

SURGICAL TREATMENT PRINCIPLES IN PERIAPICAL ENDODONTIC PATHOLOGY

Constantin Mihai¹, Cristian Constantin Budacu¹, Gabi Topor²

¹ University of Medicine and Pharmacy "Grigore T. Popa" Iasi, Romania, Faculty of Dentistry

² "Dunărea de Jos" University of Galați, Romania, Faculty of Medicine and Pharmacy, Department of Dentistry

*Corresponding author; *e-mail*: cristibudacu@yahoo.com

ABSTRACT

The fact that apical periodontitis is one of the most thorny problems of endodontic therapy, determine us to consider it necessary to understand some aspects of diagnosis in order to achieve the procedures that have the greatest chances of maintaining the pulp and periapical affected teeth. Incorrectly treated pulp infections will cause complications in apical periodontium which is located below the tooth. The microbes present in the infected pulp can diffuse into surrounding tissues through the hole at the tip of the root (called apex) causing acute or chronic infections. Apical periodontitis are most often complications of the pulp gangrene, which is an important factor of infection, able to maintain remote illnesses (nephritis, myocarditis, endocarditis, rheumatic diseases). **Material and method:** The study carried out in order to achieve the proposed objectives included a total of 191 patients solved in the Oral and Maxillofacial Surgery Clinic (Ambulator), from the University Polyclinic of the Faculty of Dental Medicine in Iași, between 1.01.2014-01.12.2018. **Results and discussions:** Since the main cause of periapical inflammation is of an endodontic nature, surgical treatment can not be considered as the first choice because it does not debride the root canal, as it is the endodontic therapy. Periapical surgery should never be performed before conventional non-surgical canal treatment has been performed. **Conclusions:** The major indication of apical resection is found at the level of the frontal teeth group, especially the central incisors. These teeth, due to endodontic characteristics, are well suited to conservative endodontic treatment. The need for surgery is probably the result of a failure of conservative treatment, a technical mistake, or the convenience of a practitioner who prefers to resort to surgery before even tending conservative treatment.

Keywords : *apical periodontitis, affected teeth, pulp infections, inflammatory process.*

INTRODUCTION

Endo-periodontal lesions represent a real challenge in current medical practice for both the endodontic and the periodontist specialist. The simultaneous existence of pulp and periodontal problems in the same tooth may complicate the diagnosis and treatment planned for the

tooth. A type of pathology is a special situation due to the complexity of anatomy and pulse and periodontal physiology. The prognosis is reserved and these conditions recommend an interdisciplinary approach, with good collaboration

between endodontic, periodontology and microbiology specialists[1-8].The dental pulp is tightly connected with the periodontal ligament through the apical foramen, access channels and dentinal tubules. Due to this relationship, pulp diseases can influence periodontal health and *vice versa* , periodontal infection can affect pulp integrity. It has been estimated that pulp and periodontal problems are responsible for more than 50% of dental mortality[9-13].

It has been shown that the main etiologic agent in periodontitis is the bacterial plaque that adheres to the teeth and other hard surfaces of the oral cavity. The pulp can be affected by the invasion of bacteria or their toxins, or by direct trauma during restorative therapies.The pulpar gangrene represents an infection and the decay of the pulp under the influence of putrefactive bacteria, and the necrosis of the pulp means the pulp mortification provided in the absence of pathogens, under the action of aggressive physical and chemical agents[14-24]. In these cases the symptoms are almost absent, it is precisely for this reason there is a risk of worsening the affection. The treatment of the pulp gangrene either conservatively or surgically, aims to keep the teeth arcade, a conservative biological attitude characteristic of modern dental medicine. Whenever the periapical pathology subsists under the conditions of an endodontic treatment considered to be correct, through endodontic surgery in particular the apical resection, the surgical intervention by which the apexian portion of the root is removed, along with the pathological elements around it. The main purpose is to remove the apical and periapical

pathological focus, to make it possible to properly filling the root canal[25-31].

