

Sealing of root perforation associated with connective tissue graft in aesthetic area: Case report

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ABSTRACT

Introduction: Root perforation is the communication between the walls of the root canal and the periodontal space. The time, location and size of the perforation are factors that affect the prognosis of the tooth. **Objective:** To report a clinical case of treatment of supraosseous root perforation associated with grafting of connective tissue in aesthetic area. **Case report:** Patient reported that 3 months had started root canal treatment of tooth 22, but was not finalized. At the clinical examination, the tooth presented absence of pain and presence of sinus tract in the region of attached gingiva. Radiographic and tomographic images revealed an image suggestive of root perforation in the buccal region of tooth 22, as well as a hypodense / radiolucent area circumscribed to the root apex, leading to the diagnosis of asymptom-

atic apical periodontitis associated with supraosseous root perforation. Initially, it were performed root canal preparation and intracanal medication. After 21 days, root canal obturation and composite restoration were performed on the palatal face. In the same session, the surgical access was made to sealing the perforation with composite resin, associated to the grafting of connective tissue in tooth 22, to avoid marginal tissue recession. It was observed after 12 months new bone formation in the periapical region of tooth 22, with absence of pain and preservation of aesthetics in the periodontal region. **Conclusion:** Multidisciplinary diagnosis and planning are important factors in the treatment of root perforations, as well as the correct selection of materials used to seal root perforations.

Keywords: Endodontics. Iatrogenic Disease. Graft Survival.

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Introduction

Root perforation can be defined as a communication between the root canal system and the outer surface of the tooth.¹ This problem can be caused by a pathological process (dental caries, root resorption) or an iatrogenic procedures.^{2,3}

Different clinical conditions may hamper access to the root canal and predispose to root perforations, such as: presence of pulp stones, calcification, resorption, dental malposition, internal anatomy complexity and presence of intracanal posts.⁴

According to Estrela et al. (2017), the basis for achieving high success rates in root canal treatment is a correct diagnosis.⁵ In root perforation this is not different, intracanal bleeding is common during the initial phase of root canal treatment of teeth with pulp vitality, but after pulpectomy the bleeding is contained, which differs from the cases of root perforations.³ The identification of bleeding can be performed directly by inspection of the pulp cavity, and the magnification of the operative field is an important resource to optimize the diagnosis.⁶

Described since 1996 in literature, another important resource for the diagnoses in root perforations is the use of electronic foramen locators.⁷ Because of the technological ability to identify the region of the periodontal ligament, readings significantly lower than the working length may indicate root perforations.⁸ In addition, Cone-beam computed tomography (CBCT) is an important resource for evaluating the diagnosis and prognosis of this clinical condition.⁹

The most commonly used classification in the literature is based on the factors that may affect the treatment outcome: time, location and size.² In relation to time, root perforation may be recent (treated immediately after occurrence - aseptic conditions) or old (not treated at the time of its occurrence - non-aseptic conditions).² In addition, it can be classified considering the location: In the apical third of the root, above or below the level of the alveolar bone crest.² Finally, the size of the root perforation can be small (less than 0.20 mm) or large (greater than 0.20 mm).²

The consequences of root perforation may result in an inflammatory response in the periodontal region, in addition to causing destruction of the alveo-

lar bone and, if undiagnosed and treated, may lead to tooth loss.³ In this way, the aim of this work is to report a clinical case of treatment of supraosseous root perforation associated with grafting of connective tissue in aesthetic area.

Case report

Patient reported that 3 months had started root canal treatment of tooth 22, but was not finalized. At the clinical examination, the tooth presented absence of pain, presence of supposed sinus tract in the region of attached gingiva and temporary restoration (Fig 1). Radiographic and tomographic images revealed an image suggestive of root perforation in the buccal region of tooth 22, as well as a hypodense / radiolucent area circumscribed to the root apex, leading to the diagnosis of asymptomatic apical periodontitis associated with supraosseous root perforation (Fig 2).

Supraperiosteal anesthesia was performed on tooth 22, removal of temporary restoration and isolation with rubber dam. Then, using an operating microscope, the size of perforation was evaluated in the buccal area (Fig 3A and B) and, subsequently, was performed a temporary restoration of perforation with glass ionomer cement. The disinfection process of root canal was performed with 2.5% sodium hypochlorite irrigation, root canal preparation with K-File #70 and a calcium hydroxide associated with saline solution as intracanal medication for 21 days.

