STUDY ON THE INCIDENCE OF EXTERNAL ROOT RESORPTION IN CURRENT PRACTICE

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ABSTRACT
Introduction Our study aims to identify: the incidence of external root resorption (ERR) in current practice, the etiologic factors that could leading to ERR, the possible associations with other local and general factors, and also criteria indices upon that, teeth recovery with ERR is possible. Material and method The study was performed in a lot with 264 patients, 153 women and 111 men, which were presented in 2010 at dental office in Iași. Excluded patients from our study were them aged less than 15 years, who had received treatments for temporary or permanent teeth with incomplete root formed. Also, we selected all patients who required achieving at least one intraoral radiograph for complementary teeth diagnosis Results In our entire study group, mostly aged between 40-60 years, ERR percentage level was in males at 13% of cases and at 16% in women. The most affected teeth by ERR were molars (59%) and premolars (29%) and the most common etiological factors were by endodontic way (81%). In 10% of cases ERR involved more than one tooth or it was combined with internal root resorption (IRR). The study group was limited to adult patients requiring dental radiographs as complementary diagnosis, so relatively insignificant cases were excluded when they were presented for other motivations, such as prophylactics, or with mild pathology. The incidence was highest in patients older than 40 years, especially at molar levels. For a large number of cases, there was evidenced in the same patient both: more than one ERR, or ERR combined with RRI. Conclusions External root resorption (ERR) is not a very rare entity in general dental practice, due to his complex aetiology: inflammation, occlusal trauma, impacted teeth, and iatrogenic causes. External root resorption management requires differentiated approach, tailored to diversity etiological factors.

Key words: external root resorption, incidence, therapeutic management.

INTRODUCTION
External root resorption defines (ERR) as irreversible processes lyases in cement or cement- dentinal started to root surface of the teeth. This process appears in both teeth, with and without vitality, and the diagnosis is incidentally statutes on radiographs and clinical examination, although mostly are asymptomatic resorption. (Bergmans & col. 2002) [1]. ERR classification plays an important role in diagnosis and treatment plan algorithms. Andreasen (1985) brought in the last 40 years a significant contribution to understanding this process of resorption, due to dental traumas and its classification still remains widely accepted [2]. According to the classification of Rita F., Guttman N.E. and others (1999), published in Quintessence International, external root resorption is based on clinical and histological manifestations of
three types: surface resorption, substitution resorption (ankylosis), and inflammatory resorption [3, 4]. This classification does not include other forms of resorption processes identified in the last two decades. A type of internal resorption of these, as transitory stage to internal apical surface resorption, should be added together with other types of hyperplasia resorption. These hyperplastic coronary or cervical root invasive resorptions are not included into any category, and they are the results of dental trauma or other cofactors. (Heithersay 2007) [5]. Depending on the location level, external resorption classification may be: lateral, apical, and cervical (Cohen). Another classification was proposed by Lindskog (2006) and Heithersay (2007). This classification divide resorption into 3 groups: resorption due to dental traumas, resorption caused by dental infections, dental hyperplasia resorptions [5, 6, 7]. Some ERR are apparently without cause and are named “idiopathic”. The advantage of this classification is that make a clear distinction between each category, providing useful data on treatment options. For example, resorption caused by teeth infections, regardless the type of infection, requires the removal of microorganisms as an essential part of treatment management (Heithersay 2007) [4, 5].

Levander and Malmgren’s classification has four stages for ERR (Fig. 1) [10].
- irregular root contour, opened apex
- resorption less than 2 mm
- resorption more than 2 mm up to one third root level
- severe resorption over one third root level

Terminology for ERR is still unclear and creates confusion among dentists (Bergmans et al. 2002) [1, 10]. Our study aimed the following objectives: to determine the incidence of ERR in current dentistry practice, identification main aetiological factors that could cause ERR, the possible association with other local and general cofactors, criteria establishment for teeth with ERR recovery, with medical treatment, or for adequate surgical techniques (apicectomy, extraction).

Fig. 1. Root resorption stages

**MATERIAL AND METHODS**

The study was conducted in a group made from the patients who were presented in 2010 at dental office in Iași. Patients under 15 years that received treatment for temporary or permanent teeth with incomplete root formed were excluded. Also we selected patients who required at least one X-ray complementary diagnosis per tooth. The study group included 264 patients, 153 women and 111 men (Fig. 2). Incidence of ERR by gender in study group is illustrated in the Fig. 3, 4.

Teeth groups’ distribution for ERR is presented in Fig. 5.

Depending on etiologic diagnosis for ERR we obtained the following diagram (Fig. 6).

We encountered more situations where in the same patient ERR was present in more than one tooth (5 cases of 46 patients) or ERR was combined with IRR in the same patient (5 cases) (Fig. 7, 8).

