Apicoectomy - Endodontical Surgical Procedure

CRISTIAN BUDACU[1], SORIN V. IBRIC CIORANU[2]*, IULIA CHISCOP[23], MIHAELA SALCEANU[4], ANCA MELIAN[4]

[1]Grigore T.Popa University of Medicine and Pharmacy, Faculty of Dental Medicine, Department of Anesthesiology and Oral Surgery, 16 Universitatii Str., 700115, Iasi, Romania

[2]Titu Maiorescu University of Medicine and Pharmacy, Faculty of Dental Medicine, Oral maxilofacial Surgery Department, 67A Gheorghe Petrascu, 031593, Bucharest, Romania

[3]University Dunarea de Jos of Galati, Faculty of Medicine and Pharmacy, Department of Dentistry, 47 Domneascã Str., 800008, Galati, Romania

[4]Grigore T.Popa University of Medicine and Pharmacy, Faculty of Dental Medicine, Department of Endodontics, 16 Universitatii Str., 700115, Iasi, Romania,

The progress of fundamental medical sciences, of other medical and surgical specialties enabled a fast development pace of modern maxilla-facial surgery. Oro-maxilla-facial surgery bring together science and art in order to prevent, diagnose and cure disease, to reconstitute shapes and restore functions of the oro-maxilla-facial area often by surgery. Apical surgery is a standard surgical procedure including incision of the apex and resection of the apical and periapical diseased site, preceded or not by the correct endodontic treatment and the adequate root canal obturation. Periapical pathology is maintained in an endodontic treatment considered correct, being resolved by endodontic surgery with apicoectomy and avoiding extracting the causal tooth. In this way the area is kept as favorable as possible for future prosthetic works. It is achieved mostly in monoradicular teeth and this intervention is suitable for molars, yet the topography and the morphology of the molars make the surgery more difficult. Oral surgery and endodontics have accumulated a rich experience in maintaining the teeth on the arch for as long as possible. The study material for endodontic case selection, examination and resolving is gathered from the Clinic of Oral and Maxillo-Facial Surgery of the Spiridon Teaching Hospital over a period of two years, from 2014 to 2016; the study group for endodontic therapy and surgery comprises 59 patients. To receive apicoectomy, the tooth and its periodontium should meet certain conditions after apicoectomy, the operated root needs to keep an osseous implantation length equal to two thirds or at least half its initial length. Complex oral rehabilitation of various clinical cases met in dental surgery is a challenge for the dental surgeon due to the various degrees of impairment of all system elements. The emerging malfunction is difficult to diagnose and to treat, asking for dental surgeon's special experience and clinician skills.

Keywords: oro-maxillo-facial surgery, apicoectomy, odontal surgery, periapical pathology

In dental practice of recent years, endodontics has been playing an increasing role, thanks to the high success rate of modern endodontic treatments. The objective of the endodontic therapy is to restore the treated tooth to the shape and function it previously had in the maxilla-dental system.

Endodontics is the basis of restorative dentistry, as it cures from within the tooth. Inside each tooth there is a pulp chamber where the dental pulp and the root canal system are. These contain soft tissue, nerves, blood vessels. If this sterile area gets infected accidentally or due to dental decay bacteria or viruses, pus may be formed leading to serious diseases, such as meningitis or septicemia.

Usual dental procedures consist in: cleaning the root canals fully of organic or inorganic debris [1].

The objective of endodontic surgical procedures, such as transmaxillary apical draining, periapical curettage, apicoectomy, radicular amputation and therapeutic dental replantation is to keep the teeth and the dental roots when conservative endodontics fails to perform.

In endodontics, radiography is the most important and the only aid in providing a diagnosis, being the only way to get information about the root canal and the periapical space, invisible to the surgeon. An X-ray method known in the specialized literature may provide the information necessary to conduct the correct endodontic treatment [2].

Apicoectomy is a simple, logical, thorough and well-adjusted surgical procedure, often the only method that can avoid extraction enabling a correct endodontic root canal obturation, removing the apex and the periapical lesions and creating the conditions for the bony tissue to get restored. It enables us to keep the relevant teeth and dental roots in terms of functionality and esthetics, when conservative instrumental, medicine and physio-therapeutic treatments failed.

