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Maxillary rhinosinusitis of odontogenic origin: A case series

Tulio Bonna Pignaton[1], Rubens Spin-Neto[2], Guilherme José Pimentel Lopes de Oliveira[3], Carlos Eduardo de Almeida Ferreira[1]

SUMMARY

The present study presents a series of cases of maxillary rhinosinusitis related to dental infection and threated exclusively with the extraction of the compromised teeth. Eight patients were selected from a private practice dental institute presenting a violated Schneiderian membrane due to odontogenic infections, as confirmed by a Cone Beam computed tomography (CBCT) that was performed in all cases for diagnosis. The origin of these infection was due to endodontic of periodontal lesions, and the pulpar vitality tests and periodontal probing were executed in order to confirm that the source of the maxillary rhinosinusitis was due to the odontogenic infections. All the cases of maxillary rhinosinusitis were resolved after the tooth extraction, since the dental implants placement were indicated in all the cases. It is possible to conclude the importance of the diagnosis of infectious lesions of odontogenic origin for the differential diagnosis of rhinosinusitis to determine the treatment appropriated for the resolution of this illness.

Keywords: dental implants, maxillary rhinosinusitis, odontogenic infection, sinus lift procedure.

INTRODUCTION

The maxillary sinus is part of a series of paranasal sinuses, which includes the frontal, ethmoid, and sphenoid sinuses. The condition of sinusitis is now more appropriately referred to as *rhinosinusitis* (1). The change in nomenclature was made because the mucous membranes of the nose and paranasal sinuses (maxillary, frontal, ethmoid, and sphenoid) are all anatomically contiguous and respond similarly to medical and surgical therapy (2).

The maxillary sinus is surrounded by the orbital floor, the lateral nasal walls, and the dentoalveolar portion of the maxilla. It can even extend into the palatine and zygomatic bones (3). Continued expansion and pneumatization of the maxillary sinus can persist throughout life in dentate individuals, which may induce inferior displacement of the floor of the sinus in the direction of the maxillary posterior teeth roots (4). The maxillary teeth roots may protrude into the sinus cavity, resulting in surrounding of the apical aspects of the dental roots by the sinus mucoperiosteum (5, 6).

The roots of the maxillary premolar and molar teeth are situated below the sinus floor. These short distances explain the easy extension of an infectious process from these teeth to the maxillary sinus. An estimated 5% to 40% of cases of maxillary sinusitis have been attributed to odontogenic infections (7). Conditions that violate the Schneiderian membrane, such as periapical abscesses, periodontal disease, dental trauma, tooth extractions, are thought to increase the risk of maxillary sinusitis (2).

The patients often present with symptoms of chronic sinusitis as well as pain associated with the involved tooth. The unique presentation is a diagnostic challenge due to variations in symptoms and clinical findings (8). Patients are often referred to the otolaryngologist owing to lack of definitive diagnosis (9). The present study presents a series of cases of maxillary sinusitis related to dental infection and threated exclusively with the extraction of the compromised teeth.

CASE SERIES

Eight patients were selected from a private practice Dental Institute (PPDI) presenting a violated schneiderian membrane due to odontogenic infections,

[1]*Private practitice, Vila Velha, Brazil*
[2]*Department of Oral Radiology, Aahus University, Aarhus, Denmark*
[3]*Department of Periodontology and Implantology, Federal University of Uberlândia, Uberlândia, Brazil*

Address correspondence to Tulio Bonna Pignaton, Champagnat Av. 501 – Office 1001, Praia da Costa, zip code: 29.100-010, Vila Velha – ES, Brazil.
E-mail address: tuliopignaton@gmail.com

