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Case Study

Selective Endodontic Retreatment - An Efficient Therapeutic Approach of Teeth with Missed Canals

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Abstract

It is already known and studied in the endodontic literature that missed canals induce apical periodontitis. Current excellent technical resources for accurate diagnosis, such as Cone-Beam Computed Tomography (CBCT), but also the dental operating microscope make it possible to locate and target missed root canals that are cause of apical pathology, without the need to approach the other canals as well, thus achieving minimally invasive, cost effective and, more importantly, predictable, clinically favorable treatments. The aim of this paper is to provide evidence regarding the clinical efficiency of selective endodontic retreatment, as a conservative treatment alternative of roots with periapical pathosis of multirooted teeth.

Keywords: Selective Retreatment; Cone-Beam Computed Tomography; Missed Canals

Introduction

The high prevalence of post-treatment chronic apical periodontitis, such as persistent, recurrent or emerging apical periodontitis, which can reach 39-46% [1,2], determines the high degree of addressability of retreatment cases in endodontic offices.

There are multiple reasons why an endodontic treatment fails, and it is crucial to identify and then to address the cause for a successful outcome, as it is always an endodontic infection (persistent or secondary) which determines the periapical disease [3,4]. If we exclude the causes of failure that are not of an endodontic nature (lack of coronal seal, defective prosthetic treatment plan, periodontal disease), then we can refer to endodontic technical errors as the most frequent reasons why post-treatment disease occurs.

If we can estimate that there was no contamination of the endodontic space, certain iatrogenic errors, limited to a certain canal, can be corrected, without resuming the entire endodontic treatment in the case of teeth with more than one canal.

Selective retreatment finds its applicability in cases of missed root canals, for example, the most affected dental group being the maxillary molars, by omitting the second mesio-buccal canal or the lingual canal in the first mandibular premolars [5].

Missed canals have been associated in the endodontic literature as being one of the causes of apical pathology [6,7], maxillary molars and mandibular first premolars often presents with missed canals and consequently with an apical periodontitis.

Our clinical cases expose the diagnostic algorithm, the decision of selective treatment and the postoperative outcome.

Clinical case 1

A 46-year-old female patient was referred to our endodontic office for endodontic treatment of tooth 26 (maxillary left first molar). She told us that two weeks ago she had severe pain related to this molar. As she was a dentist, she went to an endodontist, who suspected a missed mesio-buccal canal, but he could not locate its orifice. The patient told us that the tooth was treated endodontically some years ago by her general dentist but she did not remember the exact moment. A crown was cemented at that time, but it was removed by the previous endodontist when he attempted to locate the mesio-buccal canal.

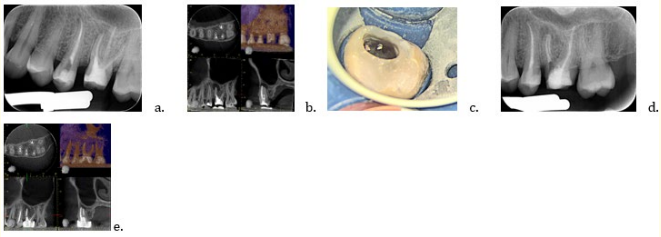

Figure 1: a preoperative radiograph b. preoperative CBCT c. intraoperative image d. postoperative radiograph e. 6-month follow-up CBCT.

Upon clinical examination in our office, the tooth was tender to percussion and palpation, periodontal probing within normal limits. The tooth had a fiber post in the palatal canal. A periapical radiograph (Figure 1a) showed a periapical radiolucency in relation to the mesio-buccal root of tooth 16, right first maxillary molar. The three root canals were satisfactory treated. We decided to scan the tooth, to confirm and to locate the missed canal and to rule out a periapical lesion in relation to the other roots. Small field of view (a scan limited to only 3-4 teeth) CBCT (Figure 1b) showed the exact position of this canal, a very large periapical lesion in relation to this root and no periapical lesion related to the other roots. No sinus inflammation was observed, and the sinus floor was intact. The coronal restoration showed no signs of recurrent caries and consequently we went for a smaller slot access, to minimize damage to the restoration. The palatal post was left in place. We were able to locate the canal (Figure 1c) and then to establish apical patency, to shape, disinfect and obturate the canal with a bioceramic sealer and gutta-percha cone (Ah plus Bioceramic, Dentsply) (Figure 1d). It was a single-visit endodontic treatment for this second mesio-buccal canal.

A 6 month-follow-up CBCT showed a remarkable evolution towards healing. The tooth was no longer sensitive, symptom free and functioning.

Clinical case 2

A 32-year-old female patient was referred to our office for evaluation of tooth 44 (mandibular right first premolar). The chief complaint was pain on biting on the right side of the mandible. Root canal therapy was completed some years ago and the patient said it underwent some surgery short time afterwards, due to persistent sensitivity of the tooth (these treatments were performed by her general dentist at the time). The patient could not remember the exact moment for any of these treatments. The patient reports that these painful episodes have been repeated lately. The last one occurred two days before the visit to our clinic. The pain was dull and intermittent, triggered by chewing on this tooth.