It is the surgical method that supports the most used endodontic treatment, applied mostly in young people, mostly in the anterior maxillary frontal group, may be conductive to patients' psychoemotional disturbance, to the reduction of the tooth implantation surface and later to cure with scars[3].

Dental surgical interventions on the periapical area or apicoectomies are indicated when the lesions of the periapical area cannot be treated by endodontic treatment or when the endodontic treatment cannot be conducted.

The success of the treatment is conditioned by the correct indication, the correct technique, the follow up and

* email: isorin83@yahoo.com; Phone: (+40)748365320

patient's observance of the after-surgery recommendations.

The endodontic treatment is a predictable dental treatment, being able to save a tooth with endodontic pathology as long as the diagnosis and the treatment plan are correct, accidents and incidents during treatment may be avoided, it is made in two sessions. Its role of saving a tooth has many other advantages, such as: efficient mastication, correct bite, natural pleasant aspect, well-protected teeth [4].

This treatment is made within the tooth and is needed when the pulp is inflamed or infected, because of various reasons (decays, repeated dental procedures on that tooth, displaced crowns, blows or accidents).

From a moral and ethical stand, we reserve the right to communicate to patients the diagnosis in terms of periodontal disorders and/or any failure of long-term dental restoration after the endodontic treatment.

The patient will be obviously interested in the method, technique and quality of the anesthesia and of the surgical procedure, in the possibility of any deficiency in anesthesia onset or length, if there is going to be pain during or after the surgery. The dental surgeon - patient relationship is psychologically "colder" in the last decade, as the surgeon is more concerned with the organic suffering of the patient rather than with patient's state of mind.

The communication ways between endodontium and periodontium are represented by the apical foramen, which is the main passage duct of the inflammation from the pulp to the apical periodontium and sometimes even marginal; accessory canals are rarely outlined in dental X-rays, they have a clinical relevance in spreading infectious elements from the necrotic pulp to the periodontium or back, which is not yet proven scientifically. Lateral canals make a quite right angle to the main canal, linking it to the periodontium. Secondary canals are open by a separate foramen. Additional canals are located in the same supranumerary root and dental tubules extend from the pulp to the amelo-dentinal junction and the cement-dentinal junction.

Indications of apicoectomy are given by: periodontal lesions, obstacles that prevent the endodontic treatment, failures of the endodontic treatment, radicular fractures.

In acute processes, there are reserves. The surgery at this stage is risky because tissues suffered metabolic changes, *p*H changes in the lesion, that would delay the postoperatory cure.

The x-ray examination is mandatorily associated to the clinical examination, as it enables the bidimensional view of lesion extension, their relations to the root of that tooth, of the neighboring teeth, with the sinusal cavities or other neighboring anatomical elements (Walton 2004).

When the indication of apicoectomy is determined, we shall take into account the age of the patient, which is highly relevant. Apicoectomy is indicated when there is a functional tooth-periodontium balance, when the entire organism is in full biological activity. The tooth and the periodontium should perform certain conditions after apicoectomy, the operated root should preserve an osseous implantation equal to two thirds or at least one half the initial length.

The counter-indication for apicoectomy is the subgingival coronary lesions that do now allow for root restoration, the periapical lesions exceeding a third or even half the length of the root, the concomitant existence of a chronic marginal periodontitis with osteolysis involving or surpassing the cervical third part of the root or the seat of the tooth in an irradiated area.

For the acute or underacute periapical lesions or in the case of concomitant evolution of a gingivo-stomatitis, the indication of apicoectomy is determined after the treatment and their retrocession. Physiological causes or general disorders may determine the rescheduling of the surgery, and some serious disorders (decompensated cardiopathies, hemophilia, leucosis, diabetes, cashexia and so on) are formal counter-indications.

Preoperatory preparation: preparing the surgery site means cleaning and draining correctly the oral cavity.

