



Surgical Treatment of Endo-periodontal Lesion – A Case Report

Dobromira Shopova*

Department of Prosthetic Dentistry, Faculty of Dental Medicine, Medical University, Plovdiv, Bulgaria

Abstract

BACKGROUND: Periapical lesions are a pathological changes that occur in most of poorly endodontically treated teeth. Endodontic and periodontal diseases are caused by a mixed anaerobic infection. Periodontal disease produces lesions in the tooth-supporting tissues. Generalized periodontitis comprises hard and soft tissue at the whole dentition. Surgical methods of treatment include etiological and pathogenetic methods – removal of pathological tissue, destruction of the bacterial causative agent, and recovery of lost tissue. Recognition and management of risk factors (local and general) increase the chances of a successful treatment outcome. The combined surgical protocol presented in this article is the last step before extraction. Especially in the frontal area, dentist should try to keep the esthetics, maintaining the tooth and the surrounding bone.

CASE REPORT: The presented patient is a 59-year-old lady with generalized periodontal disease and periodontitis apicalis chronica dentis 21. Bone graft covered by soft-tissue graft was used to fill the defects around the apex and surrounding the teeth. After 5 months, the apical lesion was in very good condition according to radiological and clinical examination. The periodontal lesion was almost at the same vertical condition as the initial situation, but this surgery method aims to make bone thicker for support of the mucosa. The risk factors were smoking, average level of oral hygiene, and osteoporosis.

CONCLUSION: The combination of different clinical protocols is a necessity in surgical practice. Knowledge of the etiology and pathogenesis of the disease allows the application of adequate methods of treatment. The result was satisfactory.

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*Correspondence: Dobromira Shopova, Department of Prosthetic Dentistry, Faculty of Dental Medicine, Medical University, Plovdiv, Bulgaria.

E-mail: dobromira.karatsanova@mu-plovdiv.bg

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Introduction

Periapical lesion is a pathological process soft and hard tissue surrounding the apical part of the tooth. It can occur in non-treated teeth with necrotic pulp and in some cases of poor endodontically treated teeth. Endodontic and periodontal diseases are caused by a mixed anaerobic infection that has entered the course of the infected canal or through deep periodontal pockets [1], [2]. Risk factors for periodontal disease can be smoking, diabetes, genetic predisposition, and osteoporosis associated with menopause in women and others [3].

In a scientific research about the bacterial component in lesions, 69% of the isolated bacteria are facultative anaerobic species and enterococci the most common isolated species [4]. The bacterial biofilm that is located in the root canal maintains a continuous infection. Studies confirm its importance in long-standing pathological processes, including large lesions and cysts [5]. Part of the treatment of apical lesions involves reducing the number and type of pathogenic bacteria. Root canal lavage with disinfectants is important during endodontic treatment, but it is very hard to cover the periapical part [6]. Through dental lasers and photodynamic therapy during the surgery procedure, it is possible to influence the tissues in depth [7], [8].

The principal causal agent of periodontal disease is bacterial plaque, which induces progressive tissue damage. In the presence of susceptibility to periodontal disease due to systemic conditions, the role of bacterial plaque is debated. Some authors consider that periodontal disease cannot be induced without the presence of plaque and tartar, and suggest that a systemic predisposition simply accelerates the destruction caused by bacterial agents [9]. Others, however, consider that there is no consistent evidence demonstrating that non-specific bacterial plaque causes processes of this kind, since no cause-effect relationship is established between the type of bacterial plaque and the severity of periodontal damage [10].

Other authors described a model in which the interaction of personal factors with the social environment provides the potential for the initiation of periodontitis. The personal factors that diminish the efficiency of host defense may include psychosocial stress from the social environment, factors from the lifestyle such as diet, smoking, and alcoholism, and systemic factors such as intercurrent disease or deficiencies within the immune inflammatory system [11].

Surgical treatment of apical periodontitis depends on the stage of its development. In the initial to intermediate phase, it is possible to perform an apical osteotomy. After its implementation, it is desirable to

exclude the compromised tooth from occlusion and to splint it to the neighboring teeth depending of the tooth prognosis [12]. In an advanced stage or in the presence of a large number of complicating factors, tooth extraction can occur [13]. The main principle of surgical treatment is the removal of granulation tissue, cleaning, or polishing of the root surface to create conditions for a new bone formation [14].