Pulp gangrene as the last stage of pulp inflammation, is a septic inflammation with anaerobic germs of pulp tissue devitalized through various pathological processes. Anaerobic germs cause pulp decay without response from the apical periodontium.Pulmonary gangrene as the last stage of pulp inflammation is defined by all the reactions and adaptation processes that the pulp organ advances in the fight with the pathogen in a sequence of adaptive phases; at the end of these phases, by exhaustion of all buffer reserves, the pulp tissue turns into a conglomerate without structure, a good culture medium for the microbial agents that have generated it. The aseptic mortification of the pulp takes place, with the exhaustion of its defensive means, under the aggressive action of some physical chemical agents.

The mortification gangrene means the septic mortification of the pulp and its decay under the influence of anaerobic putrefactive microorganisms, that strictly are of interest in the territory of the tooth (simple gangrene), or with the implication of apical periodont (complicated gangrene). Under the influence of germs microbes, especially those of rotting, on different pathways in the necrosized pulp tissue, the pulp gangrene appears. The resulting products are toxic to the pulp tissues, initiating the inflammatory response.Untreated, pulp gangrene is evolving towards the apical periodontium producing an acute apical periodontitis or chronic apical periodontitis. They favor the coronary fractal, because the

resistance of dental hard tissues decreases; it constitutes an infection focus, and could determine, in the distance, glomerulonephritis, myocarditis, endocarditis, rheumatic diseases.

The simple pulp gangrene is a septic change characterized by decomposing the decay pulp under the influence of anaerobic putrefactive microorganisms and are definitely into the pulp chamber and root canals; it is mortification septic pulp as a result of the decay of microbial invasion, established in the pulp chamber and root canals, occurs when the destructive inflammatory process is at the level of the pulp chamber and the root canal. It can present into two forms: wet or dry.

If the gangrene process is entirely concerned with root canals, it is about total gangrene and when only one or two canals (pluri radicular teeth) the pulp is septicallly necrotic and the other pulp is alive, the partial gangrene is about . If the gangrene process goes beyond the endodontic space, inducing periapical phenomena, it is a complicate gangrene with acute or chronic forms of periapical damage.

Dental gangrene is an important factor of infection, and can maintain distant illnesses (nephritis, myocarditis, endocarditis, rheumatic diseases).When the inflammatory process or the toxic components of the gangrene pulp reaches the connective tissue of the pulp-periapical junction, the apical periodontitis occurs.

The affection of the periapical components occurs rapidly, starting from the desmodontium, then extending to the

other elements of the apical periodontium: cement, alveolar internal cortical, alveolar septum.

Suppurated forms of acute apical periodontitis, in the absence of adequate treatment, can cause local, loco-regional or distal severe complications: condensation osteitis or periapical osteosclerosis, rarifiable osteitis, chronic periapical abscess, periapical granuloma, periapical cyst.

To determine the diagnosis of a periapical disorder, extra and intraoral examination should be performed in a precise and orderly manner. The stability of a methodical approach will promptly identify the relevant aspects of the diagnosis process.

Data obtained through clinical examination should be recorded in the patient record as well as the results of the diagnostic tests.

Obtaining diagnostic data involves endodontic damage, periapical damage; differential diagnosis. Dental history record is the next step in the diagnosis process. Used in conjunction with the medical examination, it will allow the clinician to identify the problem and to specify the treatment. It is recommended that from the beginning, the patient be allowed to present the symptoms in personal terms, using a narrative form. The presentation should as accurately relate the main characteristics of the suffering and the circumstances in which it occurred.

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Clinical examination consists in two phases:

1. physical inspection;
2. diagnosis tests.

If the value and technique of apical resection reached a relative unity of opinion on the world stage, there were numerous controversies as regarding the name of the method, trying to reach a consensus that would represent the whole content of the intervention.

