Revista ARACÊ
ISSN: 2358-2472

RETREATMENT OF THE MAXILLARY SECOND PREMOLAR WITH 4 ROOT CANALS

https://doi.org/10.56238/arev7n4-122

Submitted on: 03/11/2025 **Publication date:** 04/11/2025

Rosana Maria Coelho Travassos[1], Gustavo Moreira de Almeida[2], Vanessa Lessa Cavalcanti de Araújo[3], Alexandre Batista Lopes do Nascimento[4], Josué Alves[5], Priscila Prosini[6], Verônica Maria de Sá Rodrigues[7], Kattyenne Kabbaz Asfora[8], Ronaldo de Carvalho Raimundo[9], Pedro Guimarães Sampaio Trajano Dos Santos[10], Izabella Christina Xavier Lins[11] and Emmanuel Brito Carvalho de Sá[12]

ABSTRACT

A 37-year-old male patient reported that he had gone to three dentists who were unable to solve the problem, and was then referred to the specialist. Clinically, the patient presented pain on vertical percussion and palpation. Radiographically, the presence of filling material

[1]University of Pernambuco, Brazil
ORCID: https://orcid.org/0000-0003-4148-1288
Email: rosana.travassos@upe.br
[2]ORCID: https://orcid.org/0000-0002-1404-099X
Research and Teaching Institute College
Email: drgustavoalmeida01@gmail.com
[3]ORCID: https://orcid.org/0000-0001-6356-1639
University of Pernambuco
Email: vanessa.lessa@upe.br
[4]ORCID: https://orcid 000-0001-5546-0424
University of Pernambuco
E-mail: Alexandre.nascimento1@upe.br
[5]ORCID: https://orcid.org/0000-0002-1825-2260
University of Pernambuco, Brazil
E-mail: Josue.alves@upe.br
[6]University of Pernambuco, Brazil
ORCID: https://orcid.org/0000-0002-7199-0414
Email: priscila.prosini@upe.br
[7]University of Pernambuco, Brazil
ORCID: https://orcid.org/0000-0001-9425-4068
Email: veronica.rodrigues@upe.br
[8]ORCID: https://orcid.org/0000-0002-7514-1444
University of Pernambuco, Brazil
Email: kattyenne.asfora@upe.br
[9]ORCID: https://orcid.org/0000-0003-3847-0609
University of Pernambuco
E-mail: ronaldo.carvalho@upe.br
[10]ORCID: https://orcid.org/0009-0001-5720-603X
Faculty of Dentistry of Recife
Email: pedroguimaraessampaio@gmail.com
[11]ORCID: https://orcid.org/ 0009-0004-3256-3067
University of Pernambuco, Brazil
Email: bellalinns2@gmail.com
[12]ORCID: https://orcid.org 0000-0003-2327-5296
Federal University of Pernambuco-Brazil
Email : emmanuel.de.sa@hotmail.com

Revista ARACÊ
ISSN: 2358-2472

and anatomy suggesting an extra canal was observed. The root canal was unfilled with the Prodesign S rotary system from Easy file #25.08, followed by radiographic odontometry. The foraminal patency was performed with 30#01 files and the root canal was reprepared with rotary instrumentation (Prodesign Logic 2 System: 30#05 file, determining an enlargement and modeling appropriate to the anatomy of the canal. and the obturation of the root canal system was performed using the 30#05 single cone technique, associated with Bio C Sealer cement. It is concluded that variations in the configuration of the root canal are a great challenge for the endodontist during endodontic procedures.

Keywords: Endodontics. Anatomy. Maxillary premolar. Root canal retreatment.

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Non-surgical endodontic retreatment is a procedure considered as the best alternative when there is a failure in the previous treatment, it consists of the execution of a new chemical preparation, reinstrumentation and refilling of the conduits in order to exceed the failure of the previous therapy. It is considered a more conservative procedure when compared to surgical endodontic retreatment and tooth extraction. In addition, possible cases of failure in endodontic treatments are the result of microbial or non-microbial factors. However, in order to obtain a good result from the treatment, it is necessary to correctly select the case, perform all operative steps, and even have an efficient coronary shielding. (Souza et al. 2024).

