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ERRORS AND COMPLICATIONS IN ENDODONTIC INTERVENTIONS ON MULTI-ROOTED TEETH

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Abstract: Errors, even if unintentional, interfere with the unbiased and objective clinical judgment of the dentist. On the other hand, the selection of adequate approaches to solve certain clinical situations depends on the mistakes made in the past and how much the doctor understands the reasons for their occurrence. If you analyze the last patient who came to you with the problem of unsuccessful endodontic treatment and successfully placed a dental implant, the idea appears that implantation is a more predictable intervention than endodontics. And this will also be a mistake. Today's trends in endodontics include the use of a microscope for iatrogenic intervention

Key words: canal anatomy; tools for processing them; predictability of interventions.

Errors in endodontic treatment

Taking this fact into account, in this article we will try to analyze the most common problems that arise during endodontic appointments and suggest the best ways to solve them. Our analysis focuses on the following three aspects:

canal anatomy;

tools for processing them;

predictability of interventions.

These aspects are logically connected: after all, anatomy determines the possibility of adequate processing, and the selection of necessary tools determines the predictability of manipulation in general.

Anatomical errors

All dentists should clearly understand the role and perspective of continuing clinical education with an emphasis on improving knowledge of dental anatomy. Endodontic, occlusal, periodontal, and even aesthetic problems often arise from anatomical causes that no one pays attention to. Very simplified educational materials allow the doctor to misunderstand the endodontic details of the tooth structure, thereby increasing the risk of developing a number of possible complications.

Anatomical errors

This is one of the recommendations that all doctors should take into account: after extraction, the teeth should be examined under a microscope or a magnifying glass. Two-dimensional radiographs may show only three root canals, whereas up to 80% of all first and third molars may have four roots and equal or more canals. The MB and MP canals (MB-2) usually merge, but their morphology remains unique. It is safer for the clinician to consider these channels as independent of each other for diagnosis, access, and treatment. Wisdom teeth often differ in their anatomy with a greater complexity than the first and second molars, so the classic rules of canal treatment may not be suitable, and the structure of such teeth in most cases ensures the presence of four canals. The radiographic apex of the tooth should not be considered as a reference point for assessing the adequacy of the root canal filling, since the location of the root canal filling and the actual opening of the apex are often completely different. Such a simple anatomy of the apical foramen depicted in advertising brochures for endodontic instruments can only be found in incisors, but in other teeth it is more complex.

A photograph of an extracted molar shows that the actual position of the apical hole is more than 1 mm from the radiographic apex of the tooth. If the tooth is underfilled by only 0.75 mm at the narrowing, a direct radiograph will show that there is still more than 2 mm to the radiographic apex. Therefore, the main thing in such cases is not to overdo it.

Anatomical errors III: Apical narrowing

The narrowing of the root canal is about 3 mm from the apex of the root. Thus, even if the canal is filled to the point of narrowing, a direct radiograph shows an unfilled space of almost 4 mm. Using the Apex Locator, you can avoid problems and "misunderstandings" about the depth of filling. Most of the current vertex locators allow very precise determination of the position of the root vertex. At the same time, the author of this article found that when testing the latest designs of apex locators, they sometimes provide slightly "reduced" indications of the position of the root apex due to the closure of the electrical loop of the device. root compression area. But, on the other hand, when performing a primary endodontic intervention, not filling the root canals to the end is histologically justified, because the remaining part is filled with the so-called "biological plug". In the treatment of previtral teeth, removing the root filler beyond the apex is a biologically unreasonable approach, although it cannot be considered a critical error. This reminds me of the argument between Europeans and Americans: in many conferences, the former ask the latter, why do they remove more material from the peak than fill it? It should be noted that this trend has actually been observed in North America, but over the past 50 years the endodontic filling margin concept has shifted to a more coronal apex.

If the tooth is completely calcified on the X-ray, then the pulp is considered to be completely absent and therefore there is no reason for endodontic treatment. However, studies have shown that even in cases of X-ray obliteration of the canals, clinically they may contain pulp extending from the crown to the apex, which is slightly smaller. Consequently, endodontic manipulations in such teeth are no longer unreasonable.