It was proposed over the years many names such as: chronic apical periodontitis, radical surgery, radical amputation, apical osteotomy, periapectomy, apicectomy, maxilotomy, apectomy, apicectomie or granulomectomy, periapical curettage, a pical maxilotomy, root resection. All these names remained as proposals or as their own names in the respective countries, not being admitted internationally.

According to Timoshca, the apical resection consists of the "removal of the root apex and of the periapical pathological process, concomitant or preceded by the correct endodontic treatment and the ideal root filling. The apical resection is very often the only method that can avoid dental extraction, allowing the correct endodontic filling, apex and periapical lesions, creating favorable conditions for recovery of bone tissue."

The technical term of "apical resection", which has become more and more known, is in fact an improper titration, because, as Lacronique says, apical

resection is not the whole operation, but only one stage of the intervention, being part of the operation called "periapical curettage". However, this name of "apical resection" has not yet been substituted because, on the one hand, everyone knows what this term means, but on the other hand the proposed terminology failed to justify the principle method and content.

From the apical resection practice emerges numerous arguments proving that a true indication and technique favors a well-run favorable postoperative evolution, with a quick healing. In setting apical resection indications there are taken into account: local and general condition of the patient, his/her age; complementary examinations (pulmonary radioscopy, complete blood count, bleeding and coagulation time, blood pressure, electrocardiogram, glycemia, liver samples, urine summary, Bordet-Wassermann reaction) etc; The indications of apical resection are given by four large groups of lesions: apical periodontal lesions, obstacles preventing canal treatment, endodontic treatment failure, radical traumatic lesions. In upper molars, the indication is limited by the provision of the roots, the multiplication of the root canals, the proximity of the maxillary sinus, and the bone construction at the zigomato-alveolar ridge. The intervention on the lower molars is even more difficult due to the particular thickness of the vestibular bone sheet, the difficult access in the distal third of the lower buccal vestibule, and reports that are sometimes very close to the mandibular canal. Taking into account the exceptional interventions on molars, we can say that apical resection can benefit all teeth without exception.

The lower frequency of intervention in premolars I and II is explained at the jaw through the danger of opening the maxillary sinus, and in the jaw by the anatomical conditions of proximity with the menton hole, through which the vasculo-nervous pack passes, and there is the risk of its injuries.

In cases of resected teeth, it is always clear that the functional value of the tooth deserves the intervention, its traumatic trauma and the risk of complications. Obstacles stopping endodontic treatment are: anatomical abnormalities, such as lumens, root-crooks recurved, apical deltas that do not allow catheter and mechanical-chemical treatment of the channel, obstacles in the channels can be represented by: processes calcification occluding the root canal (in this case the root resection will be performed up to the level of the obstruction, or apical resection with retrograde filling); needles broken on the canal (Kerr, nerve extractors). If the broken fragment is in the apical third, the resection will be executed by removing the portion of the broken needle through the bone wound, and if the fragment is found in the middle third, the apical resection with retrograde obturation. In all cases where the metal fragment is not extracted by using one of the numerous mechanical and chemical processes described in the literature, we resort to apical resection. The apical portion of the root being removed, it is often easy to extract the instrument piece along the channel until it reaches the cross sectional area.

Faults of endodontic treatment is due either to incompletely solved periapical lesions or to technical deficiencies. In such cases, apical resection is the

intervention that complements the filling or allows its filling.