After 21 days, root canal obturation was performed by the lateral condensation technique using Sealapex (Sealapex®, SybronEndo Corporation, Orange, CA, USA) (Fig 3C) and final restoration in composite resin Z350XT (3M ESPE®, Saint Paul, Minnesota, USA) (Fig 3D).

In the same session, surgical access was performed with intrasulcular incision, delicate soft tissue divulsion, and removal of restorative glass ionomer cement from the root perforation region (Fig 4). Due to the fact that the perforation is above the bone level, it was decided to seal with adhesive system (SingleBond Universal 3M ESPE®, Saint Paul, Minnesota, USA) and composite resin Z350XT (3M ESPE®, Saint Paul, Minnesota, USA) with dental polishing rubber (Fig 5).



Figure 1. Initial clinical aspect of the tooth region 22 - **A)** Front view of the smile; **B)** Front view of the tooth 22; **C)** Occlusal view of the tooth 22.

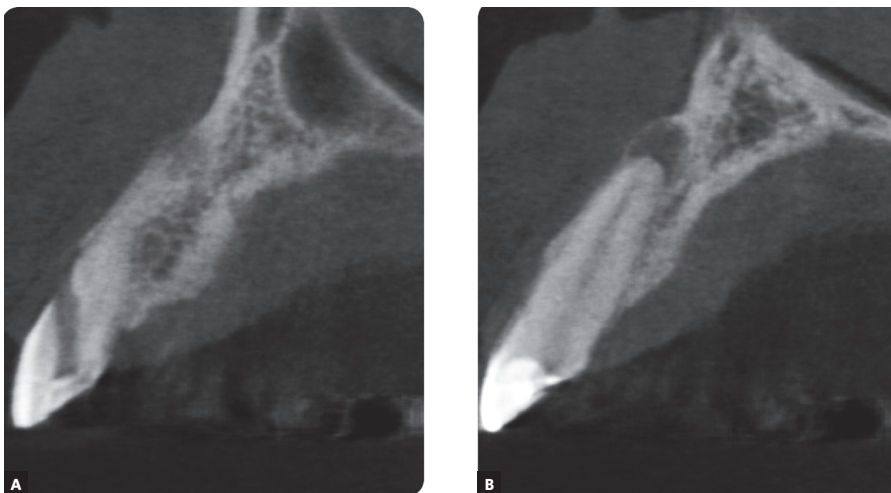


Figure 2. Longitudinal sections of Cone Beam Computed Tomography of tooth 22 - **A)** Root perforation; **B)** Hypodensity in the periapical region.

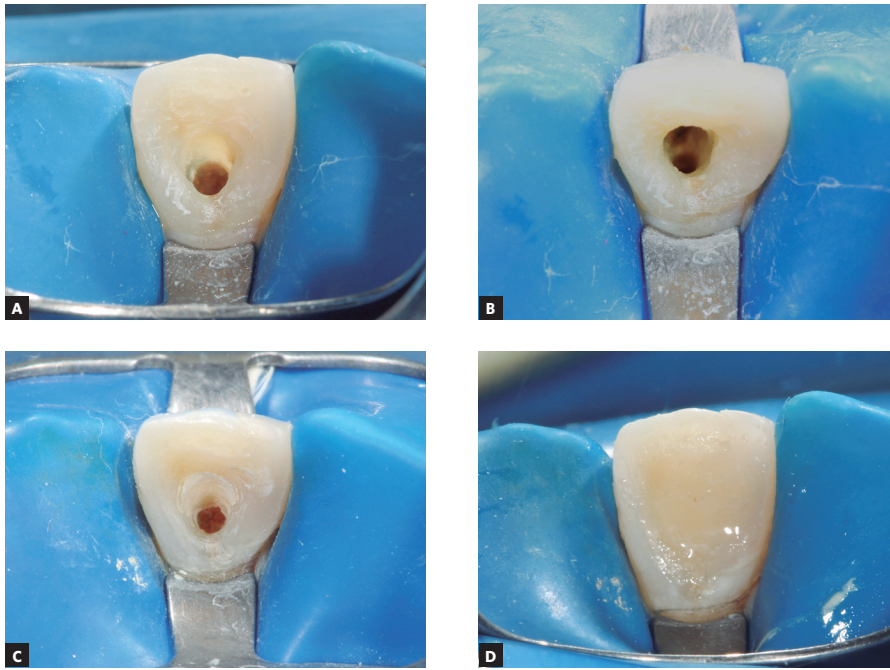


Figure 3. Perforation in the buccal area of the tooth root 22. **A)** and **B)** Evaluation of the location and size of the perforation. **C)** Root canal filling. **D)** Final restoration.

