

Case Report

Single-visit nonsurgical endodontic treatment of maxillary sinusitis: A case series

Barbara Czopik, Joanna Zarzecka

Department of Conservative Dentistry with Endodontics, Faculty of Medicine, Institute of Stomatology, Jagiellonian University Medical College, Cracow, Poland

ABSTRACT

The etiopathology of maxillary sinusitis of dental origin (MSDO) is well established, and chronic apical periodontitis is the second most common cause of all dental-induced sinusitis incidents. The literature presents no common treatment protocols for MSDO and very few studies address the impact of root canal treatment (RCT) in its management. The literature presents cases of maxillary sinusitis resolution after performing a multivisit nonsurgical endodontic treatment, yet none described complete healing of MSDO as a result of single-visit nonsurgical RCT. This paper reports a case series of maxillary sinusitis of endodontic origin (MSEO) associated with upper maxillary molars that were successfully treated with single-visit nonsurgical antiseptic RCT. In all cases, the clinical symptoms subsided within a week after endodontic treatment. Control cone-beam computed tomography (CBCT) scan showed healing of periapical bone and total resolution of maxillary sinusitis symptoms. MSDO treatment protocol should start with nonsurgical antiseptic RCT. Single-visit nonsurgical endodontic treatment can be effective in MSEO management. CBCT is a method of choice in MSEO diagnostics. Endodontists are well trained and well equipped to treat MSDO, and the cooperation between ear, nose, and throat specialists, maxillofacial surgeons, and endodontists is crucial for both: good diagnostics and treatment.

Key Words: Endodontic treatment, maxillary sinusitis, maxillary sinusitis of dental origin, maxillary sinusitis of endodontic origin, root canal treatment

Received: 27-Feb-2021
Revised: 28-Apr-2021
Accepted: 26-Jul-2021
Published: 28-Jan-2022

Address for correspondence:

Dr. Barbara Czopik,
Department of Conservative
Dentistry with Endodontics,
Institute of Stomatology,
Jagiellonian University
Medical College,
Montelupich 4 Street,
Cracow 31-155, Poland.
E-mail: bczopik@o2.pl

INTRODUCTION

The main goal of endodontic treatment is to prevent or cure apical periodontitis. Due to anatomical relationships, periapical lesions of upper premolars and molars can induce odontogenic infection inside maxillary sinus.^[1,2] Etiopathology of sinusitis of odontogenic origin has been well established clinically and scientifically, yet there are still concerns in the field of proper diagnosis and treatment from both: dental and laryngological standpoints.^[1,3-5] The incidence

of maxillary sinusitis of dental origin (MSDO) is higher than previously thought and is reported to be 10%–72% of all cases of unilateral maxillary sinusitis.^[3,6,7] Despite the high prevalence, it is still not common for ear, nose, and throat (ENT) specialists or maxillofacial surgeons to refer patients for endodontic consultation and treatment.^[3] Moreover, despite the fact that maxillary sinusitis of odontogenic origin can heal after nonsurgical endodontic treatment without

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Czopik B, Zarzecka J. Single-visit nonsurgical endodontic treatment of maxillary sinusitis: A case series. Dent Res J 2022;19:3.

Access this article online



Website: www.drj.ir
www.drjjournal.net
www.ncbi.nlm.nih.gov/pmc/journals/1480

any surgical intervention,^[8] this mode of treatment is still less preferable than intraoral/extraoral surgical and laryngological approach.^[5]

A variety of terms have been established for dental-induced maxillary sinusitis. Characterized as antral-nasal syndrome by Selden,^[9,10] it is also known as odontogenic maxillary sinusitis or MSDO.^[11] In 2018, the American Association of Endodontists proposed a new term of Maxillary Sinusitis of Endodontic Origin (MSEO) that indicates sinusitis secondary to endodontic infection. The exclusion of MSEO from the group of odontogenic sinusitis caused by other dental pathologies emphasizes the role of endodontic microbiota as an important and primary cause of MSEO and dictates the mode of the treatment, which is antiseptic root canal treatment (RCT).^[3]

