THE OUTCOME OF ENDODONTIC AND SURGICAL RETREATMENT

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Keywords: endodontic retreatment, surgical endodontic retreatment, outcome, management **Abstract:** The persistence of teeth on the arch for a long enough period of time represents an accomplished goal due to the existence and constant improvement of the conservative means of treatment. Most frequently, the natural teeth of the patient can satisfy or can reach the standards of function and esthetics, with minimum rehabilitation treatments. However, sometimes this goals can be achieved with great efforts due to a more serious pathology. In endodontic retreatment cases, the difficulty consists in aspects concerning: dental anathomy, lack of direct visibility, the technique used, the existing pathology and also the cases involved in retreatment due to primary endodontic failure. The success rate of 83-89%, after 5 years follow-up is encouraging.

Cuvinte cheie: retratament endodontic, retratament endodontic chirurgical, succes, management **Rezumat:** Păstrarea dinților pe arcade un timp cât mai îndelungat este un deziderat realizabil datorită existenței si perfec□ionării continue a metodelor de tratament conservative. Cel mai adesea dinții naturali ai pacientului satisfac sau pot să atingă standardele de funcționalitate și estetică, cu ajutorul unor minime tratamente de reabilitare. Uneori însă aceste deziderate se ating cu mai mult efort datorită unei patologii avansate. În cazul retratamentelor endodontice dificultatea constă în aspecte ce țin de: anatomia dintelui, de lipsa de vizibilitate directă, de tehnică aplicată, de patologia existentă precum și de cazurile de eșec al tratamentului endodontic primar. Rata de succes însă, între 83-89% după 5 ani este încurajatoare.

INTRODUCTION

The main objectives of the endodontic treatment are infected pulp removal, endodontic disinfection and shaping to an internal geometry that might allow tridimensional sealing of the intraradicular space, the healing of periapical tissues and the prevention of second infection/re-infection.(1) Despite the high success rate regarding the endodontic treatment, up to 90-95% (2), failure can occur. Persistence of pathology is frequently joined by signs and symptoms accused by the patient, that might remain or reappear. The cited fail rate can reach values between 14-16%.(3)

RETREATMENT METHODS:

Treated teeth that have persistent periapical pathology can be submitted to one of the following retreatment methods: retreatment, endodontic surgical retreatment and extraction.(3,4). In the first two cases, the tooth needs to be restorable and there is also the need for the patient's compliance. Extraction is chosen in the following cases: monoradicular teeth with radicular vertical fracture, teeth that cannot be restored, massive coronal, sub-gingival, unrepairable iatrogenic, low periodontal prognostic or the patients' request.(5) Endodontic orthograde retreatment is the most conservative treatment option that is to be chosen in the first place, due to its least invasive character. In addition, the surgical retreatment without proper endodontic treatment or in missed canals presence has, despite the apical retrograde sealing, a lee success rate.(4) However, it is true that many dentists send endodontic failures directly to the surgeon without trying the conservative method or without asking for specialized endodontist advice. Abramovitz et al. (6) cited high percentage up to 55% cases sent to surgical retreatment, cases that could have been reviewed (10,5%) or

retreated endodontically (44,5%) by an experienced endodontist. According to Practice Standards, CAE (7), non-surgical retreatment is preferable to retrograde filling in cases of endodontic poor fillings when access is available for reinstrumentation and sealing of canals.

According to CAE, the indications for endodontic retreatment are the following:

- Endodontic pathology persistence with or without symptoms of a primary treated tooth;
- Incorrect primary endodontic treatment;
- Before a restorative or prosthetic treatment of an endodontic treated tooth that might predispose the apical tissues to pathology;
- Before a restorative or prosthetic treatment of incorrect an endodontic treated tooth;
- Lack of coronal restoration in absence of periapical pathology.

Endodontic retreatment consists in access to endodontic filled space, filling removal, mechanical debridement, disinfection, iatrogenic and mishaps correction and mechanical retreatment followed by sealing appropriately the endodontic space.(8)

Figure no. 1.a. Initial treatment, b. Retreatment; c. One year follow-up (Torcătoru Anca's casuistics)



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<u>Surgical retreatment</u> is to be done when orthograde endodontic retreatment is inefficient or cannot be done.

According to el-Swiah and Walker (9), the indications of surgical retreatment can be divided into biological, technical or the combination of the two. The biological indications refer to teeth with periapical pathology that do not respond to endodontic treatment, to blockage removal, calcifications and apical transportation at infected canals. In this case, biopsy is advisable when apical pathology is present.