The causes of failure in endodontic treatment are varied and can be grouped into technical failures and microbial factors. Technical failures include inadequacy in root canal filling or inability to address all routes of infection, while microbial factors are related to the persistence of infections in the apical region of the root canal, which can result in a chronic inflammatory process (Vieira, 2022).

The basic objective of Endodontic Science is to provide patients with the prevention or elimination of contamination in the root canal system, lesions or diseases of the dental pulp. To perform any endodontic procedures, it is necessary to have the knowledge and training of a qualified professional who is able to work in this area (Barbosa et al., 2018).

Variations in the configuration of the root canal are a major challenge for the endodontist during endodontic procedures. This requires understanding the morphology of the canal before starting treatment. Endodontic treatment of the 1st mandibular premolar with a single canal is generally not difficult. However, when it has more than one root canal, its treatment becomes more complex. In the presence of two canals, the bifurcation can be located in the cervical, middle, and apical thirds. The difficulty of treatment increases as the bifurcation becomes more apical. For endodontic success, it is necessary that the entire root canal system be cleaned and shaped to receive an airtight filling. Mandibular second premolars have always been studied to have only a single canal at their root. (Marques Colombo et al. 2020). The success of endodontic treatment is related to the knowledge of the anatomy of the root canal system, especially with its possible complexities and variations. The presence of more than one root canal in mandibular premolars can be found in the literature as an uncommon variation. When present, careful care is needed in

Revista ARACÊ
ISSN: 2358-2472

identifying and locating these channels in order to minimize possible failures during treatment. (Veras et al. 2020).

OBJECTIVE

The objective of this article was to report a clinical case of endodontic retreatment of the maxillary premolar with four root canals.

CASE REPORT

A 37-year-old male patient reported that he had gone to three dentists who were unable to solve the problem, and was then referred to the specialist. Clinically, the patient presented pain on vertical percussion and palpation. Radiographically, the presence of filling material and anatomy suggesting an extra canal was observed, as well as the presence of bone radiotransparency in the palatal root. (Figure 1).

Figure 1 - Presence of filling material and anatomy suggesting an extra canal

The root canal was unfilled with the Prodesign S rotary system from Easy (Fig.2) file #25.08), activated by the X-Smart motor (Dentsplay) with small advances and indentation, and brushing against the walls of the root canal for better cleaning and removal of the filling material. There was no need to use any type of solvent in the de-buroution process. For every 2 mm of rotational file advancement, irrigation, aspiration and flooding with sodium

Revista ARACÊ
ISSN: 2358-2472

hypochlorite (NaOCl) at 2.5%. Irrigation was performed with a 5 ml Ultradent plastic syringe, with Navitip needles (Ultradent) demarcated with a stop cursor. Odontometry was performed with the Root ZX apical locator, determining the actual length of the tooth and was confirmed with radiography. (Figure 2).

Figure 2 - Radiographic odontometry determining the actual length of the tooth

Foraminal patency was performed with 30#01 files and canal preparation was performed with rotational instrumentation (Prodesign Logic 2 System: 30#05 file, determining an enlargement and modeling appropriate to the anatomy of the canal.

To remove the smear layer and the PUI (Passive Ultrasonic Irrigation) technique was performed with the Easy Clean used in the engine. The protocol of the PUI technique was followed, performing three activations for 20 seconds each with 2.5% Sodium Hypochlorite, three activations for 20 seconds with 17% Ethylenediamine Tetraacetic Acid (EDTA) and followed by three more activations for 20 seconds with 2.5% Sodium Hypochlorite.

