TOOTH SYNDROME CRACKED IN UPPER MOLAR RESTORED: CASE REPORT

SÍNDROME DEL DIENTE AGRIETADO EM MOLAR SUPERIOR RESTAURADO: RELATO DE CASO

SÍNDROME DO DENTE RACHADO EM MOLAR SUPERIOR RESTAURADO: RELATO DE CASO

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Abstract
Objective: The present study aims to present, through a clinical case, the importance of the early diagnosis and the treatment instituted in a tooth that presents a crack.
Case report: Patient sought endodontic treatment due to an acute pain that felt in tooth 17. It had a restoration of amalgam in the occlusal without infiltration or without any clinically visible fracture. In the tests of palpation and percussion there was the presence of painful symptomatology and in the thermal test intense pain that took a few seconds to cease. Radiographically no periapical lesion was observed. After removal of the restoration, it was observed that the tooth presented a mesial to distal crack. The adopted treatment was the accomplishment of the endodontic treatment and subsequent prosthetic rehabilitation.
Conclusion: Thus, it was concluded that teeth, when well diagnosed, can be treated and kept in the oral cavity.
Keywords: Cracked Tooth Syndrome; Endodontics; Molar; Toothache.

Resumen
Objetivo: El presente trabajo tiene como objetivo presentar a través de un caso clínico, la importancia del diagnóstico precoz y el tratamiento instituido en un diente que presenta trinca.
Relato de caso: El paciente buscó tratamiento endodóntico debido a un dolor agudo que sentía en el diente 17. El mismo presentaba una restauración de amalgama en la oclusal sin infiltración o sin fractura alguna visible clinicamente. En las pruebas de palpación y de percusión hubo la presencia de sintomatología dolorosa y en el test térmico dolor intenso que tardó algunos segundos para cesar. No se observó presencia de lesión periapical. Después de la remoción de la restauración, se observó que el diente presentaba una trinca de mesial a distal. La conducta de tratamiento adoptada fue la realización del tratamiento endodóntico y posterior rehabilitación protética.
Conclusión: Así se concluyó que dientes trincados, cuando bien diagnosticados, pueden ser tratados y mantenedos en la cavidad oral.
Palabras-claves: Síndrome de Diente Fisurado; Endodoncia; Diente Molar, Odontalgia.

Resumo
Objetivo: O presente trabalho objetiva apresentar através de um caso clínico, a importância do diagnóstico precoce e o tratamento instituído em um dente que apresenta trinca.
Relato de caso: Paciente procurou tratamento endodôntico devido uma dor aguda que sentia no dente 17. O mesmo apresentava uma restauração de amálgama na oclusal sem infiltração ou sem fratura nenhuma visível clinicamente. Nos testes de palpação e de percussão houve a presença de sintomatologia dolorosa e no teste térmico dor intensa que demorou alguns segundos para cessar. Radiograficamente não foi observado presença de lesão periapical. Após a remoção da restauração observou-se que o dente apresentava uma trinca de mesial para distal. A conduta de tratamento adotada foi a realização do tratamento endodôntico e posterior reabilitação protética.
Conclusão: Assim concluiu-se que dentes trincados, quando bem diagnosticados, podem ser tratados e mantidos na cavidade oral.
Descritores: Síndrome de dente quebrado; Endodontia; Dente Molar; Odontalgia.

Introduction
Caries and periodontal disease are the main factors that cause tooth loss. However, it is important to remember that studies show that a growing number of patients have been compromised by fractures, which has become the third most common cause of tooth loss in industrialized countries. These fractures may be related to a visible crack that can reach restored teeth or even healthy teeth.

The term cracked tooth syndrome was first described in 1964 in a paper by Cameron and was defined as a crack or crack in the enamel and/or dentin in a vital posterior tooth, which occasionally extends to pulp. This fracture promotes the rupture of the tooth, but the segments do not separate, being held together by a portion of the dental structure, so called incomplete fracture.

The descriptive syndrome presents as a relatively common occurrence in dental practice, but often leaves the dental surgeon in an enigmatic situation, since it is not always possible to perform the diagnosis clearly and accurately. This is because, for the most part, the signs and symptoms are nonspecific, the cracks are not visible during the clinical analysis nor even identifiable in routine radiographic projections.

The etiology and predisposing factors of this syndrome have multifactorial characteristics. Morphological, physical and iatrogenic aspects, such as deep grooves, pronounced fluctuation of intraoral temperature, poor design of cavity preparation, erroneous selection of restorative materials, functional habits, chewing of hard objects, excessive occlusal forces, placement of intraradicular pins, use of rotating instruments, physical trauma, premature contact, teeth weakened by resorption (internal or external), and/or caused by some iatrogeny may predispose the posterior teeth to an incomplete fracture.