The preparation of the tooth for resection: tooth trepanation or correct opening of the trepanation, cleaning the dental decay cavity; thorough mechanical cleaning and shaping, enlarging and cleaning the root canal the day of the surgery. If the tooth has a covering crown, it is removed, and if the covering crown is part of a multi-pin fixed prosthesis, the crown will be drilled through.

Antibiotic treatment in the event of any focus disease starts two hours before the surgery.

At any time the pathology resists when an endodontic treatment is applied correctly by endodontic surgery, apicoectomy, the apical and periapical pathological focus may be removed, creating the conditions for periapical pathological processes curing and for full tissue restoration. Apicoectomy avoids the extraction of the causal tooth, preserving a favorable situation for the future prosthetic works [5].

From the perspective of tooth conservation, apicoectomy is a valuable procedure for avoiding early edentulousness, being considered a surgical method that assists the conservative endodontic therapy.

Apicoectomy means to remove the radicular apex and the periapical pathological process, concomitantly or preceded by the correct endodontic treatment and the ideal root canal filling (Timosca, Burlibasa,1983).

Respecting the correct indication and the operating technique, postoperatory evolution is favorable and the curing will be quick [6].

Apicoectomy is made mostly in monoradicular teeth, yet this intervention may be also applied to molars (Moore 2001), although their morphology and topography makes the surgery difficult.

Experimental part

Material and methods

The study material for endodontic selection, examining and resolving of the cases is gathered from the Clinic of Oral and Maxilla-facial Surgery of the Teaching Hospital over a period of two years, from 2014 to 2016; the study group for endodontic therapy and surgery comprises 59 patients.

In this study we applied tests specific to various types of analyzed data: tests for comparing mean values of a parameter, Anova test; specific correlation tests for quantitative variables and for qualitative variables, Pearson, CHI square (x^2).

Results and discussions

Out of the 59 patients with periapical pathology, for 16 patients (27.11%) we determined based on the clinical examination and off-clinic tests the necessity of conducting the conservative endodontic treatment. In the event of failure of the conservative endodontic treatment for 7 patients (11.86%), we recommended a surgical treatment: methods assisting the endodontic treatment (5 patients – 8.47%) or tooth extraction (2 cases – 3.38%, due to the associated periodontal disorder that counter-indicated the apicoectomy).

Apicoectomy is maybe one of the most encountered surgical procedures in endodontics, aiming at removing diseased tissue from the apical and periapical areas and mostly avoiding *tooth extraction* and the preservation of the tooth on the arch [7].

The purposes of this procedure are multiple, such as: remove the hardly accessible dental root portion, which could not be treated (disinfected, filled) and determined or maintained an acute or chronic inflammation; facilitate access to make a retrograde root canal filling (from apex to the dental crown) in order to seal the endodontic area and to block the access of microbial germs; conservative alternative of treatment of a tooth that may be extracted after the failure of an endodontic therapy and tooth preservation on the arch; osseous repairing the periapical area, where the inflammation occurred and preventing its spreading to the bone (creating severe disorders, such as osteitis, osteomyelitis); identification of a superposed periapical lesion of a different origin by the histopathological examination of the resected part (the infected tissue fragment being removed).

After determining the diagnosis, the doctor talked to the patient, she presented the diagnoses, the purpose and the proposed therapeutic procedures, their risks and advantages.

The dental surgeon should inform the patient about the mandatory stages of the treatment plan.

The patient is entitled to accept or not the therapeutic variant proposed by the dental surgeon. The surgeon has the responsibility to talk to the patient and to obtain his consent for the treatment.

The preoperatory preparation was focused on the patient's general condition [3,8] and on the local and loco-regional condition s (conditions of the oral system, of the oral cavity mainly and the future operating area).

We performed the preoperatory preparation of the teeth, we achieved and took part in the surgery.

To perform the apicoectomy, the tooth and the periodontium need to keep certain conditions after apicoectomy, the operated root has to keep an osseuous implantation equal to two thirds or at least one half its initial length. The cleaning of the oral cavity precedes mandatorily the surgical procedure by scaling, professional brushing, provisional filling of any decays, extraction of irrecoverable root debris, treating the oral mucous membrane lesions. The preoperatory cleaning of the oral cavity is considered a permanent desideratum, a rules without exceptions.

