BRAZILIAN JOURNAL OF IMPLANTOLOGY AND HEALTH SCIENCES

ISSN 2674-8169

Multiple residual roots extractions and etiopathogenesis of associated periapical lesion: a surgical case report

Oliver Renê Viana de Jesus[1]; Rebecca Lineker da Silva Alves[2]; Allana Vieira Cardoso[3]; Juliana Maria Fernandes Santos[4]; Gliciane Santana da Silva[5]; Maria Thysbe Lima de Figueiredo[6]; Letícia de Andrade Oliveira [7]; Emanuele Souza Monteiro[8]; Cecília Bezerra de Meneses Corbal Guerra[9]

CASE REPORT

ABSTRACT

Before any surgical intervention in dentistry, it is necessary to plan each case correctly, to induce a positive prognosis for patients, always enabling the functionality of the stomatognathic system. Men tend to have more teeth extracted than women, with more posterior teeth extracted in patients in more advanced age groups due to periodontal disease. The case presented leads to a discussion of the periapical lesions removed surgically. The etiology and study of the evolutionary process of pulp pathology and the supporting tissues of the dental element are substantial. The endo-periodontal interrelationship is unique and can be considered a single continuous system or biological unit with multiple forms of communication. In summary, this article seeks to highlight and report a surgical case of a patient diagnosed with periapical lesions associated with residual tooth roots, which were removed during the common exodontia protocol with the aim of total rehabilitation of the patient. The patient authorized all the images and information used in this study.

Keywords: Apical Diseases; Tooth Diseases; Periapical Tissue; Oral Surgery.

Múltiples extracciones de raíces residuales y etiopatogenia de la lesión periapical asociada: reporte de un caso quirúrgico

RESUMEN

Antes de cualquier intervención quirúrgica en odontología, es necesario planificar correctamente cada caso, para inducir un pronóstico positivo en los pacientes, posibilitando siempre la funcionalidad del sistema estomatognático. Los hombres tienden a extraer más dientes que las mujeres, y se extraen más dientes posteriores en pacientes de grupos de edad más avanzados debido a enfermedad periodontal. El caso presentado induce una discusión sobre las lesiones periapicales extirpadas quirúrgicamente. La etiología y el estudio del proceso evolutivo de la patología pulpar y de los tejidos de soporte del elemento dentario son sustanciales. La interrelación endoperiodontal es única y puede considerarse un único sistema continuo o unidad biológica con múltiples formas de comunicación. En resumen, este artículo busca resaltar y reportar un caso quirúrgico de un paciente con diagnóstico de lesiones periapicales asociadas a raíces dentarias residuales, las cuales fueron extirpadas durante el protocolo de exodoncia común con el objetivo de la rehabilitación total del paciente. El paciente autorizó todas las imágenes e información utilizadas en este estudio.

Palabras-clave: Enfermedades Periapicales; Enfermedades Dentales; Tejido Periapical; Cirugía Bucal.

Dados da publicação: Artigo recebido em 20 de Março e publicado em 10 de Maio de 2024.

DOI: https://doi.org/10.36557/2674-8169.2024v6n5p794-803

Autor correspondente*: Oliver Renê Viana de Jesus.* *vianawork@hotmail.com*

INTRODUCTION

Before any surgical intervention in dentistry, it is necessary to plan each case correctly, to induce a positive prognosis for patients, always enabling the functionality of the stomatognathic system. Mckenzie (2020) states that a complete history of the individual and a thorough physical examination must be completed before any surgical procedure. The examination process also includes radiographs and other diagnostic imaging tests of the teeth to ensure the removal necessity and assess possible complications.

The diagnosis of periodontal disorder depends mainly on clinical signs and symptoms. However, radiographic images are often included in the diagnostic workflow to provide the clinician with further knowledge. In dental practice, two-dimensional (2D) periapical and panoramic radiographs are used routinely for assessing the bone levels around the roots and the overall status of the periodontal support tissues (Johannsen et al., 2023).

Machado *et al.,* (2021) concluded that oral pathologies are of different etiologies and causes, however, there is a propensity for certain areas such as Periodontics and Endodontics, which leads to a discussion in dentistry about the severity of endodontic and periodontal pathologies that impair the prognosis of the dental element, leading to the questioning of tooth extraction, which when correlated to work written, became the most viable option for the patient of the clinical case and its specificities (case report proscribed later).