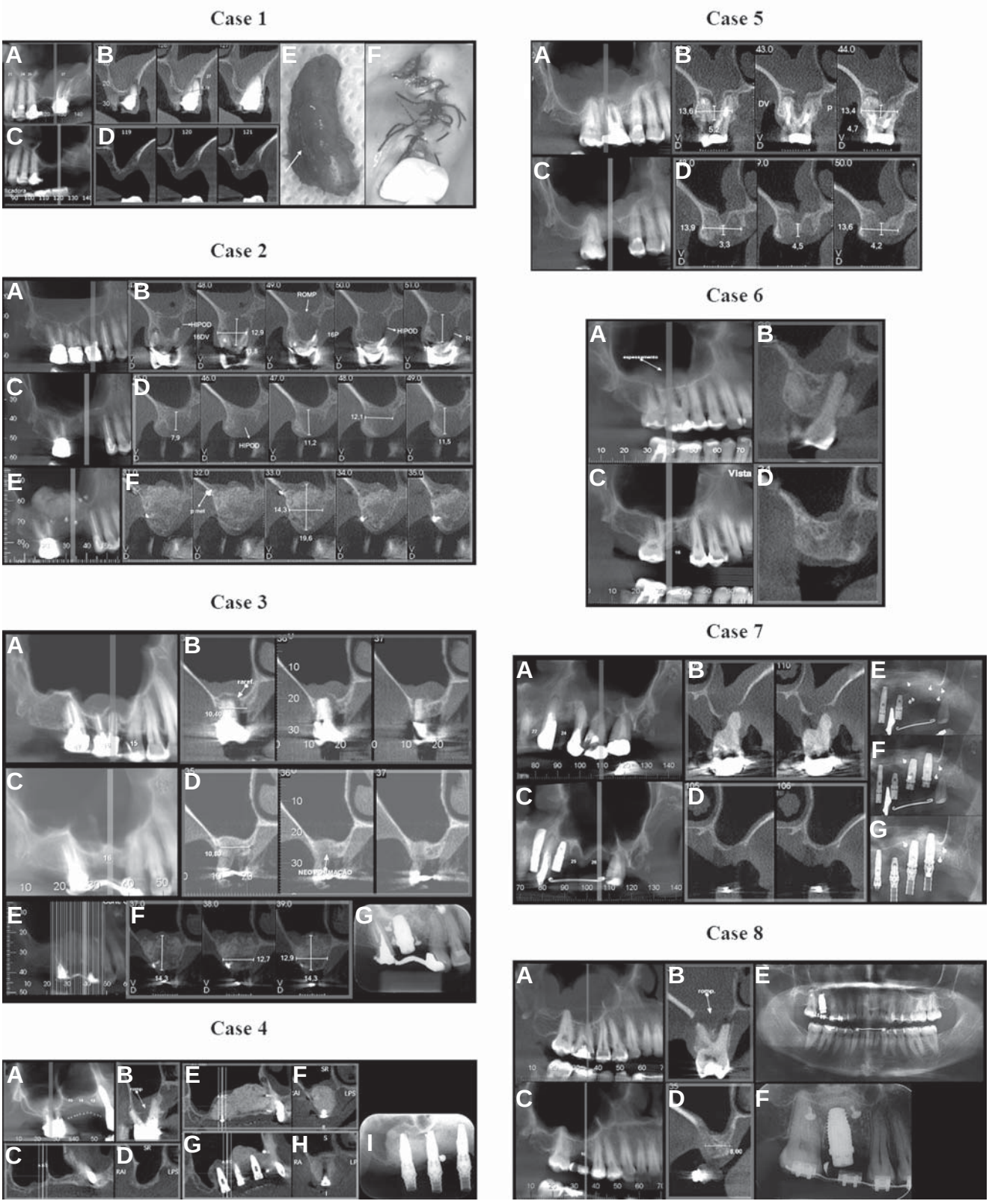

Fig. Representative images of this case report. In all the cases, the maxillary rhinosinusitis had the tooth infections as the etiological factor as determinate by clinical exams and CBCT (A-B). All the cases presented clinical resolution of the maxillary rhinosinusitis after the dental extraction (C-D). In some cases, the sinus lift procedure was performed in order to placed the dental implants (Cases 2-4, 7, E-F). Then, the dental implants were placed with no complications (Cases 3-4, 7-8, F-I).

as confirmed by a Cone Beam computed tomography (CBCT) that was performed in all cases for diagnosis. All the patients gave consent for the publication of the cases.