The preparation of the tooth under surgery meant also catheterization and mechanical preparation of the endodontic area, 90 min before the operation.

The canal filling was performed under visual control, on a completely dry and correctly treated mechanically and chemically canal, during the surgery. The method enables the removal of any filling material in excess, enabling a good tissue integration of the resected root [9,10].

Plexal loco-regional anesthesia was performed. Plexal and peripheral trocular anesthesia may also be associated [8].

No premedication was needed.

Accidents that may occur during the surgery are the injury of the apexes or of the roots of neighboring teeth, opening the maxillary sinus or of the nostrils, the injury of the masseteric nerve, the opening of the mandibular canal, hemorrhage or breaking the Kerr or Lentullo needle in the root canal (Burlibasa,1999).

Postoperatory complications of the apicoectomy are: suppuration, dental mobility, retractile scars, bucco-sinusal, bucco-nasal communications, paresthesy, anesthesia on the territory of the massenteric nerve, after surgeries on lateral mandible teeth, mucous membrane would dehiscence (Carotte, 2005).

The failures of the apicoectomy may occur after incorrect indications, systemic disorders that compromise the outcome of the procedure or operatory technique errors.

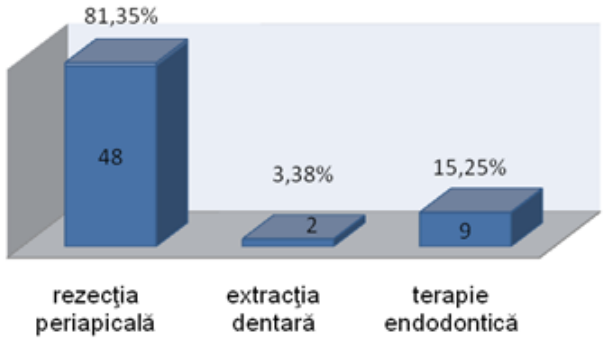

Fig.1.Tables of the therapeutic indication versus periapical lesions

Given the high percentage of chronic periapical pathology, we may keep the tooth on the arch for a longer period of time by determining the diagnosis criteria and the therapeutic variants. When odontal-periodontal units are lost, changes occur in the components of the oral-dental system, irrespective of the cause and of the edentulousness amplitude.

Morphological and functional changes occur, whose amplitude is difficult to anticipate.

The dental surgeon resorts to this therapy only when the initial therapy and the non-surgical endodontic treatment failed. The tooth apex and the affected adjacent tissues are removed by surgery (*direct coiffage*).

It is a conservative method of dressing the dental pulp with a non-irritant substance, antiseptic and anti-inflammatory to preserve the pup vitality by stimulating the production of new dentine that plays a part in protecting the dental pulp (*indirect coiffage*).

In the event of deep decays in which the removal of the obsolute dentine would lead to the exhibition of the pulp chamber, the affected tissues are partly removed by applying a paste in the cavity on top of which provisional fillings are made to stimulate the new dentine formation [11].

This type of surgery is used when the dental pulp gets inflamed or is infected. Such circumstances occur often because of high rate of dental decays not treated on time or when the dental surgeon did not perform adequately other interventions, such as the fillings. If the occurring disorders are not treated on time, then the pulp will die and will attract numerous microbes that gradually migrate, their final destination being the bone, which is destroyed step by step.

Conclusions

The conservative treatment is accepted easily by some patients, yet numerous therapy sessions are involved and sometimes the outcome is not satisfactory [6].

The surgical treatment is preferred by certain patients as it is a quick option.

Dental extraction is chosen as an alternative in molars with chronic apical periodontitis due to the seriousness of the lesion or due to patient's refusal to follow a conservative treatment [12,13].

Pain perception in patients is tightly connected to their psychical state[14-17]. A solitary therapy is not 100% sufficient in the dental practice. The mixture of several factors has a cumulative positive effect: psychical preparation, pharmaco-therapeutic sedation and loco-regional anesthesia.

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