Cardoso (2021) exhibits and reports that men tend to have more teeth extracted than women, with more extractions of posterior teeth occurring in patients in more advanced age groups (the elderly) due to periodontal disease. The case presented leads to a discussion of the periapical lesions seen on imaging (panoramic radiography) and removed surgically. However, the etiology and study of the evolutionary process of pulp pathology and the supporting tissues of the dental element are substantial.

Zaharescu *et al.* (2019) declare that the endo-periodontal interrelationship is unique and can be considered a single continuous system or biological unit with multiple forms of communication. The interdependence of these structures influences each

other's health, function and disease, they can also be affected individually or in combination; when both systems are involved, the lesions are called endo-periodontal syndromes (Zaharescu *et al.*, 2019).

In summary, this article aims to underline and report a surgical case of a patient diagnosed with periapical lesions associated with residual tooth roots, which were removed during the common exodontia protocol with the aim of total rehabilitation of the patient. All the images and information used in this study were authorized by the patient.

CASE REPORT

A 30-year-old male leucoderma patient, with no systemic problems or other pathological processes that could limit his care, was admitted to the dental clinic of the Supervised Internship at the University Center of Maurício de Nassau, Sergipe, Brazil, on September 22, 2023, reporting the presence of 'soft' teeth that did not allow him to eat properly or perform his routine normally. During the assessment and consulting process, the patient's file was taken and initial physical examinations were carried out, such as observing the patient's blood pressure and performing an extra-oral physical examination.

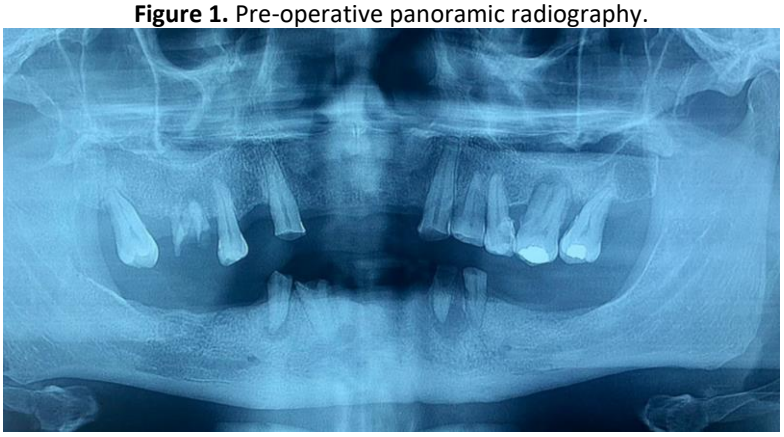
After the intra-oral check, periodontal probing, and stomatological analysis of the oral cavity, it was possible to verify the absence of all the mandibular teeth, except for the presence of the residual roots of dental elements 33, 34, 43 and 44, respectively. At first, it was suggested that the excessive tooth loss was caused by the evolution of caries disease in association with periodontal pathology, given the history portrayed by the patient together with the clinical aspect (amalgam restorations present and caries lesion in the upper unit, respectively).

Adjustment of the oral environment was assumed at the first appointment, along with the request for a panoramic radiograph for surgical planning of the extraction of root remnants and other teeth that would not enable prosthetic rehabilitation. On the patient's return, the panoramic image **(figure 1)** showed that 03 of the 04 lower residual roots were associated with periapical lesions with a unilocular radiolucent radiographic appearance, which meant that they needed to be removed and curettage during the

surgical stage.

After a general check of the planning, multiple extractions of the residual roots of elements 33, 34, 43 and 44 were initiated. The anesthetic technique of choice was locoregional infiltration of the mental nerve bilaterally with 2% lidocaine + 1:100,000 epinephrine and supplementary anesthesia during the surgery with articaine, when necessary, without exceeding the anesthetic dosage limit according to the patient's weight.

Figure 1. Pre-operative panoramic radiography.



Source: authors, 2023.