Summary of Anatomical Errors and Clinical Recommendations

The goal of endodontic treatment of living teeth (during primary endodontic interventions) is to fill the roots of the teeth to the level of anatomical narrowing, not to the level of the radiographic apex. In primary endodontic interventions, removal of the root filling beyond the apex is an unacceptable clinical outcome of the treatment. A number of factors affecting the quality of diagnostic procedures performed to determine the apical opening should be taken into account. In the case of secondary endodontic interventions, it is better to fill the canals to the level of the tooth apex, having clearly determined its position in advance. In some cases, it is not possible to prevent the root sealant from extruding beyond the apex of the tooth, while ensuring adequate cleaning and preparation of the root canal. The anatomy of clinical ovoid canals can be

much more complex than a doctor's radiograph, because the number of roots and canals of teeth often exceeds what can be recorded on two-dimensional radiographs. Vertucci classified eight different types of canals located in the ovoid root, the root canals run independently or intersect in various combinations along their course. Gulabivala added five more channel patterns to the eight channels proposed by Vertucci, including the ability to have four separate channels on a single root.

Errors in rooting tools

Round drilling has long been the tool of choice for creating root canal access. Due to their spherical shape, they seem safer than other analogues, besides, they are convenient for treating coronal pulpotomy and calcified pulp chambers. There is a common misconception that round burs provide a safe and slow preparation, but this is not true. x-ray showing how dangerous it is to use a round drill without supervision. As a result of its application, a tunnel with parallel walls is formed in the coronal part of the canal, it is desirable to form a cone for endodontic reasons. An experienced doctor can create the desired cone shape using round burs with different diameters of the working part. But it is much easier to achieve the same result with conical folds. In addition, it may be necessary to use 5-7 tools to form a conical entry in a round bore channel, when the same result can be achieved with only 2 conical tools.

Basically, round burs are characterized by the presence of three main disadvantages. The first is size. The size of the working part of the round nose is very large. The second drawback is the form. After preparation with a round drill, pits are formed in the structure of the drill, which makes it difficult to insert working files. In this case, the file is simply placed in the wrong direction. Without understanding the real cause of the problem, the doctor tries to insert the file as deep as possible, as a result, it thins and thins the wall of the spherical depression until a perforation is formed. Khademy found that the use of a round drill to access the dental canals does not allow to completely drain all the walls of the pulp chamber due to the shape of the drill and the dentine "roof" in some places. the pulp remains intact. What does this lead to? In addition, pulp or plaque residues remain in such places, which are formed during preparation and are not cleaned later. In other places, the walls of the pulp chamber, on the contrary, are prepared more than necessary. There is little logic behind this approach.

Thus, round burs can be used for endodontic purposes, but such interventions require planning. New instrument systems take into account the above-mentioned disadvantages of round drills and they are modified in such a way as to provide the most biologically based approach to the formation of the root canal access. When preparing the pulp chamber with the help of carbide conical burrs, the doctor can even feel the difference between the dense dentin and the remnants of the dental pulp. On the other hand, the lack of visualization during preparation in the pulp area can be mitigated by using 8 or 24x magnification. Thus, the doctor can identify all areas that require additional training. In any case, the use of conical carbide burs and magnifying optics helps to preserve the cervical dentine tissue to the maximum, which is very important to ensure the functional stability of the tooth. Cervical dentin, also called "neck of the tooth", occupies a height of about 8 mm, of which 4 mm is coronal to the level of the bone apex and 4 mm more apical.