Diagnosis in the past was based exclusively on the patient's reported symptoms. But today, in addition to the described symptoms, there are methods that help to realize the diagnosis of RDS. If a tooth is restored, removal of the restoration with subsequent use of stains for coloring the fracture line, use of a magnifying glass, a microscope, and even computed tomography may favor cracking.

The clinical signs and symptoms of RDS are varied according to the extent and depth of the fracture. The patient usually reports painful symptoms with discomfort during the chewing of harder foods. This is because the pressure promoted by occlusal forces on the crown of a cracked tooth causes small movements and slight removal of the cracked fragments, resulting in hydraulic movement of the dentinal fluid, activation of the myelinated fibers and finally stimulation of odontoblasts creating a rapid and intense. In addition to the characteristic symptoms there may be sensitivity to temperature variation, especially to cold and sensitivity to chewing sweets and acidic foods.

The prognosis is directly related to three factors: the extent and location of the fracture, the time of the intervention and the type of restoration. This causes the symptoms to be dependent on the severity of the fracture, which may be small, resulting in a simple sensitivity without the need for invasive treatment, or may be severe, resulting in endodontic treatment or even tooth loss.

Treatment will depend on the location and extent of the fracture. The closer to the pulp, the worse the treatment and prognosis of the tooth, so early diagnosis is very important. There is no current evidence to show that the treatment option has the highest success rate, both from a restorative perspective and from a pulp health point of view.

The condition is found mainly in patients over the age of 40. Men and women are equally affected. The most affected teeth are the first maxillary molar, followed by the lower first molar, the second mandibular molar and the second mandibular
molar. While fractures tend to mesiodistal orientation in most teeth, mandibular molars may occur in the buccolingual orientation.

The clinical case aims to show the importance of early diagnosis and treatment of a tooth that presents a vertical crack.

**Case report**

A female patient, without systemic involvement, sought endodontic treatment due to an acute pain in the tooth. Anamnesis and extra-oral and intra-oral clinical examination were performed. Clinically an amalgam restoration was observed in the occlusal without infiltration and without any visible fracture type. All sites were probed and there was no periodontal impairment. In the palpation and percussion tests, the patient reported painful symptoms. During the thermal test, he reported intense pain, which took a few seconds to pass and, radiographically, no periapical lesion was present (Figure 1).

Based on these tests, a diagnosis of terminal irreversible symptomatic pulpitis can be reached. For the endodontic treatment, the chemical-mechanical preparation (PQM) associated with 1% sodium hypochlorite was performed (Asfer Indústria Química Ltda, São Caetano do Sul, SP, Brazil) as auxiliary chemical. Anesthesia and total removal of the amalgam restoration was done (Figure 2) where it was possible to perceive a darkened line from mesial to distal in the vertical direction. Apparently it appeared to be a fracture, but with endodontic nails (Dentsply-Maillefer-Ballaigues, Switzerland) it was realized that there was no separation of fragments. A fissure or incomplete fracture was suspected.
Figure 2: After removing the amalgam restoration

Coronary opening was performed with a 1014 drill bit (K.G.Sorensen Ltda, Barueri, SP, Brazil) and endo-Z drill ceiling removal (Dentsply-Maillefer, Ballaigues, Switzerland). Then absolute insulation was performed and at this stage the crack length was observed in the mesio-distal direction and it was concluded that it was an incomplete fracture (Figure 3).

Figure 3: Clinical image of the mesio-distal fracture line

After the coronary access, the channels were penetrated with K # 10 file (Dentsply-Maillefer, Ballaigues, Switzerland) and pre-enlarged with the FileProglider (Dentsply-Maillefer, Ballaigues, Switzerland). Odontometry was initially performed with Romiapex apical locator (Romidan LTD, Kiryat-Ono, Israel) and confirmed with FIT digital sensor x-ray (Micro Image, Indaiatuba, SP, Brazil). The instrumentation was made as a reciprocating system WaveOne Gold (Dentsply-Maillefer, Ballaigues, Switzerland) using the VDW Silver engine (VDW Germany, Munich). The mesiobuccal canal was modeled with instrument # 35/06 (medium), whereas the distobuccal and palatal channels, with instrument # 45/05 (large).

At the end of the instrumentation, the EDTA Trissodic 17% (Biodynamic Quim and Farm. Ltda - Ibiporã, PR, BR) was used for 3 min to remove the smear layer produced after instrumentation. The channels were dried with sterile paper tips (DentsplyInd Com LTDA, RJ, Petrópolis, Brazil) and the calcium hydroxide paste Calen (SS WhiteDuflex, Rio de Janeiro, Brazil) was placed.

After the conclusion of the first session, the patient was clarified about the treatment options and that the maintenance of the tooth would be a viable attempt, however, the prognosis would be reserved. After contact with the specialist in
rehabilitation, we opted for endodontic treatment followed by prosthetic rehabilitation with total crown, aiming to stabilize the crack region.