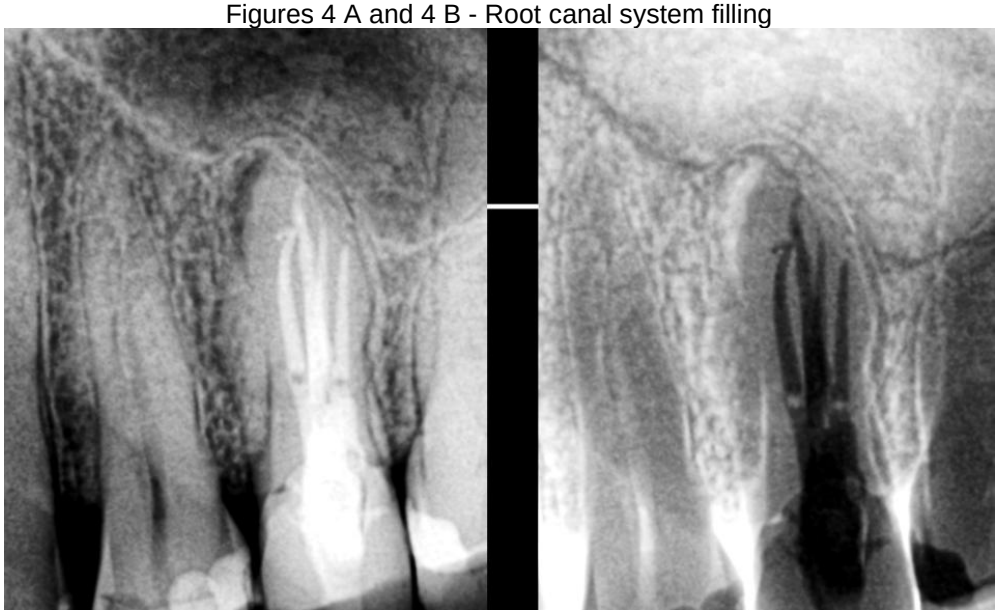
Clinical and radiographic proof of gutta-percha cones was confirmed with an X-ray. (Figures 3 A and 3 B).

Revista ARACÊ
ISSN: 2358-2472

Figures 3 A and 3 B - Clinical and radiographic evidence of gutta-percha cones

The root canal drying was performed with sterile 30#05 absorbent paper cones, and the root canal system was filled using the 30#05 single cone technique, associated with Bio C Sealer cement (Figures 4 A and 4 B). The patient was referred to the prosthodontist.

Figures 4 A and 4 B - Root canal system filling



Revista ARACÊ
ISSN: 2358-2472

DISCUSSION

In the context of endodontic retreatment, one of the critical aspects that can directly influence the success of the procedure is the amount of gutta percha and endodontic cement present in the root canals. Removing a substantial amount of this material is essential to facilitate subsequent thorough cleaning, precise reshaping, and proper filling of the canal. In a dynamic field like endodontics, where research and innovations continue to shape clinical practices, dedication to improving retreatment approaches is crucial to achieving the best outcomes for patients. The convergence of knowledge, technology, and clinical experience is the way to address the challenges inherent in endodontic retreatment and to continue to raise the standards of dental care. (Travassos et al. 2023). Therefore, in this study, rotary files were chosen to remove the gutta percha, reducing the work time, which favored endodontic therapy in a single session.

To obtain the effectiveness of an endodontic retreatment, it must be taken into account that the cleaning of the root canal needs to be performed through the combination of several endodontic instruments, in addition to an irrigating solution. There are several techniques and systems for endodontic retreatment, all of which have their advantages and disadvantages. The Easy ProDesign S® system has been shown to be a simple and safe technique for root canal unfilling, offering optimal surgical preparation capacity and root canal system cleaning with less preparation time. (Travassos et al. 2024).

It is extremely important for the clinical dentist to know the anatomy of the elements to be treated. Lack of knowledge results in erroneous diagnoses, errors in the location of canals, and incorrect or incomplete preparation and filling (Agwan; Sheikh, 2016). When a tooth has a greater number of canals than usual, it requires a correct diagnosis, careful evaluation of the X-ray, and morphological variations in the pulp anatomy should be observed before starting treatment (Ferreira, Moraes, Bernardineli, 2000). It is important to observe the floor of the pulp chamber during opening, as it may show traces of the existing types of root canals. If there is only one canal, it is in the center of the pulp chamber and is relatively easy to find. If a hole is found far from the center, there is a greater chance that there will be another on the opposite side. The farther away the entrances to the canals, the greater the chance that they are separated by their entire length (Martins, 2011).