Case 1

A 61-years old male patient was indicated to the PPDI by his prosthodontics to evaluate the prognosis of the second superior left molar due to caries lesion

entering the biological width in its mesial aspect and planning the implant placement in the region of the tooth 26. During clinical evaluation, along with the biological width invasion, periodontal pocket depth over 10 mm was detected in the mesial aspect of tooth 27. After CBCT evaluation it was defined that maxillary sinus bone graft was necessary prior to implant placement in the tooth 26 region due to limited residual bone height. Also, the possibility to perform a crown lengthening procedure along with periodontal scaling and root planning in tooth 27 was discarded due limited alveolar bone between sinus floor and cervical aspect of the restoration. The CBCT images suggest that during probing the probe was actually entering the maxillary sinus. Furthermore, a maxillary rhinosinusitis was diagnosed (Figure; Case 1, A-C) and a close relation to periodontal infection and maxillary sinus can be seen in the images b. For all that, the extraction of the tooth 27 was indicated prior to sinus lift procedure. During tooth extraction the presence of an inflammatory tissue corresponding to the periodontal pocket in the mesial aspect of the mesio-buccal root can be seen (Figure; Case 1, D-E) and an extensive oroantral communication (OAC) was detected. A pandiculated palatal connective tissue graft was rotated along with the coronal displacement of the buccal flap permitted to close the alveolar socket entrance (Figure; Case 1, F). Due to OAC Amoxicilin 875mg was prescribed twice a day for 7 days. After 3 months a second CBCT was performed to evaluate alveolar socket healing and plan sinus grafting procedure. It can be seen that after tooth extraction, maxillary rhinosinusitis was resolved.

Case 2

A 62-years old male patients were indicated to PPDI for extraction of teeth 16 and 17 for subsequently implant placement. Clinically the patient noticed a nasal obstruction, rhinorrhea and episodes of facial numbness. The CBCT showed the communication of the periapical lesion with maxillary sinus along with rhinosinusitis (Figure; Case 2, A-B). Pre-operative 2 g Amoxicilin was prescribed and teeth were extracted. The periapical lesion wasn't completely removed to avoid OAC. Attention was taken to assure coagulum formation and the post extraction sockets was sutured. An uneventful post-operatory healing was observed and patient described a fully improvement in rhinosinusitis symptoms. After 3 months a CBCT was performed to plan the bone grafting (Figure; Case 2, C-D) and the maxillary infection was successfully healed. Maxillary sinus lift was performed and after 7 months another CBCT was performed for planning implant placement (Figure; Case 2, E-F).

Case 3

A 69-years old female patient was indicated to PPDI due to evaluated the periodontal prognosis of the tooth 16. During clinical evaluation a periodontal pocket depth of 11 mm was detected in the palatal aspect of the tooth. The CBCT showed an endodontic-periodontal lesion in the tooth 16 that was communicated to maxillary sinus (Figure; Case 3, A-B). No symptoms of rhinosinusitis were described by the patient. Due to the poor prognosis for endodontic and periodontal treatment and also the financial cost, tooth extraction was the chosen alternative. After 6 months a second CBCT was performed to evaluate residual bone height as patient decided to replace the missed tooth with an implant. No infection was presented (Figure; Case 3, C-D) and maxillary sinus lift procedure was performed (Figure; Case 3, E-F). The dental implant was placed 8 months after the grafting procedure and a periapical was performed 3 months after implant insertion (Figure; Case 3, G).

Case 4

A 56-years-old male presented to PPDI pretending to perform dental implants due to absence of several teeth in the maxilla. A CBCT was requested for treatment planning. Clinical exam revealed extensive periodontal attachment loss in the second molar with furcation involvement. CBCT images showed the communication of the periodontal infection and maxillary sinus (Figure; Case 4, A-B). Due to the extension of periodontal disease and bone loss, tooth extraction was performed. The extraction procedure was carefully conducted aiming to remove the inflammatory tissue without creating an OAC (Figure; Case 4, C-D). Healing was uneventful. After 3 months another CBCT was performed for planning sinus lift procedure and maxillary sinus infection was resolved (Figure; Case 4, E-F). After 6 months of the sinus lift procedure the dental implants were placed (Figure; Case 4, G-I).

Cases 5 – 8

Patients 5, 6, 7 and 8 were indicated to the PPDI for tooth extraction and implant placement. After evaluation of CBCT, all of them presented a communication between maxillary sinus and an infection from dental origin (Figure; Cases 5-8, A-B). In all cases, the compromised tooth was extracted and after the healing period of 3 months the second CBCT was performed. As presented in the images, there was no more sinus infection (Figure; Cases 5-8, C-D) and after tooth extraction the cases became a regular situation in which the professional will decide between sinus floor elevation prior to or along with implant placement (Figure; Case 7, E-G) or even use of short implants (Figure; Case 8, E-F).

