The CL procedure has long been considered the classic surgical approach to the maxillary sinus due to its easy intraoral access to the sinus cavity through canine fossa, which can be performed under local anesthesia. The traditional CL operation involves accessing the sinus cavity through the canine fossa, removing the diseased sinus membrane, and drainage through an artificial aperture on the inferior nasal meatus. However, in the era of endoscopic surgery, the CL approach is considered aggressive due to common complications, including postoperative swelling, infraorbital nerve paresthesia, trauma to adjacent teeth, oroantral fistula, and postoperative anterior maxillary wall defects [3]. Also the removal of the entire sinus mucosa during the CL procedure leads to its replacement with nonfunctional mucosa, permanently altering physiological functions of the sinus [5]. Further complications may arise when an inferior meatal antrostomy is performed to sinus drainage, such as extended surgery time, nasolacrimal duct injury, and epistaxis [6]. In the present case, we presented a modification of the classic CL approach to enucleate large dentigerous cyst in the maxillary sinus and remove two ectopic teeth: #27 located in the lateral nasal wall and #28 located in the PPF. Three-dimensional CBCT image reconstruction was used for preoperative planning. The imaging revealed that despite the cyst's significant size, it was well demarcated from surrounding bone structures. Ectopic tooth #28 in the PPF was not in contact with neurovascular elements, and tooth #27 was not in contact with the nasolacrimal canal. Therefore, instead of creating a bony defect on the anterior maxillary wall (around 2x1 cm in diameter), we elevated a bony-periosteal flap and sutured it back into place, avoiding thus postoperative defect in the anterior wall of the maxilla.

To reduce the complications associated with the two standard techniques, several authors have reported modifications to these approaches. Li et al. [7] used an endoscopy-assisted CL operation to treat dentigerous cysts and ectopic third molars involving the maxillary sinus, demonstrating that this approach provides clear visibility during operation, less bleeding and nerve injury, minimal incisions, and minimal bone loss. The combination of ESS and CL operation has also been shown to be effective for the removal of foreign bodies in the sinus and even for the enucleation of maxillary sinus tumors such as nasal inverted papilloma. Seo et al. [6] reported a modified ESS technique that integrates elements of both the conventional Caldwell-Luc procedure and functional endoscopic sinus surgery. This approach includes repositioning the buccal bony window and enlarging the maxillary ostium via an endonasal approach, which enables postoperative reduction of the maxillary sinus resulting from postoperative cyst formation or scar tissues.

Radiological examinations are essential in the preoperative diagnosis and treatment planning for enucleation of ectopic teeth and cysts in maxillary sinus. Conventional panoramic radiographs are useful due to their low level of radiation and diagnostic accuracy for assessing lesions and location of the ectopic tooth [8]. However, 2D panoramic imaging has limitations in interpreting the exact location of the ectopic tooth, especially when displaced in the posterosuperior direction, due to superimposition of different bony structures [8]. Specialized imaging modalities like CT, MRI, and CBCT play a vital role in managing and definitely diagnosing dentigerous cysts involving the maxillary sinus. CBCT offers several advantages over CT and MRI, including multiplanar volume reconstructions, 3D volumetric planning, a significantly lower radiation dose, lower costs, shorter scan times, and fewer imaging artifacts [8]. CBCT is a useful diagnostic tool for evaluating maxillary sinus pathologies due to high sensitivity and specificity for detecting jaw bone pathologies compared with panoramic, CT and MRI. Given that dentigerous cyst are found in about 80% of cases involving ectopic maxillary third molars, differential diagnosis with other cystic radiolucent lesions in the maxillary sinus, such as ameloblastoma and odontogenic keratocyst, is essential due to varying treatment approaches for each lesion [9, 10].

Conclusion

We can conclude that the Caldwell-Luc procedure remains the preferred treatment for the removal of ectopic teeth associated with the maxillary sinus, with or without the presence of dentigerous cysts. However, recent reports on the use of endoscopic sinus surgery for the removal of ectopic teeth favor this less invasive approach. Special consideration should be given to further modifications of intraoral endoscopy in combination with the Caldwell-Luc technique, which may become the gold standard for this intervention.

References

1. Zhang LL, Yang R, Zhang L, Li W, MacDonald-Jankowski D, Poh CF. Dentigerous cyst: a retrospective clinicopathological analysis of 2082 dentigerous cysts in British Columbia, Canada. Int J Oral Maxillofac Surg. 2010;39(9):878-82.

2. Courtot R, Devoize L, Louvrier A, Pereira B, Caillet J, Meyer C, et al. Surgical approach of ectopic maxillary third molar avulsion: systematic review and meta-analysis. J Stomatol Oral Maxillofac Surg. 2021;122(1):77-82.

3. Ikeda K, Hirano K, Oshima T, Shimomura A, Suzuki H, Sunose H, et al. Comparison of complications between endoscopic sinus surgery and Caldwell-Luc operation. Tohoku J Exp Med. 1996;180(1):27-31.

4. Buyukkurt MC, Omezli MM, Miloglu O. Dentigerous cyst associated with an ectopic tooth in the maxillary sinus: a report of 3 cases and review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010;109(1):67-71.

5. Allen DZ, Sethia R, Hamersley E, Elmaraghy CA. Presentation of an iatrogenically displaced third molar into the maxillary sinus in a 14-year-old patient successfully removed with an endoscopic approach: a case report and a review of the literature. J Surg Case Rep. 2020;2020(10):rjaa290.

6. Seo MH, Lee JY, Frimpong P, Eo MY, Kim SM. Modified endoscopic-assisted approach for removal of ectopic third molar in the maxillary sinus. Appl Sci (Basel). 2021;11(18):8446.

7. Li SH, Wang Y, Huang ZX, Jin TT, Huang ZQ. Endoscope-assisted surgery in the treatment of dentigerous cyst involving the maxillary sinus - report of two cases. Chin J Dent Res. 2020;23(1):71-6.

8. Ngoc VTN, Anh LQ, Duc NM, Dinh TC, Dinh TC. Cone beam computed tomography application in finding ectopic tooth: a systemic analysis and a case report. Open Access Maced J Med Sci. 2019;7(24):4333-6.

9. Mijatov I, Kiralj A, Vučković N, Nikolić J, Tadić A, Mijatov S. Preoperative determination of tumor thickness in oral squamous cell carcinoma by computed tomography. Med Pregl. 2022;75(11-12):338-43.

10. Meng Y, Zhao YN, Zhang YQ, Liu DG, Gao Y. Three-dimensional radiographic features of ameloblastoma and cystic lesions in the maxilla. Dentomaxillofac Radiol. 2019;48(6):20190066.

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