After mucoperiosteal detachment and preparation of the envelope flap, luxation of the dental units was started with the elevators and forceps 65 and 69. All lesions were removed **(figure 2**) and the internal area of the alveolar bone was duly irrigated and curetted.

Figure 2. Appearance of the removed surgical components.

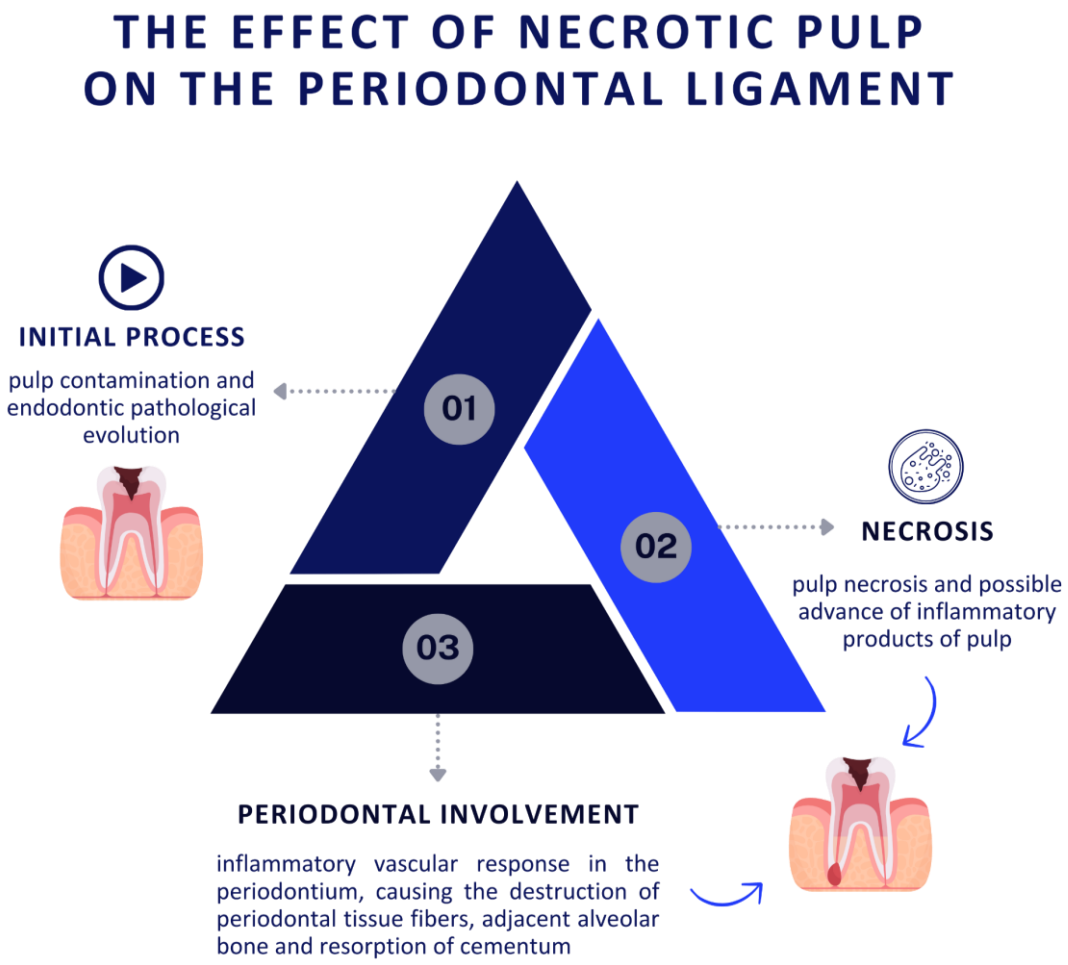
Source: authors, 2023.

During extraction, units 34 and 44 showed resistance to the conventional dislocation and luxation process, requiring an osteotomy to be made, which was executed. Furthermore, isolated and continuous sutures were made to homogenize the healing process and post-operative medication was prescripted.

DISCUSSION

After the pulp contamination and endodontic pathological processes **(figure 3)**, the pulp becomes necrotic and the inflammatory products of pulp origin can extend, triggering an inflammatory vascular response in the periodontium, causing the destruction of periodontal tissue fibers, adjacent alveolar bone and resorption of cementum (Alotaibi *et al*., 2020). The nature and extent of periodontal destruction depends on several factors, such as the virulence of the microorganisms, the duration of the disease and the host's defense mechanism (Shenoy, 2010).