DISCUSSION

The etiology of rhinosinusitis may be the result of bacterial infections, fungus, environmental allergens, irritants, maxillary trauma, immune deficits or dental issues including inflammation, infection, or foreign bodies. Iatrogenic causes are consistently described in literature as an important etiology factor even when compared to infectious etiologies (7, 10).

The incidence of odontogenic rhinosinusitis seems to be increasing over the last decade (11) and it is most common among 30–50 year olds with a slight female predominance (7). Approximately 50% of patients will report previous dental surgery or infection, however only one-third will report associated dental pain (12). It is estimated that 10% of cases of chronic maxillary rhinosinusitis are odontogenic in origin (13, 14), and that up to 40% of all sinusitis cases may have an underlying dental pathology (15, 16).

The unique presentation is a diagnostic challenge due to variations in symptoms and clinical findings (8). Diagnostic challenges also stem from the use of periapical and panoramic radiographs alone for the evaluation, because these imaging modalities do not quantitatively estimate the amount of bone loss therefore do not consistently predict an oroantral communication (17, 18). Cone beam computed tomographic (CBCT) is often used by dentists and otolaryngologists to assess paranasal sinuses. The higher resolution and lower radiation doses represent the major advantages of CBCT in sinus diagnostics (19, 20).

The treatment of the dental pathology through endodontic treatment or tooth extraction is the first step as it appropriately targets the source of infection (21). During teeth extraction attention to OAC is important. OACs with a size less than 2 mm use to close spontaneously whereas those larger than 3 mm can progress to an oroantral fistula in the absence of treatment (22). Different techniques like Bichat fat pad graft, palatal and vestibular mucosal rotation flaps (22-25), alveolotomy of defect site (26), closure with biocompatible biomaterials (27), and autogenous bone graft (28) have been used to treat oroantral communication. Endoscopic sinus surgery may be required for patients who fail initial medical management and dental treatment (16).

The assessment of dental issues is the first step to proper treat teeth related maxillary rhinosinusitis. The initial endodontic treatment provides an excellent survival rate that reaches up to 97% (29). However the retreatment determines a significant reduction in success rates varying from 37 to 85% with a mean rate of 70% (29). Moreover the presence of periapical lesion determines a reduction in the success of endodontic treatment and tooth survival ≥10% (30). When choosing the dental treatment adequate option, the prognostic and cost of treatment are taking into consideration and the final decision will be the consensus of the professional and patient agreement. In the presented cases the compromised tooth extraction provided an improvement in rhinosinusitis in all cases. The outcome presented support the importance of managing dental issues as the first-line treatment.

CONCLUSION

In this way, it is possible to conclude the importance of the diagnosis of infectious lesions of odontogenic origin for the differential diagnosis of rhinosinusitis to determine the treatment appropriated for the resolution of this illness.

STATEMENT OF CONFLICTS OF INTEREST

The authors state no conflict of interest.

REFERENCES

1. Osguthorpe JD, Hadley JA. Rhinosinusitis. Current concepts in evaluation and management. The Medical clinics of North America. 1999;83(1):27-41, vii-viii.
2. Kretzschmar DP, Kretzschmar JL. Rhinosinusitis: review from a dental perspective. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2003;96(2):128-35.
3. Brook I. Sinusitis of odontogenic origin. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery. 2006;135(3):349-55.
4. Sicher H. The viscera of head and neck. Oral anatomy. St Louis (MO): CV Mosby; 1975. p. 418-24.
5. Kelley H, Kay LW. The maxillary sinus and its dental implications. Dental practice handbook. Bristol (UK): John Wright and Sons; 1975. p. 1-13.
6. Skillern R. Maxillary Sinus. The catarrhal and suppurative diseases of the accessory sinus of the nose. Philadelphia: JB Lippincott; 1947. p. 104-25.
7. Lechien JR, Filleul O, Costa de Araujo P, Hsieh JW, Chantrain G, Saussez S. Chronic maxillary rhinosinusitis of dental origin: a systematic review of 674 patient cases. International journal of otolaryngology. 2014;2014:465173.
8. Nair UP, Nair MK. Maxillary sinusitis of odontogenic origin: cone-beam volumetric computerized tomography-aided diagnosis. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2010;110(6):e53-7.
9. Bomeli SR, Branstetter BFt, Ferguson BJ. Frequency of a dental source for acute maxillary sinusitis. The Laryngoscope. 2009;119(3):580-4.
10. Lopatin AS, Sysolyatin SP, Sysolyatin PG, Melnikov