Buccal/labial bone resorption is very common the result of periodontal disease progress. A wide range of host and microbial factors contributes to alveolar bone loss in periodontitis [15]. The vestibular plate of the upper jaw is thinner and is often resorbed due to its anatomical features – more spongiosis and less compactness. However, this makes it rich in blood supply and the bone augmentation of allografts is more successful [16].

The bone defects should be filled with bone grafts. Allograft materials are made of spongy bone of human origin. By the “Osteopure” method, the allografts which are taken from living donors are cleaned of prions or viral contamination. These allografts have preserved growth factor and optimize the conditions for bone recolonization [17], [18], [19]. This article aims to demonstrate a combined surgical protocol for apical lesion and periodontal resorption.

Case Report

The patient was a 59-year-old woman in good general condition but she is an active smoker (20 cigarettes per day). The reason for visiting a dental specialist was a change in the levels of the incisal edges of the central incisors. Periodontitis apicalis chronica dentis 21 was diagnosed by segmental radiography (from her previous dentist, this radiography was not presented to us), and the patient was referred for surgical treatment of the lesion. After clinical examination, it was found softened area around the apical part of tooth 21 with mild pain. A cone-beam computed tomography was performed, which confirmed the diagnosis. By the help of measurement instruments of the software, a periapical lesion with a labiolingual size of 3.5 mm and a bone resorption of about 4 mm from the anatomical crown of the tooth in the apical direction was found, Figure 1.

Preliminary endodontic preparation of tooth 21, retreatment, and filling of the canal with sealer (BioRoot, Septodont, France) was required. According to the patient, this was the third endodontic treatment of this tooth. One week after the retreatment of the root canal, the surgical part started.

A full-thickness mucoperiosteal flap with a marginal incision was dissected under terminal anesthesia with articaine and adrenaline (Septanest, Septodont,

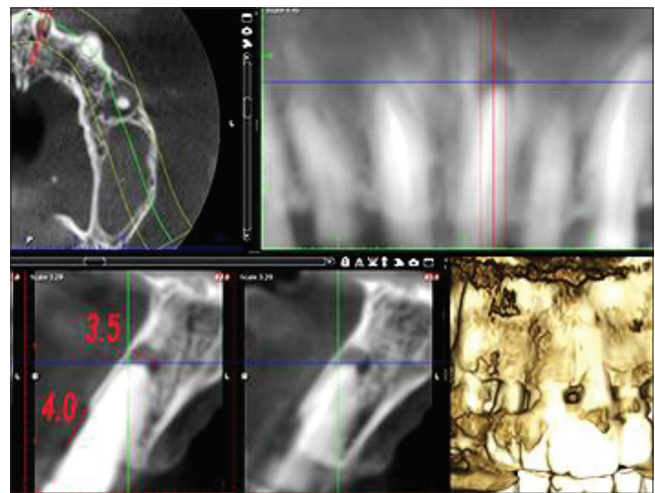


Figure 1: Cone-beam computed tomography of the patient

Saint-Maur-des-Fosses, France). Procedure was done using the round bur and a handpiece with copious saline irrigation. The granulation tissue in the apical part of tooth 21 and marginally around tooth 21 and 22 was removed by different shape and size curettes. The cementum of the roots of tooth 21 and 22 was cleaned and smoothed (root planing). The attachment of the frenulum labii superioris was removed, Figure 2. Clinically, it turned out that the vestibular resorption was more than 4 mm and the tooth “floated” in pathologically altered tissues. For better disinfection, especially after an anamnesis of repeated endodontic treatment, we decided to use photodynamic antimicrobial therapy with “PACT 400” (Cumdente, Germany). This device is laser diode type with very short exposure time – 20 s. It is indicated for perio- and endotherapy, peri-implantitis, etc. We used it for 30 s in the area of the apex and in the area of the marginal lesion. The purpose was to remove the bacterial infection and toxins in the depths of the tissues, Figure 3.