Clinical condition

In this article, we also analyze the clinical situation, which shows that a comprehensive approach to endodontic radiation is the key to success. A 42-year-old woman is scheduled for endodontic treatment of a calcified central incisor for intracanal whitening. On the X-ray taken before the intervention, the canal appears to be completely destroyed, except for the area in the center of the root of the tooth. In such clinical cases, it is recommended to use a microscope to visually expand the working area to ensure a successful treatment outcome. In clinical practice, general practitioners, even without magnification, struggle with partially sclerosed root canals, spending a little more effort and nerves than those who use a microscope or magnifying glasses for such cases. Isolation of a single tooth during endodontic treatment can be a little

confusing for the doctor, because it is sometimes very difficult to visualize the three-dimensional structure of the tooth root system under the rubber dam. In addition, the rubber dam hides some anatomical landmarks that the doctor can use to create access. In addition, the clamp for the rubber dam makes it difficult to use the X-ray examination immediately, because it causes a change in the position of the sensor during the diagnostic imaging process. Some doctors suggest not using a rubber dam at all in the endodontic treatment of sclerotic root canals. According to the author of the article, the disadvantages of isolating a single tooth can be avoided by isolating the rubber dam scarves of all teeth simultaneously in the quadrant of interest: in this way, all anatomical landmarks can be visualized in any case. method of breaking the dryness of the work area. The first step in the endodontic treatment of calcified central incisors is to plan the access space from the palatal side of the tooth (Fig. 15-16). After the doctor reaches the area of the pulp chamber, it is recommended to take a control X-ray. Customized scholarships should be used to create a suitable entry. First, they create a small depression in the enamel and dentine structure of the tooth, and then continue it in the apical direction.

This approach reduces the risk of the drill bit slipping during the preparation process. In addition, in this way, it is possible to ensure the correct inclination of the drill along the entire depth until it reaches the pulp chamber. After creating access in this way, we have a very narrow and targeted access to the incisal pulp. Expanding this access, the doctor can imagine all the necessary map of the lower part of the pulp cavity.

The author of this article suggests taking a series of targeted radiographs with a conical drill in the tooth structure to visually understand how its position depends on the position of the pulp chamber and canal openings (Figures 21-24). In the past, a similar approach was used with endodontic files in the dental canal, but the conical burrs that the doctor uses to make a pulpotomy and create an access to the hole are also ideal for this purpose. By performing the approach described above, the doctor is also able to reduce the size of the prepared tissue compared to what needs to be removed when creating a classic horizontal approach in the center of the crown. The latter also involves changing the direction of preparation at an angle of 90 degrees from horizontal to vertical, which also led to the appearance of a number of iatrogenic complications.

Thus, the proposed modified approach allows solving a number of problems associated with the implementation of classical algorithms for preparing teeth for endodontic treatment, in particular:

instead of isolating a single tooth, it is recommended to isolate the entire sextant or quadrant to ensure the visualization of all anatomical landmarks;

instead of a horizontal entrance at an angle of 45 to 90 degrees, which later moves vertically, it is recommended to create an entrance to the pulp chamber with a conical drill below the incisal edge of the tooth from the palatal side;

To carry out primary preparation at an angle of 90 degrees, it is recommended to create a primary recess at an angle of 45 degrees using a round, diamond or conical carbide instead of the classic marking of the entrance to the enamel. Bur;

instead of creating a deep entrance with a long round drill, it is recommended to deepen the cavity of the pulp chamber with conical carbide drills;

Instead of tunneling deeply to find the pulp with different instruments, it is recommended to treat according to the concept of "incisal edge to apical end", following the same direction of the instruments.

Error summary

In restorative dentistry, fissurotomy, air abrasive treatment, laser cutting of hard tissues and other modifications of approaches to the preparation of occlusal caries sites provide preservation of a much larger

volume of hard tooth tissue than classical cutting of enamel and dentin. types of drilling. Thus, the paradigm of minimally invasive interventions is becoming increasingly popular, for which new tools and materials have been developed. In contrast, aggressive treatment methods involving the excision of large amounts of hard tooth tissue are becoming increasingly popular in endodontics. This only means that the treatment paradigm shift in endodontics is progressing much more slowly than in restorative dentistry. But sooner or later, all fields come to the conclusion that a conservative approach is the most effective, because it eliminates the development of secondary complications.

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