Periapical lesions that originated from endodontic pathologies and penetrated maxillary sinus are mainly associated with maxillary molars. Molars are 11 times more likely than premolars to cause MSEO when both teeth are present.^[7,8] The proximity or direct communication between the periradicular area of upper teeth and maxillary sinus is the reason for apical lesion penetration into these pneumatic anatomic spaces. Bone destruction in the process of periapical lesion growth causes bacteria invasion and proliferation of sinus mucosa that results in obstruction visible in radiological examination. MSEO can manifest either as periapical osteoperiostitis (PAO), when maxillary sinus periosteum forms characteristic “halo” lesion, or periapical mucositis (PAM), when infectious agents from apical area induce the proliferation of antral mucosa.

This paper reports a case series of MSEO associated with upper first maxillary molars that were successfully treated with single-visit nonsurgical antiseptic RCT without any surgical intervention.

CASE REPORTS

Case report 1

A 43-year-old male was referred to endodontic practice by general dental practitioner for endodontic retreatment of 26 tooth. Tooth underwent RCT 5 years ago. The patient reported nonspecific recurrent pain in the left facial area for 3 months; there was no history of laryngological treatment nor other general health diseases. Extraoral examination revealed tenderness to percussion in the left maxillary sinus area. In an

intraoral examination, tooth 26 gave a slightly positive reaction to percussion test. There was fistula present in the projection of root apex. Intraoral periapical preoperative radiograph revealed periapical lesion. All canals were underfilled with poor condensation of obturating material. Because the presence of maxillary sinusitis was suspected, standard radiological diagnostics was supplemented with preoperative CBCT [shown in Figure 1a-c]. It revealed PAO in the left maxillary sinus with characteristic “halo” lesion as well as PAM and missed MB2 canal in 26 tooth. Chronic apical periodontitis and MSEO were diagnosed and tooth 26 was qualified for antiseptic RCT in dental operating microscope (DOM). The patient signed informed consent.

After performing infiltration anesthesia with 1 amp of 4% articaine with 1 adrenaline both buccally