Clinical examination confirmed that the tooth was tender to percussion and with normal periodontal probing.

The periapical radiograph showed (Figure 2a) a periapical radiolucency in relation to tooth 44, right first mandibular premolar. The image was suggestive for a premolar with two canals. We were able to locate the lingual canal. We shaped it with Pro Taper (Dentsply) rotary files to file F2 (25.08) and disinfect with sodium hypochlorite 5.25% and a final ethylenediaminetetraacetic acid (EDTA) 17% irrigation. The solutions were ultrasonically activated to enhance their efficiency. The canal was dried with sterile paper points, and we filled it in one session. We decided not to approach the buccal canal, as it presented a satisfactory obturation upon inspection with the dental operating microscope. The off-centric postoperative radiograph (Figure 2b) showed the obturated lingual canal, which was slightly longer, as it was not resected during the previous apical surgery.

4 years later, the periapical radiograph (Figure 2c) showed complete healing of the periapical lesion. The tooth was completely asymptomatic and functioning.

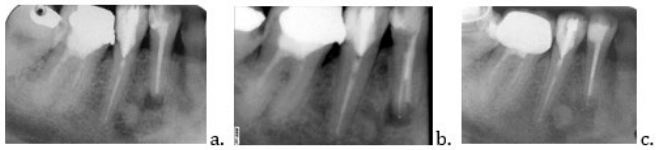

Figure 2: a. preoperative radiograph b. postoperative radiograph c. 4 year follow-up radiograph.

Discussion

In the presence of a root canal treatment which on the periapical radiograph seems correctly performed and in the absence of marginal caries, we can suspect a missed canal.

To confirm this potential situation, it is essential to scan the respective tooth with CBCT, as it allows for a precise diagnosis, without the impediment of the superimposition of other anatomical structures or artifacts [8,9]. The most useful section for this purpose is the axial, horizontal one, although, in certain cases the coronal one is useful, as well.

As in many other situations, the selection of the case is crucial for the success of the treatment through this approach [10,11]. Unfortunately, we do not have a lot of objective information with which to perfectly appreciate these conditions. Thus, the radiological aspect is a starting point, but especially the one on CBCT, which can accurately highlight early stages of apical pathology.

The CBCT scan helped us to decide for a selective retreatment for the first case, as we did not retreat the other root canals. The absence of the periapical lesion on the CBCT image helped us to make this decision.

The intraoperative aspect of the endodontic space as it appears exposed with the help of the dental operating microscope is another essential factor to consider when is to establish a treatment plan. Thus, an obturation that appears satisfactory on radiological images, when evaluated with dental operating microscope, may actually show a series of deficiencies, leaky, easily penetrated, with necrotic tissue remnants on the root canal walls. In this case, we are required to change the treatment plan, as it is well known that satisfactory coronal restoration was found to improve the outcome of root canal treatment significantly [12].

Considering all these aspects, selective retreatment is not frequently applied in endodontic practice, because the conditions for success are not usually met.

In the case of missed canals, their approach is most often facilitated by the fact that their anatomy has not been altered by previous treatments and therefore can be completed in one session [13,14].

The challenge, most of the time, is to clinically identify, intraoperatively, the omitted canal, which was previously visualized on the axial CBCT section and then to be able to gain full working length. This is easier said than done for many of second mesio-buccal canals and also for the deep bifurcated lingual canal of first mandibular premolars. The first clinical case clearly emphasizes the value in the subsequent evolution of the clinical experience of the operator [15].

Regarding the follow-up rate, it is comparable to outcomes reported of full root canal retreatment in teeth with apical periodontitis [16-18]. Selective root canal retreatment in a retrospective study had a favorable outcome in a majority of cases, 86.7%. Unretreated roots rarely developed radiographic signs of a new periapical lesion at follow-up [19,20].

In the near future, the lack of experience will probably be counterbalanced by new technologies, such as guided endodontics. Although it involves additional costs and cannot yet be applied in all situations, static or dynamic guidance is accurate, minimally invasive and faster than freehand technique [21].

When it is applicable, selective retreatment is beneficial for both the operator and the patient, with obvious advantages from a biological point of view, being minimally invasive and with reduced risks of iatrogenic mishaps, but also in terms of time and costs, being equally effective clinically as a complete retreatment [22].

This treatment concept, if judiciously applied, allows a targeted, individual approach, specific to surgical treatment, but conservative, with high success rates.

Conclusions

Selective retreatment is similar to endodontic surgical treatment, which only addresses roots with apical disease, but it is by its orthograde nature, conservative and minimally invasive.

Thus, it presents multiple advantages for the patient, being performed quite quickly, often in a single session, less demanding in terms of time, effort and costs, but with the same favorable outcome.

This treatment concept, if judiciously applied, offers encouraging results and may help clinicians to consider it as a viable alternative to classic nonsurgical retreatment.

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