Technical problems include crown and post presence as well as fractured instruments or silver cones presence that obstruct the access to endodontic level. The excessive curved canals and perforation that cannot be accessed orthogradely are included here as well.

According to AAE (10) surgical retreatment with retrograde filling is admitted in the following situations:

- Persistent symptoms or sinus tract presence as a consequence to an inadequate sealing that cannot be endodontically repaired.
- Periapical pathology obstructed endodontic system that cannot be adequately sealed.

Beer et al. (11) announced four general indications:

- The failure of endodontic procedure;
- Increasing or persistence of periapical radiolucency;
- Anatomical aberrations;
- Different errors in canal instrumentation: Perforations, fractured instruments, under or overfilling the canals accompanied by clinical signs and symptoms.

These previous indications are not detailed enough concerning the type of sealing that cannot be done properly endodontically and neither aspects concerning type of blockage that need surgical intervention. This is why a large field of cases might be included in one or the other of the two treatment options. The specialist decides between the two and so the decision might lead to a thin line between justified and unjustified options. This is why the surgical retreatment is way too often the treatment of choice and the endodontic conservative retreatment is neglected.

The surgical retreatment consists in the following steps: incision, mucoperiostal flap reflection, bone removal in various quantities (fenestration presence or bone destruction), but always the less possible. The pathological tissue and an apex fragment (max 3mm) are removed. After haemostasis a Ist class cavity is prepared at the section level and filled. In the end come the sutures and compressive haemostasis.

Figure no. 2. Surgical retreatment for removal of apically fractured fragment (Torcătoru Anca casuistic)



Figure no. 5.One year follow-up result



MODERN PERSPECTIVE

The introduction of endodontic microscopy that allows optimizing visibility through magnification and co-axial

illumination, as well as ultrasonic in traditional endodontics allowed the overcoming of many impediments in accessing the endodontic space and so it enlarged the field of cases where access can be achieved orthograde.

The access through crowns is limited in surface, post removal is a lot safer, the fractured files and silver cones can be easily removed thanks to ultrasonic under magnification. Obstructive complications can be overcome as well as perforations and hardly accessible canals, all of this thanks to microscopy and selective staining.(5)

Nichel-Titanium instruments brought a significant contribution in accessing and preparing the curved canals. Consequently the success rate of endodontic treatment and retreatment increased in surgical procedure's disadvantage.(6) Many cases that in the past were certain candidates for surgical retreatment can be successfully solved endodontically.

The risk of losing a crown should be weighed against surgical failure and most frequent accidents that can occur (paresthesia of the mandibular region or aesthetic alteration due to incisions.(6) We can conclude that ceramic crowns with or without posts shorter than 5 mm are not to be considered indications for surgical retreatment.

MANAGEMENT:

During diagnostic procedure the clinical signs and symptoms accused by the patient together with radiographic investigation are the only indications available.(12) In some cases the failure of an endodontic treatment is discovered by chance at a radiographic exam. (4) There are many factors that should be evaluated when retreatment plan is decided as they have a great influence on the long term success whether endodontically or surgically.

The factors depending on the dentist are very important. The experience and clinical abilities of the specialist are of great importance in treatment plan decision as well as its success.

The patients' motivation is essential in tooth maintenance. When there is no motivation the tooth extraction is preferable. When there is a high motivation endodontic or surgical retreatment are advisable. Time and financial constraints the surgical retreatment is of choice.(13)

However there are patients that due to financial and low education level will prefer extraction. In these cases the written consent is extremely important for medical protection against law implications of the medical act, as long as there are conservative alternatives for the same case.

Tooth factors can be classified in: microbial factors, technical factors and mixed.

The infectious or microbial factors consist in lack or insufficient disinfection or reinfection (4) of the endodontic system that leads to periapical pathology or the lack of healing of the existing one.

There is no general consensus that lesions under 5 mm are healing better compared to the ones greater than 5 mm, the difference consists in time. A higher incidence of incomplete healing with fibrous tissue is cited for lesion greater than 10 mm.

The endodontic treatment quality in the presence of periapical pathosis is extremely important. Sjőgren et al.(14) have determined a 94% of the periapical lesions are healing when the filling in up to the apex or is under filled to a maximum of 2 mm, 76% are healing when the filling is extruded through the apex and 68% are healing with an under obturation of more than 2 mm.

