

Diagnosis and restorative options for the management of longitudinal tooth fractures

G. Kozdag Gold^{1*}, K. Karauzum², D. Ural², O. Argan³, I. Karauzum², A. Agacdiken Agir², T. Sahin²

¹Albert Einstein College of Medicine - Montefiore Medical Center, Bronx, United States of America.

²Kocaeli University, Faculty of Medicine, Cardiology, Kocaeli Turkey.

³Balikesir University, Faculty of Medicine, Cardiology, Balikesir, Turkey

Article Info

Received Date: 03 May 2023, **Accepted Date:** 14 May 2023, **Published Date:** 17 May 2023

***Corresponding author:** Dr. Abdullah Al Telmesani, BDS, MCD, Assistant Consultant (Endodontist), Dentistry department, King Fahad Specialist Hospital, Dammam, Saudi Arabia, Phone: +966138043333, EXT: 1245, Email: Abdullah.Telmesani@kfsh.med.sa

Citation: Al Telmesani A. Diagnosis and restorative options for the management of longitudinal tooth fractures. J Dents Dent Med. 2023 May;6(1):177

Copyright: © 2023 Al Telmesani A. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

The aim of this review is to discuss the longitudinal tooth fractures in terms of definition and classification, aetiologies, incidence, diagnosis and management as well as to assess literatures including critical appraisal. Electronic library search was undertaken between January 2017 to March 2017 through different well known journals such as International Endodontic Journal (IEJ), Journal of Endodontics (JOE), Journal of Endodontics, Oral Surgery Oral Medicine Oral Pathology Oral Radiology Endodontology (OOOOE) and Australian Dental Journal (ADJ).

Longitudinal tooth fracture is defined as a fracture that occurs over time with a vertical direction. Mainly, cracks and fractures can be divided into either incomplete and/or complete. In 2008, a classification of longitudinal tooth fracture was established to be from the least severe to the most. Longitudinal tooth fracture categorized into (a) craze line; (b) fractured cusp; (c) cracked tooth; (d) split tooth; and (e) vertical root fracture. The incidence of longitudinal tooth fracture is increasing due to many factors including that diagnosis of longitudinal tooth fracture is improved; therefore, it is not difficult to be identified and reported. Moreover, doing restorative procedures on teeth with no enough dentin support and placing restorations that eventually create wedging/displacing forces and cause longitudinal tooth fracture.

Longitudinal tooth fractures are findings; they are not considered to be pulpal or periapical diagnosis. Clinical signs and symptoms, results of objective tests such as a selective biting test aid detection of longitudinal tooth fracture. In addition, radiographic findings assist also to diagnose some types of longitudinal tooth fracture. There

were numerous studies that used different imaging modalities and compared them to each other in order to evaluate their diagnostic accuracy. In fact, three-dimensional imaging modalities produce an image with high accuracy than the two-dimensional ones. However, some recent studies that have some limitations concluded that there was no statistical difference between the sensitivity or specificity of both 2D and 3D imaging modalities to detect vertical root fractures certainly.

Management of longitudinal tooth fracture is complex and challenging in some cases; however, some cases are severely fractured and the tooth is considered to be non-restorable; therefore, tooth or root extraction is the required treatment approach. Management of longitudinal tooth fracture varies based on the fracture extent as well as on tooth vitality and the associated symptoms. An essential initial step to be followed which is the removal of any existent restoration in order to assess tooth restorability and check for cracks and fractures. For instance, if the affected tooth is non-vital, severely symptomatic or a fracture is extended to the pulp, a root canal treatment is required. In addition, an orthodontic band to be placed in order to hold the segments together and to prevent the increase of the existing fracture during the root canal procedure. On the contrast, if the tooth is vital and asymptomatic. A bonded composite resin restoration to be placed in the assessment cavity and a cusp coverage restoration such as an onlay or a crown to be on the top eventually.

Regarding vertical root fracture (VRF), the predictable treatment approach is either to extract the tooth or remove the fractured root by either hemisection or root amputation in multirrooted teeth. Prevention of the different types of longitudinal tooth fracture can be achieved by following

Incidence: Kang et al analyzed the distribution and characteristic features of cracked teeth and evaluated the outcome of root canal treatments (RCTs) for cracked teeth; the incidence of cracked teeth was stated. Out of 1977 teeth were examined over a five-year period, 175 teeth were diagnosed as cracked teeth (8.9%). According to AAEC classification, of 175 cracked teeth, 25 were fractured cusps (14.3%), 111 were cracked teeth (63.4%), 21 were diagnosed with VRF (12.0%), and 18 were diagnosed with split tooth (10.3%). Cracks were more prevalent among men (61.1%) than women. The lower second molar was most frequently cracked (25.1%).

The majority of patients with cracked teeth were in the age ranges of 50–59 years (32.0%) and > 60 years (32.6%) (10). This study has some limitations. Although the title of this study is “Cracked teeth”, the results included all types of tooth fractures. In addition, this study

The aim of this review is to discuss the longitudinal tooth fractures in terms of definition and classification, aetiologies, incidence, diagnosis and management as well as to assess literatures including critical appraisal. Electronic library search was undertaken between January 2017 to March 2017 through different well known journals such as International Endodontic Journal (IEJ), Journal of Endodontics (JOE), Journal of Endodontics, Oral Surgery Oral Medicine Oral Pathology Oral Radiology Endodontology (OOOOE) and Australian Dental Journal (ADJ).