Figure 3. Infographic demonstrating the effect of pulp necrosis on the periodontium.



Source: authors, 2023.

Both endodontic and periodontal lesions are polymicrobial anaerobic infections. Dakó *et al.,* (2020) affirm that combined endo-perio lesions are caused by simultaneous

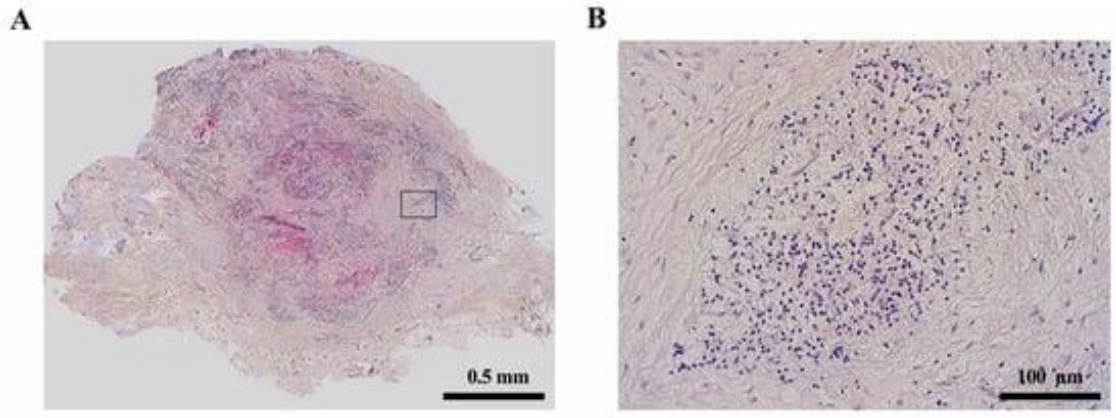
inflammation to varying degrees of the endodontic system and the periodontium. It is understood that the predominantly bacterial etiology, as well as other factors such as dental malformations, history of trauma, iatrogenic perforations and external or internal root resorption, play a role in the progression of these lesions. The presence of active caries, furcation involvement, anatomical grooves and porcelain crowns fused to metal are also considered risk factors (Dakó *et al.,*2020).

It was observed in the case presented that more than one element was associated with periapical lesions, and it can be assumed that the chronic progression of such lesions was also part of the main causes of tooth loss in the patient in question, since endo-periodontal problems, according to Zaharescu *et al.* (2019), are responsible for more than 50% of dental mortality. Finally, despite the pathogenesis ranging from fairly simple to relatively complex, Khandelwal *et al.,* (2020) state that knowing these pathological processes is essential for obtaining the correct diagnosis, allowing the construction of an appropriate treatment plan.

Some studies cannot just identify other ways to diagnose periapical lesions, but explain how de MRI (Magnetic Resonance Imaging) can be useful in this process. Studies performed by Johannsen et al., (2023) indicate that the use of MRI in the diagnosis of periodontal and periapical disease is feasible and promising, the authors also highlight that more studies are needed to define the accuracy of this non-ionizing-radiation-based diagnostic modality, in the assessment of periodontal and/or periapical lesions.

Endodontology is concerned with the study of the form, function and health of, injuries to and diseases of the dental pulp and periradicular region, their prevention and treatment (Duncan et al., 2023). Periapical lesions are considered an immunological defense response of the host to prevent the spread of bacterial infections from the root canal to the surrounding tissues; most typically, they present as apical granulomas represented in **Figure 4** (Galler et al., 2021). Most immune cells in periapical lesions are lymphocytes and macrophages (Galler et al., 2021). Microbial components such as lipopolysaccharides communicate with antigen-presenting cells (APC) like macrophages in the periapical tissue and induce the production of pro- or anti-inflammatory cytokines. It is demonstrated that proinflammatory cytokines like IL-1 and IL-6 can act as growth factors for ERM cells and may therefore stimulate radicular cyst formation (Galler et al., 2021).