Figure 2: View after removal of the granulation tissue apically and marginally

Before proceeding to bone replacement, the root surface was treated with chelating agent for chemically cleaning and dissolving the smear layer for

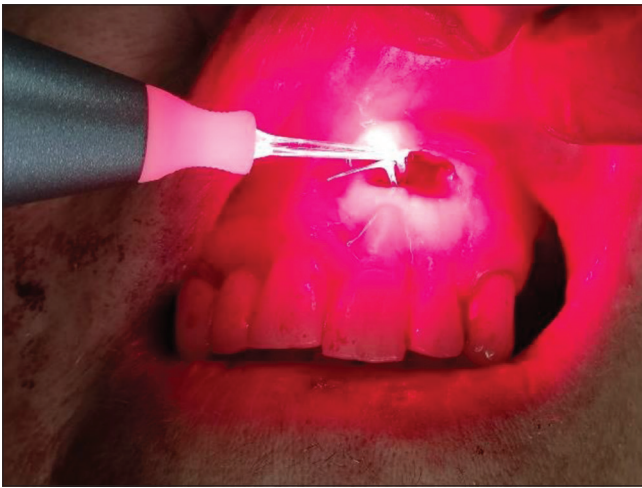


Figure 3: Photodynamic disinfection, "PACT 400" (Cumdente, Germany)

30 s (EDTA – Endo Prep gel, Cerkamed, Poland). This achieves a clean root surface on which the formation of new bone is possible. The bone defects were filled with bone allograft material (Allodyn CS Fine, OST, France), Figures 4 and 5.

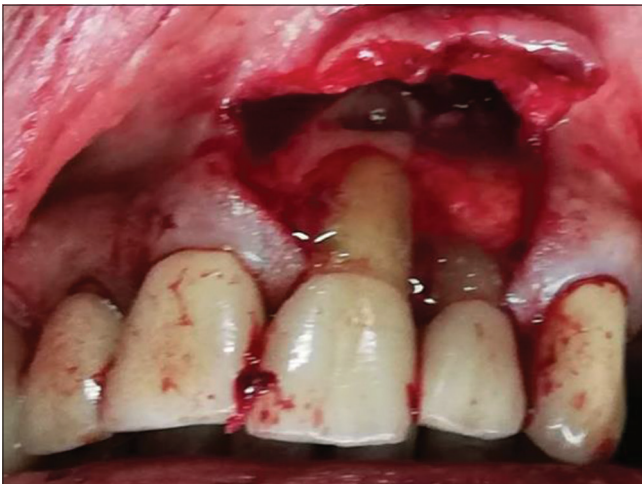


Figure 4: Chelating agent placement on root surfaces

The purpose of allograft usage was to stop the development of periodontitis and to make a support for the soft tissue.



Figure 5: Bone allograft Allodyn CS Fine (OST, France)

To compensate for the insufficient thickness of the gingiva, a soft-tissue graft was used (NovoMatrix, Allergan, USA), which adapts to the defect. The soft-tissue graft was fixed with resorbable suture 5.0 with simple interrupted sutures to the papillae, Figures 6 and 7.



Figure 6: Adapted soft-tissue graft (NovoMatrix, Allergan, USA)

The wound was closed with the available flap. The fixing of the flap was done with simple interrupted sutures by non-absorbable 5.0 sewing material (Nylon). To ensure 48 h without bacterial comfort on the surgical wound, an adhesive periodontal dressing was used (Reso-Pac, Hager Werken, Germany), Figures 8 and 9.



Figure 7: Sewn soft-tissue graft with simple interrupted sutures to the papillae

After completion of the clinical manipulation, the patient was prescribed an antibiotic (ampicillin 0.500) for 7 days and painkillers (ibuprofen 0.400), instructions were given for oral hygiene and topical treatment of the wound with antibacterial gel (Elugel, Elgydium, Pierre Fabre Oral Care, France). The patient was repeatedly asked to limit smoking at least during the recovery period. In fact, she did not stop at all. During central occlusion, there was not contact between upper and lower incisors. After 7 days, the sutures were removed.