The causes that lead to this situation are multiple: leaky obturations due to "moist channels" (persistence of secretion in the canals) possibly maintained by a chronic periodontitis; incomplete obturation-sublimation-with incorrectly chosen cements or preparations (making the Lentullo needle or immediately on the canal), which do not allow for good lateral condensation and sealing. Thus, apical canal portions may remain, where the pathological process continues to unfold; in these cases either apical resection to the obturation or resection with retrograde obturation is required; the corono-radical devices applied to teeth with incomplete root fillings, which can only be removed with the risk of compromising the root; the indication of apical resection is clear either to the old obturation or retrograde obturation, false paths (root perforations) occur during mechanical treatment. If a perforation is located at the apical third of the root, then the apical resection is indicated with full chances of success; in other cases, apical resection will be supplemented with direct or retrograde obturation of the false pathway, residual granulomas, which occur after the correct endodontic treatment, with correct root filling; the pathological process persists but the granuloma remains closed and continues its evolution on its own. In this case, apical resection is indicated, which will suppress the granuloma together with the eventual apical delta, containing the main maintenance reservoir of the periapical septic furnace.

Although fractures of the apical third root of the dental root are rare, they can

only be treated effectively by surgical intervention, ablation of the fractured small fragment, regularization of the margins of the large fragment and correct root filling. The intervention is particularly indicated at upper fronts and premolars, with the condition that the alveolar bone offers a good implantation of the remaining root part[32-35].

In the case of inter fragmentation osteitis, in the jaw fractures of the jaws, supported by teeth with necrotic pulp, apical resection will also be practiced.

It is known that in many cases fracture outbreaks are susceptible to infection by pulp necrosis of the teeth with which they are in communication. Whenever medical treatment does not seem to cure acute, subacute or chronic inflammation (post-traumatic bone cracks), the amputation of the root apexes, which at the same time allows for a good curettage of the traumatic outbreak, it is sufficient to annihilate any septic process, or considered as a useful method in preserving the tooth.

Regarding the general condition, we believe that only those patients who are able to undergo a rather large local anesthesia that already has a small operator shock and who are able to withstand the entire bone intervention should be supported. Therefore, there should be removed from the beneficiaries of this conservative treatment all anemic patients with evolving tuberculosis as well as patients with blood disorders. Patients with moderate diabetes, kept under medical control, are not a contraindication for apical resection. The pregnancy in a healthy woman is a relative contraindication for apical resection; it should be avoided, as far as possible, performing this work during the first

three months and the last month of pregnancy, as the operative trauma, and sometimes the anesthetic, is incriminated in the occurrence of spontaneous abortion or premature birth.

Purpose and objectives of the study

The purpose of this study is to establish, by clinical, statistical, informatics, a conservative or radical therapeutic approach, clinically and paraclinically justified by the dentist and the dento-alveolar surgeon to the periapical lesions.

Endodontic treatment, through endodontic surgery - in the case of apical resection, can remove the apical and periapical pathology, thus creating conditions for the healing of the periapical pathological processes for the complete tissue restructuring.

The study of the incidence of complications occurring after surgery. The study of the factors governing the decision of apical resection, but also its realization as a surgical act, to identify and establish safe and effective methods at the dentist's and dental-surgeon's surgeons' objective decisional attitudes.

MATERIAL AND METHOD

The study carried out in order to achieve the proposed objectives included a total of 191 patients solved in the Oral and Maxillofacial Surgery Clinic (Ambulator), from the University Polyclinic of the Faculty of Dental Medicine in Iași, between 1.01.2014-01.12.2018. The case study was randomized in relation to the patients' addressability during the course of the study.

RESULTS AND DISCUSSIONS

Considered from the point of view of tooth preservation, apical resection is a valuable procedure in avoiding early

edentation. This surgical method helping conservative endodontic therapy is salvage in the healing of periapical lesions, the ultimate goal being to save the causal tooth. In the view of the gender distribution of the 191 patients investigated in the Outpatient Clinic was as follows: women -54% men-46%. There were attempts to assess the share of various diagnoses within apical resection requirements. As for indications regarding casuistry related to indications for apical resection, out of Ambulatory Surgery Clinic FMO diagnoses at presentation were: teeth in fracture focuses - 4%; periapical granulom -21%; a periapical osteitis - 47%; periapical cyst - 36%. The majority of cases are periapical osteitis - 47%. The distribution of dental groups was evaluated in the apical resection directions. Thus jaw database analysis revealed the following distribution: central incisors - 38%; and lateral incisors -22%; canini teeth - 19%; premolars 1-15%; premolar 2-6%. It is obvious that the major indication of apical resection is found at the level of the front teeth group, especially the central incisors. These teeth, due to endodontic characteristics, are well suited to conservative endodontic treatment. The need for surgery is probably the result of a failure of conservative treatment, a technical mistake, or the convenience of a practitioner who prefers to resort to surgery before even tending conservative treatment.