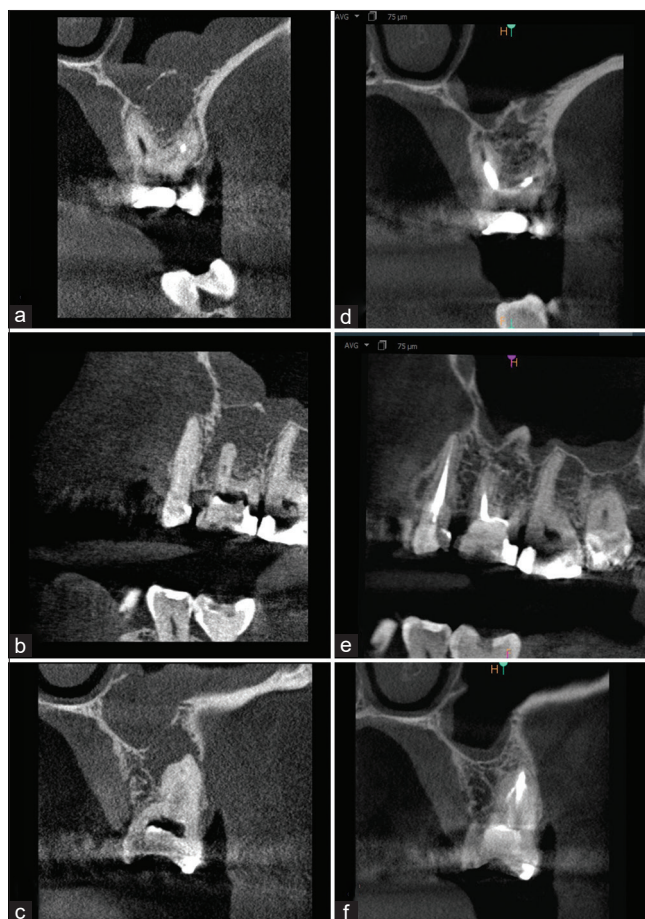


Figure 1: (a-c) Preoperative sagittal and coronal cross-sections of 26 tooth show chronic apical periodontitis coexisting with maxillary sinusitis of endodontic origin with periapical osteoperiostitis and periapical mucositis symptoms; (d-f) 1-year control cone-beam computed tomography systems shows complete reconstruction of bone and resolution of sinusitis symptoms.

and palatally (Septanest 1:200, Septodont, France) and isolation of operating field with a rubber dam (Hygienic Dental Dam Kit, Coltene/Whaledent, Switzerland), access to canals was prepared in DOM (Leica M320, Leica Microsystems, Germany). Glide-path was obtained in all four root canals using ISO 10 C-pilots (VDW, Germany) with working length assessment with Raypex 6 electronic apex locator (VDW, Germany). Chemomechanical preparation was performed with Endostar E3 rotary instruments (PolDent, Poland) with crown-down technique up to ISO size 30.04, followed by MTwo rotary file ISO 35.04 (VDW, Germany) as a MAF. During all mechanical preparation, all canals were copiously irrigated with 40 ml 5.25% sodium hypochlorite (NaOCl) (Chloraxid, Cerkamed, Poland), and after MAF preparation final irrigation protocol was performed in all canals: 5.25% NaOCl with ultrasonic activation with passive ultrasonic irrigation (PUI) method in amount of 5 ml/canal, 40% citric acid with PUI for smear layer removal in amount of 5 ml/canal, and final flush with 2% chlorhexidine 5 ml/canal for the additional antimicrobial effect with manual dynamic irrigation (MDI). All canals were dried with sterile paper points (MetaBiomed, Korea) and obturated with vertical compaction of warm gutta-percha (continuous wave of condensation technique) using 35.04 master apical cones (MACs) (MetaBiomed, Korea) coated in a small amount of AH Plus sealer (Dentsply Sirona, USA), followed by back-fill of 200°C heated gutta-percha with Super Endo B and L system (B and L Biotech, USA). Postoperative intraoral radiograph was taken to assess the direct postoperative effect of the treatment. The patient was instructed to come to 6-month, 1-year, and 2-year control visits. Because there have been no flare-ups and no postoperative complications during 12-month posttreatment period, the patient did not show up for the first 6-month control and no control radiovisiography (RVG) follow-up was made at that time. The patient came back after 12-month period, and control Cone-beam computed tomography (CBCT) was done [Figure 1d-f].

Case report 2

A 61-year-old female came to dental office due to pain and swelling in the right maxillary area. The patient reported strong spontaneous pain in the right facial area that lasted for 12 h, nasal obstruction, and pain while bending over. The patient had no history of laryngological treatment nor other general health

diseases. Extraoral examination revealed tenderness of the right buccal area, pain to palpation, and percussion. Intraoral examination showed redness and swelling of oral mucosa in the projection of 16 apical area, tooth 16 was highly responsive for percussion and restored with prosthetic crown. Intraoral periapical preoperative radiograph revealed no pathologies. Tooth 16 underwent RCT in the past. Because the presence of MSEO was suspected, radiological diagnostics was supplemented with preoperative CBCT [Figure 2a and b]. It revealed PAO and PAM in right maxillary sinus in the projection of apical area of 16 tooth. Chronic apical periodontitis and MSEO were diagnosed, and tooth 16 was qualified for antiseptic RCT in DOM.