MN. Chronic maxillary sinusitis of dental origin: is external surgical approach mandatory? The Laryngoscope. 2002;112(6):1056-9.
11. Hoskison E, Daniel M, Rowson JE, Jones NS. Evidence of an increase in the incidence of odontogenic sinusitis over the last decade in the UK. The Journal of laryngology and otology. 2012;126(1):43-6.
12. Maillet M, Bowles WR, McClanahan SL, John MT, Ahmad M. Cone-beam computed tomography evaluation of maxillary sinusitis. Journal of endodontics. 2011;37(6):753-7.
13. Mehra P, Jeong D. Maxillary sinusitis of odontogenic origin. Current infectious disease reports. 2008;10(3):205-10.
14. Troeltzsch M, Pache C, Troeltzsch M, Kaeppler G, Ehrenfeld M, Otto S, et al. Etiology and clinical characteristics of symptomatic unilateral maxillary sinusitis: A review of 174 cases. Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery. 2015;43(8):1522-9.
15. Puglisi S, Privitera S, Maiolino L, Serra A, Garotta M, Blandino G, et al. Bacteriological findings and antimicrobial resistance in odontogenic and non-odontogenic chronic maxillary sinusitis. Journal of medical microbiology. 2011;60(Pt 9):1353-9.
16. Little RE, Long CM, Loehrl TA, Poetker DM. Odontogenic sinusitis: A review of the current literature. Laryngoscope investigative otolaryngology. 2018;3(2):110-4.
17. Gutteridge DL. The use of radiographic techniques in the diagnosis and management of periodontal diseases. Dento maxillo facial radiology. 1995;24(2):107-13.
18. Oberli K, Bornstein MM, von Arx T. Periapical surgery and the maxillary sinus: radiographic parameters for clinical outcome. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2007;103(6):848-53.
19. Suomalainen A, Kiljunen T, Kaser Y, Peltola J, Kortesniemi M. Dosimetry and image quality of four dental cone beam computed tomography scanners compared with multislice computed tomography scanners. Dento maxillo facial radiology. 2009;38(6):367-78.
20. Brullmann DD, Schmidtmann I, Hornstein S, Schulze RK. Correlation of cone beam computed tomography (CBCT) findings in the maxillary sinus with dental diagnoses: a retrospective cross-sectional study. Clinical oral investigations. 2012;16(4):1023-9.
21. Wang KL, Nichols BG, Poetker DM, Loehrl TA. Odontogenic sinusitis: a case series studying diagnosis and management. International forum of allergy & rhinology. 2015;5(7):597-601.
22. Abuabara A, Cortez AL, Passeri LA, de Moraes M, Moreira RW. Evaluation of different treatments for oroantral/oronasal communications: experience of 112 cases. International journal of oral and maxillofacial surgery. 2006;35(2):155-8.
23. Salins PC, Kishore SK. Anteriorly based palatal flap for closure of large oroantral fistula. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 1996;82(3):253-6.
24. Martin-Granizo R, Naval L, Costas A, Goizueta C, Rodriguez F, Monje F, et al. Use of buccal fat pad to repair intraoral defects: review of 30 cases. The British journal of oral & maxillofacial surgery. 1997;35(2):81-4.
25. Anavi Y, Gal G, Silfen R, Calderon S. Palatal rotation-advancement flap for delayed repair of oroantral fistula: a retrospective evaluation of 63 cases. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2003;96(5):527-34.
26. Hori M, Tanaka H, Matsumoto M, Matsunaga S. Application of the interseptal alveolotomy for closing the oroantral fistula. Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons. 1995;53(12):1392-6.
27. Thoma K, Pajarola GF, Gratz KW, Schmidlin PR. Bioabsorbable root analogue for closure of oroantral communications after tooth extraction: a prospective case-cohort study. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2006;101(5):558-64.
28. Haas R, Watzak G, Baron M, Tepper G, Mailath G, Watzek G. A preliminary study of monocortical bone grafts for oroantral fistula closure. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2003;96(3):263-6.
29. Farzaneh M, Abitbol S, Friedman S. Treatment outcome in endodontics: the Toronto study. Phases I and II: Orthograde retreatment. Journal of endodontics. 2004;30(9):627-33.
30. Sjogren U, Hagglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. Journal of endodontics. 1990;16(10):498-504.

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