At a mandibular level, the analysis of the studied groups revealed the following distribution: the central incisors - 43%; lateral incisors-

24%; canine-21%; premolars 1-8%; premolar 2 -4%.

The higher percent both in the jaw and in the maxilla is interventions at the level of the central incisors, followed by the lateral and canine. Apical resection is practiced more frequently in maxillary premolar than mandibular, in molars, regardless of arcade, the procedure is very rarely indicated.

Regarding the type of incision, we know that it depends very much on the operation as such (surgery field visibility, bleeding, suture possibilities, mucous wound healing). It is specified that the type of incision must be suitable for the tooth to be operated and the clinical situation concerned.

A preference for the Pichler incision (43%) was observed, followed closely by the trapezoidal incision (37%) (normal, if we take into account that many interventions were made on the front teeth, and most of them were maxillary).

The presence of a severe osteitic process that has affected bone cortex requires increased attention to the removal of granulation tissue and other pathological formations; the erosion of the vestibular deformation may mean the presence of the sinusoidal wall in the same state (for example). On the other hand, the presence of an integral vestibular bone plaque causes the trephining to be executed after the protocol described above in order not to cause bone necrosis and to allow the development of a pathogenic flora.

The most common causes are chronic periapical inflammation, visible on radiography as radiotransparency, in combination with a root canal with restricted coronary access. Often, this

inaccessibility is caused by poorly placed root fillings, or a coronal-radicular device that is supposed to be difficult to remove.

A wide radiolucency, perforation, fracture or wide root apex, can be many reasons indicating periapical surgery.

From the endodontic point of view, periapical surgery is only indicated when a good quality treatment has been attempted but could not be completed or if healing has not taken place after treatment.

Periapical radiographic transparenations, seen before or after completion of endodontic therapy, are the most common indications of periapical surgery and are mostly represented by periapical granuloma and cyst.

In our study, based on the radiographic examination, 40-65% of cases were considered as real indications for periapical surgery, the others could be resolved without surgical treatment. Generally, the endodontium considered many more teeth as acceptable for the correct endodontic treatment than the general dentist or the oro-maxillofacial surgeon. This suggests that specialization and experience greatly influence the therapeutic decision. These observations confirm the literature.

Since the main cause of periapical inflammation is of an endodontic nature, surgical treatment can not be considered as the first choice because it does not debride the root canal, as is the endodontic therapy. Periapical surgery should never be performed before conventional non-surgical canal treatment has been performed.

In practice, however, for many reasons, this interpretation is not always true

because factors such as cost, type of medical insurance, operator skill and duration of treatment can play an important role.

CONCLUSIONS

Whenever the periapical pathology subsists under the conditions of an endodontic treatment considered to be correct, endodontic surgery - in this case the apical resection, the apical and periapical pathological focus can be removed, thus creating the conditions for the healing of the periapical pathological processes, for the complete tissue remodeling. Apical resection aims to avoid the extraction of the causal tooth, preserving the most favorable situation for future prosthetic works. Apical resection is the surgical procedure by which the apical portion of the duct is removed, together with the pathological elements around it. It has the purpose of removing the apical and periapical pathological focus, in order to make it possible to properly filling the root canal. Considered from the point of view of tooth preservation, apical resection is a valuable procedure in avoiding early edentation, being in fact considered as a surgical method that aids conservative endodontic therapy. The surgery is salvage when other conservative methods of treatment have not healed the periapical lesions.

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