All examined teeth that presenting endodontic apex damage and / or incorrect endodontic treatment (Fig. 9) were diagnosed with ERR:

Teeth with ERR degrees repartition in study group (Fig. 10).
Fig. 2. Distribution of patients by age

Fig. 3. ERR (Rate of external root resorption) incidence for males

Fig. 4. ERR (Rate of external root resorption) incidence in women (84% total women, 16% women with RRE)

Fig. 5. Distribution of external root resorption by anatomic site

Fig. 6. Distribution of etiological conditions associated with external root resorption

Fig. 7. The rate of multiple RRE

Fig. 8. Association between external and internal root resorption

Fig. 9. Incidence of external root resorption on teeth with incorrect endodontic treatment
Fig. 10. Incidence for ERR degrees in study group: <2 mm 17 cases, 2-4 mm 21 cases, >4 mm 7 cases

DISCUSSIONS

The study group included a relatively large number of patients presented to a dentist during 2010, for counselling, diagnostic and treatments purposes. Gender distribution of the study group showed a greater demand from women which is consistent with the literature, probably due to a deeper worry that they have to look in general and particularly for oral health. Age distribution in study group showed a small percentage of patients aged less than 20 years, because children who received treatments on temporary or permanently teeth with incomplete root formation were excluded. Also the study group was limited to patients that required dental X-ray as complementary diagnosis; those presented as prophylaxis control, or with mild pathology were excluded (e.g. small decays). This explains why cases have mostly counted over 40 years, with a peak between 50-60 years.

The analysis results of teeth upon age repartition in study group explains also the presence of a large number for teeth with endodontic damage, even they have either been diagnosed for first time with severe apical lesions, either they presented previously and unsatisfactory endodontic treatments. We note a very large percentage of teeth with poor endodontic treatments, especially in patients over 40 years.

In this study based on radiographic images as complementary diagnosis, we identified in an overwhelming percentage that the causes that could led to ERR were: apical lesions, due to poorly endodontic treatments, or due to deep evolution of decays in vital teeth, grind undergoing prostheses, and in a relatively small number of cases we find other causes (included teeth, occlusal trauma).

Teeth with endodontic diseases and endodontic incorrectly treatment preview a percentage of 24.5% and developed ERR as secondary complication. Number of cases with ERR was similar in men and women (13% and 16%, respectively) which shows that there no gender correlation for ERR. Instead there are some cases wherein the same patient we identified more than one tooth with ERR or ERR combined with IRR, which might suggest a certain predisposing way to this complication.

Depending on the dental teeth group analysed, mostly cases occur in molars, then premolars, and only a small percentage of the frontal group. Because mostly cases of ERR met periapical complications, this result could be explained by correlation with distribution decays percentage that occur first in molars, then premolars, and only a small percentage of the population has decays in the frontal group. So this high percentage of ERR, occurred in molar teeth is not linked with teeth position in dental arches, but it could be colligate with the incidence level of dental decays developed in groups of teeth and thus, over time, with their endodontic complications.

The ERR analysis according to resorption degree, root length was measured on radiographic images and was compared with an average standard described in the literature. There was find a large number of ERR cases with average between 2-4mm, greater than those with average under 2mm. However, error measurements are not excluded because radiographs are often binding technical errors.
This ERR classification is important in current dentistry practice, because on it depending to establish an adequate treatment planning. If for ERR at I-st class (<2mm) a classical conservative endodontic treatment may be required in mostly cases, but chances for conservative endodontic treatment decrease for ERR II-nd class, and endodontic surgery could be also indicated.

When ERR lyses is over 4mm, periodontal teeth support could be compromised, whether it is sufficient to ensure stability of the tooth over time, in these conditions a successful endodontic treatment could be applied.

Surprisingly, however, when the mobility of the teeth was assessed comparatively with ERR degree, it was found that, even where root damage exceeded more half the root length, maximum mobility degree was at I level, that’s could suggest a degree of periodontal adaptation to the slow destruction, started from apical root, in condition that the tooth is not diagnosed with periodontitis.

External root resorption of permanent teeth is a rare entity in general dental practice with complex aetiology: inflammation, occlusal trauma impact, impacted teeth, and iatrogenic treatments. Iatrogenic treatments that contributed to the external root resorption were: teeth whitening, orthodontic treatments, teeth replanting. External root resorption management requires differentiated treatments approach tailored to diversity etiological factors.

CONCLUSIONS

External root resorption defines (ERR) as irreversible processes lyses in cement or cement- dentinal started to root surface of the teeth. This process could be present in both teeth with and without vitality. If for temporary teeth ERR is a physiological process, but permanently dentition ERR becomes pathological leading to tooth loss in some cases.

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