Figure 4. Apical granuloma developed after pulp necrosis. (A) H&E staining of granulation tissue with (B) inflammatory cell infiltrates.



Source: Galler et al. (2021).

Studies executed by Galler et al., (2021) reveal the development of apical periodontitis and discuss that increased inflammatory activity may promote the formation of radicular cysts and increased bone resorption. Therefore, root-filling materials with anti-inflammatory properties like mineral trioxide aggregate (MTA) may counteract the development of radicular cysts and should be analyzed further in preclinical studies (Galler et al., 2021). Likewise, Singh et al., (2020) claim that every dentist should have proper knowledge of every disease related to pulp and periodontal tissue established on which a correct diagnosis can be constructed based on this diagnosis proper treatment strategy can be made and implemented for the well-being of patients.

FINAL CONSIDERATIONS

Maintaining research aimed at understanding the periodontium in contact with pulp necrosis bacteria can help in the future with new approaches and conditions of prevention. The studies inspected suggest that endo-perio injuries can be caused by several factors and the authors affirm that this pathology is one of the causes of tooth loss. The main etiological factors of the periapical lesion discussed in the case report are live agents (bacteria, fungi and viruses) and inert pathogens, trauma is one of the causes more commonly found in each article analyzed during the research protocol. It is accepted that immunologic pathways contribute to the formation of radicular cysts in

periapical lesions. However, the host defense processes in apical periodontitis are still a matter of research.

REFERENCES

ALOTAIBI, Ohoud et al. Evaluation of concordance between clinical and histopathological diagnoses in periapical lesions of endodontic origin. **Journal of Dental Sciences**, v. 15, n. 2, p. 132-135, 2020.

CARDOSO, Franscielle Lopes. PERFIL DE PACIENTES SUBMETIDOS A EXTRAÇÕES DENTÁRIAS NO UNIFACIG. **Repositório de Trabalhos de Conclusão de Curso**, 2021.

DAKÓ, Timea et al. Endo-perio lesions: Diagnosis and interdisciplinary treatment options. **Acta Stomatologica Marisiensis Journal**, v. 3, n. 1, p. 257-261, 2020.

DUNCAN, Henry F. et al. Treatment of pulpal and apical disease: the European Society of Endodontology (ESE) S3-level clinical practice guideline. **International endodontic journal**, v. 56, p. 238-295, 2023.

GALLER, Kerstin M. et al. Inflammatory response mechanisms of the dentine–pulp complex and the periapical tissues. **International journal of molecular sciences**, v. 22, n. 3, p. 1480, 2021

JOHANNSEN, Katrine Mølgaard et al. Magnetic resonance imaging in the diagnosis of periodontal and periapical disease. **Dentomaxillofacial Radiology**, v. 52, n. 7, p. 20230184, 2023.

KHANDELWAL, Ankita et al. Knowledge, attitude and perception on endo-perio lesions in practicing dentists-A qualitative research study. **Journal of Advanced Medical and Dental Sciences Research**, v. 8, n. 11, p. 31-34, 2020.

MACHADO, Tamires Gomes de Oliveira et al. COMPROMETIMENTO ENDODÔNTICO E/OU PERIODONTAL. QUANDO INDICAR A EXODONTIA?. **Revista Odontólogica Integrativa do Centro Oeste**, v. 1, n. 1, p. 87-102, 2021.

MCKENZIE, William Stuart. Principles of exodontia. **Oral and Maxillofacial Surgery Clinics**, v. 32, n. 4, p. 511-517, 2020.

SHENOY, Nina; SHENOY, Arvind. Endo-perio lesions: Diagnosis and clinical considerations. **Indian Journal of Dental Research**, v. 21, n. 4, p. 579-585, 2010.

SINGH, Geetanjali et al. Disease of Pulp and Periradicular Tissue: An Overview. **Journal of Current Medical Research and Opinion**, v. 3, n. 10, 2020.

ZAHARESCU, Anamaria et al. ETIOPATHOGENIC MOLECULAR MECHANISMS IN THE DEVELOPMENT OF ENDO-PERIODONTAL LESIONS. **Romanian Journal of Medical and Dental Education**, v. 8, n. 4, 2019.