Another problem for the specialists is the presence of secondary canals that frequently open into the principal canal before getting to the apex. In this case treating the principal, the secondary one is blocked and so the failure rate is lower. In the case when both are opening at the apex the missing of either of them frequently consists in failure. The radiographic evaluation of the treatment quality enables the re-intervention for finding the missed canal that can be visualized by the asymmetric disposal of the endodontic filling when secondary canals are present.(5)

It seems that no matter the coronal sealing, the teeth with inadequate endodontic fillings have a higher prevalence for periapical pathosis compared to those with correct endodontic treatment.(2) However there are failures within cases with correct endodontic treatment with persistence of pathosis. The bacterial flora in these cases responds harder to retreatment and so the teeth with initial correct treatment have a lower success rate than those with incorrect primary treatment (3)

The coronal sealing quality and traumatic occlusion have a notable influence but the subjects need further research. (15) Concerning the success of surgical retreatment, next to the aspects mentioned the following factors should be added: the position of the tooth on the arch the influences the difficulty of the intervention, the signs and symptoms of the patient. In addition surgical intervention in medical history at the same tooth is important and influence the long time prognostic as most often it lowers it. The intraoperatory factors consist in the technique, the material used for retrograde filling, the depth of cavity and the amount of tooth removed and antibioterphy.(13)

RETREATMENT EVALUATION:

The system of classification used for radiographic evaluation of endodontic and surgical retreatment in time, cited by Rud (16) is the following:

Complete healing (successful): consists in the cases where the periapical radiolucencies are healing with trabecular structure of the bone restoration and normal periodontal space delimited by cortical bone as well as clinical absence of signs and symptoms. The periodontal space can have up to double the normal dimension. (17)

Incomplete healing (scar tissue): includes the asymptomatic cases where the lesion reduces its dimension or remains stable having the radiographic characteristics of a fibrous healing. The lesion has irregular periphery that can be demarcated by a compact bone border.

Uncertain healing: the group includes cases asymptomatic characterized by stationary or decreased radiolucency up to more than twice or more the normal periodontal space.

Unsatisfactory healing (failure): the lesions stay unchanged or with dimension increasing, clinical signs and symptoms associated

From epidemiologic, (15) Salehrabi Di Rotstein consider the success of retreatment is equal to tooth persistence on the arch. This aspect is sustained by Molven (18) who cited cases with scar tissue healing that stayed unchanged after one year and 12 years as well, and so can be called success. The uncertain healing lesion that cannot be considered as fully healed but is not associated with clinical symptoms, as the patient has no accuses, the tooth is functional, can be included as successful treatment. However, frequently at 4 years posttreatment evaluation these can pass as failures.(18,19) The one year follow-up for endodontic treatment is considered to be sufficient for teeth that show complete healing or failure for these cases won't suffer any changes in time. If healing has occurred the risk for a subsequent failure is minimal.(17) All the surgical re-interventions or extractions have been done in the first two years after the treatment.(15) The results for follow-up at 6, 12 months, 1 year show a higher healing rate for surgical retreatment compared to endodontic that is justified by the lower

dynamic for endodontic retreatment due to lack of direct access to the infected tissue.

CONCLUSIONS:

With the introduction of microscopy and ultrasonic in endodontic and surgical treatment the chances of success have increased. The success rate of endodontic retreatment cited in 2009 (3) is 70,9% after 2-4 years of follow-up and 83% after 4-6 years as cases that are failures can be discovered in the first 4 years. In 2010 the reporting is 89% after 5 years of follow-up. (15)

In recent studies Friedman and Mop report that in absence of initial periapical pathology, the incidence of healed cases after primary endodontic treatment and orthograde retreatment, is 92-98% at 10 years after treatment.(20)

Gagliani and colab. (12) estimated in 2005 the rate of surgical retreatment outcome and reintervention and found a success of 86% in retreatment cases and 59% in reintervention cases. These results are comparable to those found by Rud and colab., between 76-81%. In 2009, (3) the reported success rate is 77,8% at 2-4 years and 71,8% at 4-6 years and the one reported in 2010 is 72-85% .(21)

In conclusion the studies highlight the fact that endodontic retreatment has to proceed the surgical one, both have high healing rates, comparable when the case is adequately evaluated and the re-treatments are highly professionally done.

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