Considering that the canals are not geometrically circular, different angles in the incidence of radiographs may help in the diagnosis of this type of situation, since a certain view may capture the narrower image of a canal, making it difficult to visualize, and another

Revista ARACÊ
ISSN: 2358-2472

different view may capture a wider face of the same channel, favoring its radiographic visualization. Different angles in the radiographic views may also favor a correct interpretation of the images in situations of overlapping of anatomical structures or overlapping of the root canals themselves. Another radiographic sign indicating the possibility of the existence of a second vestibular canal in a maxillary premolar is the eccentric deviation to distal or mesial of the orientation of the file used for radiographic calculation of the endodontic length of the vestibular root canal (Martins, 2011).

Due to the importance of correct identification and knowledge of the steps to be followed in the face of anatomical variations, it is important that cases that deviate from the standard be published. Cases such as a second premolar with four root canals belong to infrequent anatomical variations, and a different look is required from the dentist at the time of case resolution, as its level of difficulty increases.

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. Agwan, A. S., & Sheikh, Z. (2016). Identification and endodontic treatment of three canalled maxillary first premolar. Journal of Ayub Medical College Abbottabad, 28(3), 627–629.

2. Barbosa, H. A., Oliveira, N. R. N., Azevedo, K. C. M., Silva, G. R., Quirino, L. C., & Oliveira, M. A. V. C. (2018). Retratamento endodôntico de dentes com lesão cística e perfuração radicular: Relato de caso clínico. Dental Press Endodontics, 8(3), 61–66. https://doi.org/10.14436/2358-2545.8.3.061-066.oar

3. Ferreira, C., Moraes, I., & Bernardineli, N. (2000). Three-rooted maxillary second premolar. Journal of Endodontics, 26(2), 105–106. https://doi.org/10.1097/00004770-200002000-00011

4. Marques Colombo, B., & Prescinotti, R. (2020). Tratamento endodôntico em pré-molar inferior com dois condutos e bifurcação no terço apical – Caso clínico. Revista Odontologia UNESP, 49(N Especial), 11. https://doi.org/10.1590/1807-2577.01120

5. Martins, J. N. R. (2011). Primeiro pré-molar superior com três canais: Diagnóstico e tratamento – Quatro casos clínicos. Revista Portuguesa de Estomatologia, Medicina Dentária e Cirurgia Maxilofacial, 52(1), 43–51. https://doi.org/10.1016/S1646-2890(11)70008-7

6. Souza, A. K. N., Silva, E. M. V., & Batista, B. A. (2024). Retratamento endodôntico não cirúrgico em dentes anteriores. Research, Society and Development, 13(7), e013713742. https://doi.org/10.33448/rsd-v13i7.3742

7. Travassos, R. N. C., & others. (2023). Retratamento endodôntico com Prodesign Logic RT. Brazilian Journal of Implantology and Health Sciences, 5(4), 2393–2408. https://doi.org/10.36557/2674-8169.2023v5n4p2393-2408

8. Travassos, R. N. C., & others. (2024). Retratamento endodôntico com finalidade protética – Relato de caso. Revista FT, 28(137), 1–8.

9. Veras, T. M. M., & others. (2020). Tratamento endodôntico em pré-molares com complexidade anatômica: Relato de dois casos clínicos. Brazilian Journal of Surgical and Clinical Research, 30(1), 16–21.

10. Vieira, A. L. (2022). Percepção dos graduandos em odontologia da Unisul sobre as dificuldades relacionadas ao tratamento endodôntico [Bachelor's thesis, Universidade do Sul de Santa Catarina]. Repositorio Unisul.