Patient signed informed consent

Infiltration anesthesia with 2 amp. of 4% articaine with 1:100,000 adrenaline, both buccally and palatally (Septanest 1:100, Septodont, France) was performed followed by isolation of operating field with a rubber dam (Hygienic Dental Dam Kit, Coltene/Whaledent, Switzerland). Access to canals was prepared in DOM (Leica M320, Leica Microsystems, Germany). Glide-path has been obtained in all four root canals using ISO 10 C-pilots (VDW, Germany), followed by chemomechanical preparation with Endostar E3 (PolDent, Poland) to ISO size 30.04 and MTwo ISO 35.04 (VDW, Germany) as MAF. Working length was assessed



Figure 2: (a and b) Preoperative sagittal and coronal cross-sections of 16 tooth show chronic apical periodontitis coexisting with maxillary sinusitis of endodontic origin with periapical osteoperiostitis and periapical mucositis signs; (c and d) 8-month control cone-beam computed tomography systems shows complete resolution of sinusitis symptoms and healing of periapical bone.

with Raypex 6 electronic apex locator (VDW, Germany). During all mechanical preparation, all canals were copiously irrigated with 50 ml 5.25% sodium hypochlorite (NaOCl) (Chloraxid, CerKamed, Poland), and after MAF preparation, final irrigation protocol was performed in all canals: 5.25% NaOCl with ultrasonic activation with PUI method in the amount of 5 ml/canal, 40% citric acid with PUI for smear layer removal in amount of 5 ml/canal, and final flush with 2% chlorhexidine 5 ml/canal for additional antimicrobial effect with MDI. All canals were dried with sterile paper points (MetaBiomed, Korea) and obturated with vertical compaction of warm gutta-percha (continuous wave of condensation technique) using 35.04 MACs (MetaBiomed, Korea) coated in a small amount of AH Plus sealer (Dentsply Sirona, USA), followed by back-fill of 200°C heated gutta-percha with Super Endo B and L system (B and L Biotech, USA). Postoperative intraoral radiograph was taken to assess the direct postoperative effect of the treatment. The patient was instructed to come to 6-month, 1-year, and 2-year control visits. At 6-month control, intraoral periapical radiographs were taken, and control CBCT was made in an 8-month control period [Figure 2c and d].

DISCUSSION

If the development of sinusitis has endodontic origin, it is most likely to heal after nonsurgical endodontic therapy.^[3,8] However, RCT will resolve all symptoms of MSEO only if endodontic microbiota that the invaded endodontic space is susceptible to antiseptics used in root canal irrigation protocol. In case of survival bacteria, fungal infection, or coexistence of extraradicular infection, RCT will have to be supplemented with surgical intra or extraoral management.

CBCT is a method of choice in MSEO diagnostics, as CT of standard collimation (3 mm thick) fails to demonstrate dental origin of sinusitis.^[8] It has been also proved that it is common for dental professionals to underdiagnose MSEO while basing only on conventional two-dimensional intraoral periapical radiographs or orthopantomography.^[7,12-14] CBCT provides information about root canal anatomy, especially missed canals, that is crucial in planning and prognosing the success rate of nonsurgical RCT.

There are scientific publications that show a high ratio of maxillary sinusitis resolution after performing

multivisit nonsurgical RCT with the application of antimicrobial agents to endodontic space in-between visits.^[8] Our case series shows the complete healing of MSEO after performing single-visit RCT with effective irrigation protocol.

Sinus involvement in endodontic pathologies requires individual, multidisciplinary approach, specialistic RCT with precise working length assessment, effective antimicrobial irrigation protocol, and advanced radiographic diagnostic tools. It should be emphasized that chemomechanical preparation and obturation should stop exactly at physiological foramen and any extrusion of irrigants, debris, and obturation materials should be avoided while still managing to obtain apical patency. Over instrumentation and inadvertent extrusion of antiseptics into maxillary sinus can cause serious complications that will decrease the success ratio.^[8] This implicates in conclusion that MSEO should be managed rather by experienced specialists in endodontics than general practitioners.