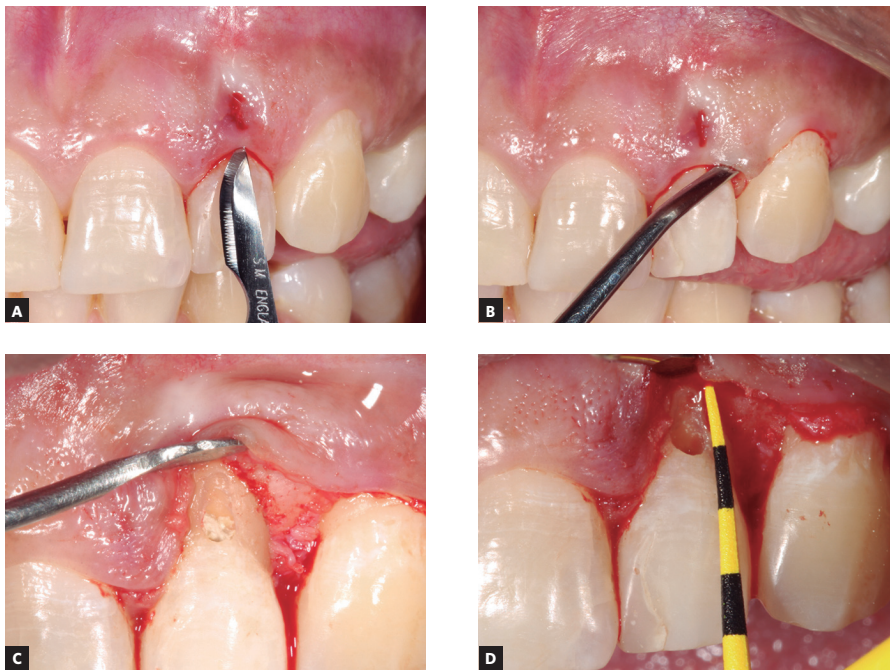


Figure 4. Surgical access for evaluation of the size perforation - **A)** and **B)** Soft tissue divulsion; **C)** Exposure of perforation and removal of temporary restorative material; **D)** Periodontal analysis of size perforation.

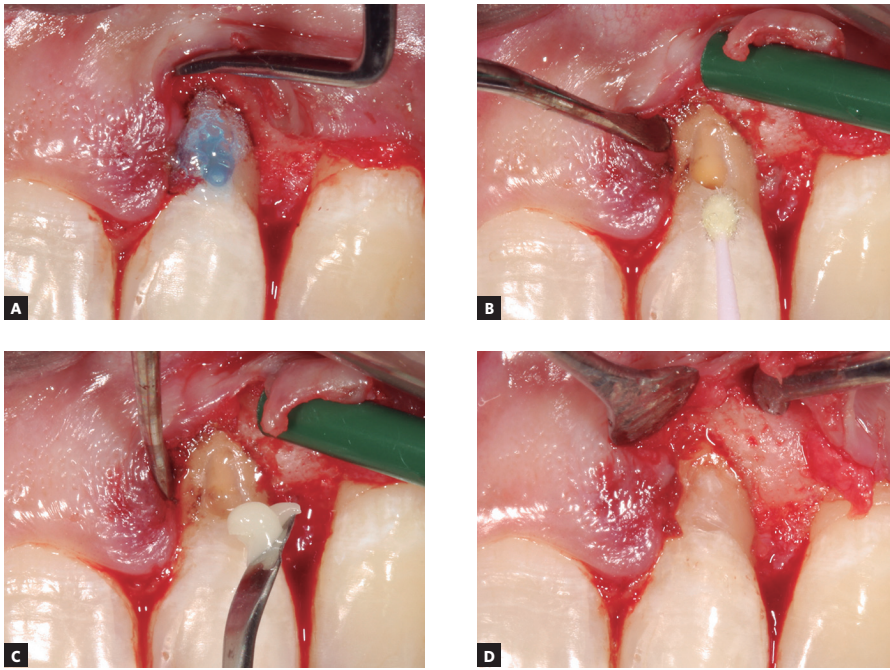


Figure 5. Sealing of supraosseous perforation with adhesive system and composite resin - **A)** Application of phosphoric acid 37%. **B)** Application of adhesive system, with the aid of a microapplicator. **C)** Restoration in composite resin. **D)** Final polishing.