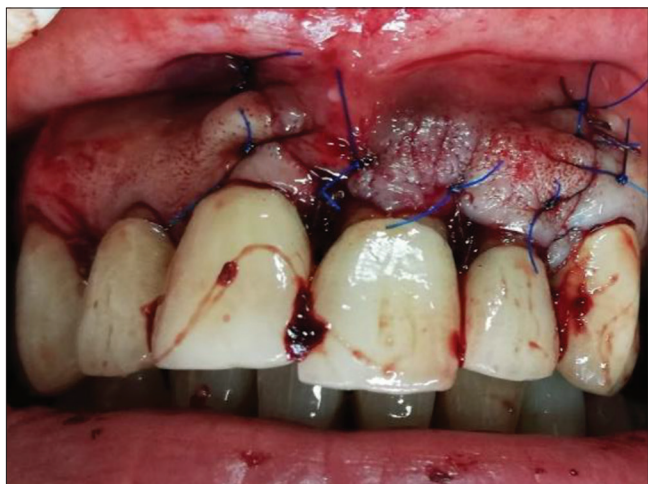


Figure 8: Sewn mucoperiosteal flap with simple interrupted sutures

A control radiograph was taken 5 months after surgery. It showed complete filling of the periapical lesion. The level of the vertical bone around teeth 21 and 22 was similar to the initial situation but this surgery method was to make bone thicker for support of the soft tissues. Both teeth had a stable position in the dentition.



Figure 9: Adhesive periodontal dressing (Reso-Pac, Hager Werken, Germany)

Clinically, the gingiva was located slightly apically but was healthy, without bleeding, thick, and painless. There was also no pain around the apex of the tooth 21. The result satisfied our patient and us, Figure 10.



Figure 10: Radiological and clinical situation 5 months after surgery

Discussion

Apical osteotomy is a surgical method for the treatment of chronic periodontitis and cysts. Its indications include localization of the lesion around the tooth apex and preserved circumferential bone structure. In the described case, the tooth had good stability despite the almost complete absence of a vestibular wall. The generalized periodontitis had not reached the point where it affected the mobility of the teeth [15]. Two protocols of work were combined – apical and periodontal surgery. The placement of a bone allograft, its covering with a soft-tissue graft, and its protection with an adhesive periodontal dressing show full adherence to the clinical surgical protocol. Soft-tissue graft was preferred to the “gold standard” – subepithelial connective tissue graft from the patient’s palate, because it was found that due to long-term use of cigarettes, the mucosa in the back of the hard palate is very thin and in poor condition, which reduced the chance of the free graft surviving [12], [13], [14]. Bone allografts with human origin and from living donors have an orderly and natural mineral-collagen framework. It allows invasion of vascular and bone cells and successful bone regeneration [17], [18], [19].

Bacterial infection has been shown to maintain and aggravate apical periodontitis. By opening a wide mucoperiosteal flap, direct access to the lesion is achieved. Precise mechanical and photodynamic impacts are a prerequisite for a successful outcome of treatment. Photodynamic therapy is a proven method for eradicating bacterial infection locally. It is the method of choice in all cases of infected hard and soft tissues [6], [7], [8].

Treatment of periodontitis aims at preventing further disease progression with the intentions to reduce the risk of tooth loss, minimize symptoms and perception of the disease, possibly restore lost periodontal tissue, and provide information on maintaining a healthy periodontium. Therapeutic intervention includes introduction of techniques to change behavior, such as oral hygiene instructions; a smoking cessation program; dietary adjustment; subgingival instrumentation to remove plaque and calculus; local and systemic pharmacotherapy; and various types of surgery [11], [13].

A major disadvantage in this case is smoking, which acts as a local vasoconstrictor. Generalized periodontitis and a woman’s age (menopause and related osteoporosis) are also a risk factor [1], [3], [5]. Another disadvantage is the average level of oral hygiene. The presence of the plaque can be predisposition to continue the development of periodontitis [9].

Conclusion

The combination of different clinical protocols is a necessity in surgical practice. Knowledge of the etiology and pathogenesis of the disease allows the application of adequate methods of treatment. The result was satisfactory. The apical lesion was invisible on the radiograph and without clinical symptoms during the intraoral examination. The periodontal lesion was covered with healthy and thick mucosa, without bleeding of the pockets.

Informed Consent Statement

Informed consent for the treatment and informed consent for pictures were obtained from the patient involved in the study.

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