After three days, a single taper of Tanari (Tanariman Industrial LTDA, Manacapuru, AM, Brazil) was performed, compatible with WaveOne Gold and AH Plus cement (Dentsply-Maillefer, Ballaigues, Switzerland) (Figure 4).

![Figure 4: X-ray of the obturation](image)

Immediately after the obturation of the root canal system, the sealing of the mouthpieces with provisional shutter Villevie (Dentalville do Brazil LTDA, Joinville, SC, Brazil) was performed and provisional restoration with Maxxion R glass ionomer cement (FGM Produtos Odontológicos, Joinville, SC, Brazil). (Figure 5). The patient was referred for prosthetic rehabilitation.

![Figure 5: Radiography with the provisional restoration of VSD](image)

Discussion
The American Association of Endodontics (EPA) in 1997 proposed a classification of four different categories of fractures (fractured cusp, split tooth, split tooth, and vertical root fracture) through clinical features and factors such as age, sex, signs and symptoms, cracking direction, restoration type and size, and diagnostic methods. However, because they are not completely clear and overlap one another, Abbott and Leow(16) proposed a simpler and clearer classification by dividing the fractures into three categories only: enamel cleft (small slits visible on the surface of the enamel without dentin involvement, asymptomatic, but need periodic monitoring, since they may evolve); (there may be involvement of other structures of the tooth such as cement or restorative material, being able to reach the pulp and the periodontal ligament as the fracture progresses and there is no separation of the dental segments and complete fracture (there is a compromise of the dentine and, consequently, pulpal tissue and periodontal ligament, the diagnosis is relatively simple, because in this case the fragments separate). This classification, in turn, is subdivided into oblique, vertical and horizontal.(12)

Fissures in enamel are small surface cracks, without the involvement of dentin. They are asymptomatic but require periodic follow-up, as they may evolve and become a deeper fracture.(17) Incomplete fractures may compromise other structures of the tooth, such as cement or restorative material, and may reach the pulp and the periodontal ligament as the fracture progresses without separation of tooth segments.(4) In complete fractures there is involvement of dentin and, consequently, pulp tissue and periodontal ligament, in which case the fragments separate.(14) In the case reported, it had an incomplete vertical fracture in which it reached the dental pulp.

The most common cause of RDS is the accidental bite of an object or food of a hard consistency (a seed, for example), especially on a restored tooth, as an excessive load of force is directed to a small area of contact in the tooth,(14) favoring the formation of the cleft. In the case presented the patient had an occlusal restoration of amalgam and, according to her report, the tooth had begun to present symptomatology without memory of specific episode, like the chewing of more consistent food.

Studies show that in the posterior teeth 4.4 out of 100 teeth fracture in adults(12,14) with 15% of the fractures resulting in pulp involvement or exodontia. Thus, one out of 23 individuals fractures one posterior tooth per year.(14) However, it has been reported that 20% of patients who go to endodontists seeking diagnosis are often not diagnosed with an incomplete fracture. That SDR is a frequent occurrence, although it is not well reported due to difficulties in diagnosis. Thus, the condition is delayed to be identified and is only diagnosed when the symptoms resemble those of an endodontic problem, that is, until the pulp becomes inflamed and consequently necrotic, or when the crack reaches the external surface of the root and is similar to the periodontal symptoms characterized by the development of periodontal pockets and/or abscesses.(6) In the case of the patient, the symptoms arose and the problem was only diagnosed when the pulp had already been reached and was in an irreversible process.

In an investigation by Hiatt(2) still in 1973 it was possible to observe a high percentage (74%) of fractured teeth without restoration or with the presence of a class I restoration. More recently, Roh and Lee(18) analyzed 154 teeth that presented with fractures and a large part (89.6%) were healthy or with minimal restoration. Therefore, the possibility of a fracture in a tooth without restoration or with restoration of only one face should not be neglected, since it does not depend on the presence or the extension of the restoration, agreeing with the presented case.

The decision whether or not to treat closed teeth involves factors such as prognosis, cost, and treatment time.(19) Even a crack being identified, it is difficult to
assess the prognosis of the involved tooth, because there is no precise way of knowing how deep this crack in the dental structure.\textsuperscript{13} Belobrov et al.\textsuperscript{20} have shown that it is worth trying conservatively in cases of neck fractures, especially in young patients. The treatment in question was decided after clarifying all the advantages and disadvantages for the patient. She was aware that this treatment would be an attempt to save the tooth, and that the prognosis was bleak. However, it would be the most feasible, as it would be a faster procedure in the event of an exodontia and subsequent implant surgery.

**Conclusion**

According to the presented case, it was possible to conclude that:
- The early diagnosis of the fissure is essential so that there is no progression of the same to the pulp or root preventing the recovery of the tooth
- Cracked teeth, when well diagnosed, can be treated and kept in the oral cavity.

**References**