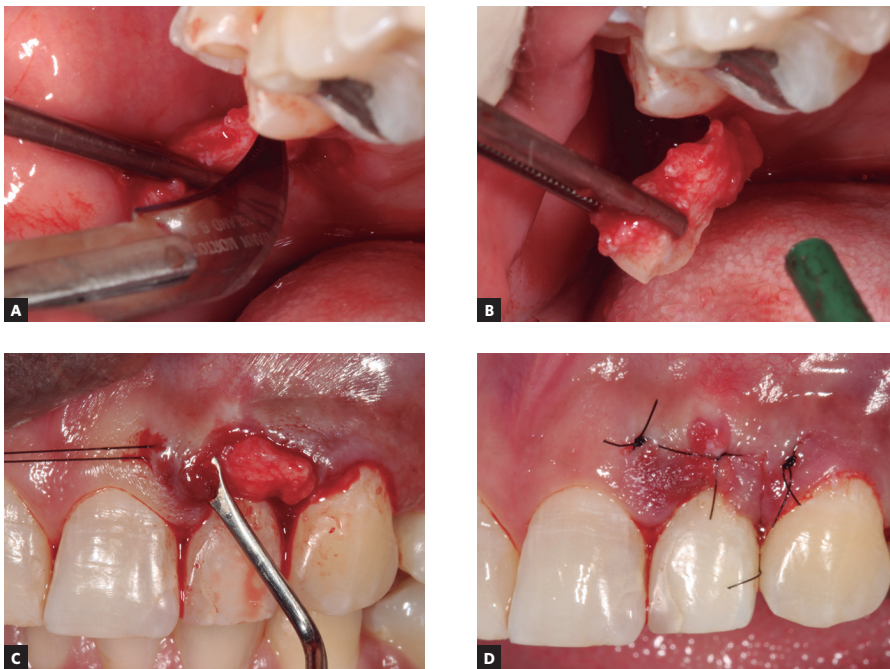


Figure 6. Connective tissue grafting in the marginal gingival region of the tooth 22. **A)** and **B)** Obtaining the connective tissue graft of the maxillary tuberosity region. **C)** and **D)** Suture of the graft in the periodontal region of the tooth 22.

In order to avoid future marginal tissue recession in the tooth 22 was chosen to perform a connective tissue graft with donor area from the maxillary tuberosity region and the flap was repositioned and sutured (Fig 6).

After 1-year follow-up, tomographic and radio-

graphic imaging bone neoformation in the periapical region of tooth 22, associated with preserved vestibular alveolar bone crest (Fig 7). Clinically, tooth 22 presented a function, with absence of painful symptomatology and preservation of aesthetics in the periodontal region (Fig 8).