CONCLUSION

MSDO treatment protocol should start with nonsurgical antiseptic RCT and should be supplemented with surgical or laryngological management only if signs of healing in follow-ups are not observed. Single-visit nonsurgical endodontic treatment can be effective in MSEO management. CBCT is a method of choice in MSEO diagnostics. Endodontists are well trained and well equipped to treat MSDO and the cooperation between ENT specialists, maxillofacial surgeons, and endodontists are crucial for both: Good diagnostics and treatment.

Highlights

- Even big apical lesions with advanced maxillary sinusitis can heal completely after single-visit nonsurgical endodontic treatment
- MSEO treatment protocol should start with RCT and this noninvasive single-visit approach can be as effective as multivisit RCT in MSEO management
- The cooperation between ENT specialists, maxillofacial surgeons, and endodontists is crucial for good diagnostics and treatment of maxillary sinusitis

Statement of ethics

Patient 1 involved in the study has given his written informed consent to publish his case (including publication of images).

Patient 2 involved in the study has given his written informed consent to publish his case (including publication of images).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understand that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

REFERENCES

1. Abrahams JJ, Glassberg RM. Dental disease: A frequently unrecognized cause of maxillary sinus abnormalities? *Am J Roentgenol* 1996;166:1219-23.
2. Bauer WH. Maxillary sinusitis of dental origin. *Am J Orthod Oral Surg* 1943;29:133-51.
3. Tataryn RW, Lewis MJ, Horalek ML, Thomson CG, Cha BY, Pokorny AT. Maxillary sinusitis of endodontic origin. *Am Assoc Endod Position Statement* 2018;1:1-11.
4. Patel NA, Ferguson BJ. Odontogenic sinusitis: An ancient but under-appreciated cause of maxillary sinusitis. *Curr Opin Otolaryngol Head Neck Surg* 2012;20:24-8.
5. Longhini AB, Branstetter BF, Ferguson BJ. Unrecognized odontogenic maxillary sinusitis: A cause of endoscopic sinus surgery failure. *Am J Rhinol Allergy* 2010;24:296-300.
6. Matsumoto Y, Ikeda T, Yokoi H, Kohno N. Association between odontogenic infections and unilateral sinus opacification. *Auris Nasus Larynx* 2015;42:288-93.
7. Maillet M, Bowles WR, McClanahan SL, John MT, Ahmad M. Cone-beam computed tomography evaluation of maxillary sinusitis. *J Endod* 2011;37:753-7.
8. Bogaerts P, Hanssens JF, Siquet JP. Healing of maxillary sinusitis of odontogenic origin following conservative endodontic retreatment: Case reports. *Acta Otorhinolaryngol Belg* 2003;57:91-7.
9. Selden HS. The interrelationship between the maxillary sinus and endodontics. *Oral Surg Oral Med Oral Pathol* 1974;38:623-9.
10. Selden HS. The endo-antral syndrome: An endodontic complication. *J Am Dent Assoc* 1989;119:397-8, 401-2.
11. Kim SM. Definition and management of odontogenic maxillary sinusitis. *Maxillofac Plast Reconstr Surg* 2019;41:13.
12. Terlemez A, Tassoker M, Kizilcakaya M, Gulec M. Comparison of cone-beam computed tomography and panoramic radiography in the evaluation of maxillary sinus pathology related to maxillary posterior teeth: Do apical lesions increase the risk of maxillary sinus pathology? *Imaging Sci Dent* 2019;49:115-22.
13. Low KM, Dula K, Bürgin W, von Arx T. Comparison of periapical radiography and limited cone-beam tomography in posterior maxillary teeth referred for apical surgery. *J Endod* 2008;34:557-62.
14. Constantine S, Clark B, Kiermeier A, Anderson PP. Panoramic radiography is of limited value in the evaluation of maxillary sinus disease. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2019;127:237-46.