Longitudinal tooth fracture is defined as a fracture that occurs over time with a vertical direction. Mainly, cracks and fractures can be divided into either incomplete and/or complete. In 2008, a classification of longitudinal tooth fracture was established to be from the least severe to the most. Longitudinal tooth fracture categorized into (a) craze line; (b) fractured cusp; (c) cracked tooth; (d) split tooth; and (e) vertical root fracture. The incidence of longitudinal tooth fracture is increasing due to many factors including that diagnosis of longitudinal tooth fracture is improved; therefore, it is not difficult to be identified and reported. Moreover, doing restorative procedures on teeth with no enough dentin support and placing restorations that eventually create wedging/displacing forces and cause longitudinal tooth fracture.

Longitudinal tooth fractures are findings; they are not considered to be pulpal or periapical diagnosis. Clinical signs and symptoms, results of objective tests such as a selective biting test aid detection of longitudinal tooth fracture. In addition, radiographic findings assist also to diagnose some types of longitudinal tooth fracture. There were numerous studies that used different imaging modalities and compared them to each other in order to evaluate their diagnostic accuracy. In fact, three-dimensional imaging modalities produce an image with high accuracy than the two-dimensional ones. However, some recent studies that have some limitations concluded that there was no statistical difference between the sensitivity or specificity of both 2D and 3D imaging modalities to detect vertical root fractures certainly.

Management of longitudinal tooth fracture is complex and challenging in some cases; however, some cases are severely fractured and the tooth is considered to be non-restorable; therefore, tooth or root extraction is the required treatment approach. Management of longitudinal tooth fracture varies based on the fracture extent as well as on tooth vitality and the associated symptoms. An essential initial step to be followed which is the removal of any existent restoration in order to assess tooth restorability and check for cracks and fractures. For instance, if the affected tooth is non-vital, severely symptomatic or a fracture is extended to the pulp, a root canal treatment is required. In addition, an orthodontic band to be placed in order to hold the segments together and to prevent the increase of the existing fracture during the root canal procedure. On the contrast, if the tooth is vital and asymptomatic. A bonded composite resin restoration to be placed in the assessment cavity and a cusp coverage restoration such as an onlay or a crown to be on the top eventually.

Regarding vertical root fracture (VRF), the predictable treatment approach is either to extract the tooth or remove the fractured root by either hemisection or root amputation in multirooted teeth. Prevention of the different types of longitudinal tooth fracture can be achieved by following some preventive measures that can increase the fracture resistance ultimately.

The aim of this review is to discuss the longitudinal tooth fractures in terms of definition and classification, aetiologies, incidence, diagnosis and management as well as to assess literatures including critical appraisal. Electronic library search was undertaken between January 2017 to March 2017 through different well known journals such as International Endodontic Journal (IEJ), Journal of Endodontics (JOE), Journal of Endodontics, Oral Surgery Oral Medicine Oral Pathology Oral Radiology Endodontology (OOOOE) and Australian Dental Journal (ADJ).

Longitudinal tooth fracture is defined as a fracture that occurs over time with a vertical direction. Mainly, cracks and fractures can be divided into either incomplete and/or complete. In 2008, a classification of longitudinal tooth fracture was established to be from the least severe to the most. Longitudinal tooth fracture categorized into (a) craze line; (b) fractured cusp; (c) cracked tooth; (d) split tooth; and (e) vertical root fracture. The incidence of longitudinal tooth fracture is increasing due to many factors including that diagnosis of longitudinal tooth fracture is improved; therefore, it is not difficult to be identified and reported. Moreover, doing restorative procedures on teeth with no enough dentin support and placing restorations that eventually create wedging/displacing forces and cause longitudinal tooth fracture.

Longitudinal tooth fractures are findings; they are not considered to be pulpal or periapical diagnosis. Clinical signs and symptoms, results of objective tests such as a selective biting test aid detection of longitudinal tooth fracture. In addition, radiographic findings assist also to diagnose some types of longitudinal tooth fracture. There were numerous studies that

used different imaging modalities and compared them to each other in order to evaluate their diagnostic accuracy. In fact, three-dimensional imaging modalities produce an image with high accuracy than the two-dimensional ones. However, some recent studies that have some limitations concluded that there was no statistical difference between the sensitivity or specificity of both 2D and 3D imaging modalities to detect vertical root fractures certainly.

Management of longitudinal tooth fracture is complex and challenging in some cases; however, some cases are severely fractured and the tooth is considered to be non-restorable; therefore, tooth or root extraction is the required treatment approach. Management of longitudinal tooth fracture varies based on the fracture extent as well as on tooth vitality and the associated symptoms. An essential initial step to be followed which is the removal of any existent restoration in order to assess tooth restorability and check for cracks and fractures. For instance, if the affected tooth is non-vital, severely symptomatic or a fracture is extended to the pulp, a root canal treatment is required. In addition, an orthodontic band to be placed in order to hold the segments together and to prevent the increase of the existing fracture during the root canal procedure. On the contrast, if the tooth is vital and asymptomatic. A bonded composite resin restoration to be placed in the assessment cavity and a cusp coverage restoration such as an onlay or a crown to be on the top eventually.

Regarding vertical root fracture (VRF), the predictable treatment approach is either to extract the tooth or remove the fractured root by either hemisection or root amputation in multirrooted teeth. Prevention of the different types of longitudinal tooth fracture can be achieved by following some preventive measures that can increase the fracture resistance ultimately.