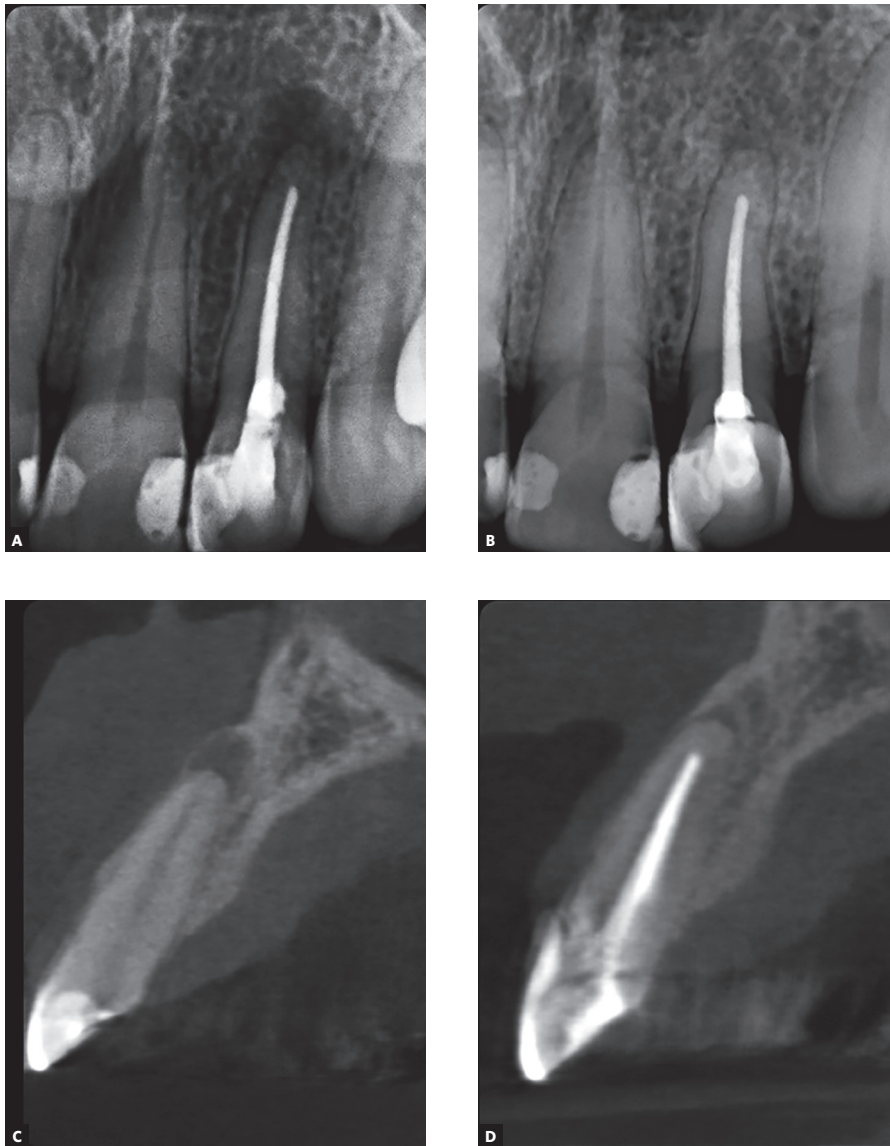


Figure 7. Image exams presenting bone neof ormation in the periapical region of the tooth 22. **A** and **B**) Initial and final radiographic images. **C** and **D**) Initial and final tomographic images in longitudinal section.



Figure 8. Clinical aspect of tooth 22 in function with preservation of aesthetics in the periodontal region.

Discussion

Among the main factors necessary to achieve success in root canal treatment, we can highlight the knowledge of the root canal anatomy associated to the technical-scientific domain of therapeutic protocols (psychomotor ability).¹⁰

In a retrospective study conducted by Tsesis et al (2010), in a total of 5048 endodontically treated teeth evaluated radiographically, 116 root perforations (2.3%) were identified.⁶ Knowing this, the correct interpretation of information collected before treatment and appropriate treatment planning are important parts of any endodontic intervention, preventing possible complications and ethical-legal claims.¹¹

In the present case, CBCT was essential for the correct diagnosis and planning of root canal treatment. Several studies have shown a greater sensitivity of CBCT in the detection of root perforations and emphasize that because it is a complex diagnosis, dynamic navigation in imaging is important to avoid diagnosis mistakes.^{9,12}

During treatment planning, three clinical factors are essential to determine the prognosis of the case: time, location and size of root perforation³. According to Fuss & Trope (1996), perforations located apical to the critical zone, involving the level of the crestal bone and the epithelial attachment, are likely to have a good prognosis when the root canal is accessible and the treatment is appropriate.² In the present case, root perforation was located above the level of the alveolar bone crest in the buccal region of tooth 22, which is considered an unfavorable clinical factor.

The success of the treatment is also influenced by the preoperative dental pulp status, associated with the presence or absence of periapical lesion¹³. In this way, because it is a tooth with asymptomatic

apical periodontitis, with extensive periapical radiolucency / hypodensity, the prognosis of the tooth was also considered unfavorable before the process of previous infection of the root canal.

The material of choice for sealing root perforations is the MTA.^{3,14} The tooth discoloration in treatments with MTA and even gingival margin has been the subject of numerous studies.¹⁵⁻¹⁷

In esthetic areas, the use of MTA should be carefully employed because of the possibility of tooth discoloration³ and, consequently, changes in smile. In the present case, because it is a perforation above the level of the alveolar bone crest, the material for sealing does not come into direct contact with the alveolar crest, in this way, the composite resin was chosen due to its biomechanical properties and sealing capacity.

An important clinical characteristic in the evaluation of perforation cases is gingival tissue thickness, since a better prognosis occurs in patients with thick gingival tissues.¹⁸ Due to the extension and damage to periodontal tissue after perforation, it was decided to perform a connective tissue graft in the area of tooth 22 to increase the thickness of gingival tissue.

In a systematic review, it was observed that the soft tissue graft root coverage is a procedure that promotes a significant reduction of the marginal tissue recession with excellent clinical results.¹⁹ Thus, in the present study it was possible to avoid apical migration of the epithelium and, consequently, a disadvantage of the harmony of the gingival zeniths of the smile.

Conclusion

Multidisciplinary diagnosis and planning are important factors in the treatment of root perforations, as well as the correct selection of materials used to seal root perforations.

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