

Management Of Horizontal Root Fractures - A Review

Running Title: Root Fractures

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ABSTRACT: *Traumatic dental injuries of the permanent teeth are commonly encountered emergencies in a dental clinic which occurs frequently in children and young adults. Root fractures involves dentine, cementum and pulp. Root fractures are divided into two categories: horizontal and vertical. They may be clinically challenging cases to treat and hence treatment of such cases requires an interdisciplinary/multidisciplinary approach for and prognosis. Proper diagnosis, treatment planning and follow up are essential for improving a favourable outcome. Treatment of horizontal root fractures depends on a number of factors such as, position of fracture line, mobility of tooth and pulpal status. This review will help the clinicians to have a thorough knowledge and adequate clinical experience to treat them properly.*

Key words: *Root fractures, Trauma, Transverse root fracture*

1. INTRODUCTION:

Traumatic injuries to a tooth can vary in intensity from a simple enamel infraction to a complete ex-articulation of tooth (avulsion). They are the third most common reason for tooth loss. Root fracture account for 1.2 to 7% of the injuries affecting the permanent dentition^[1]. At the time of initial trauma management some root fractures may not be diagnosed because they can only be seen via radiographic imaging techniques^[2]. Root fractures, according to Andreasen, are a type of tooth fracture that involves the dentin, cementum, and pulp. Root fractures are more common that insists dentists to have a thorough knowledge about the mechanisms that lead to this type of fracture, the treatment options and prognosis for the different types of horizontal root fractures.

2. ETIOLOGY:

Root fracture in endodontically treated teeth is due to condensation force during filling, during post preparations, corrosion of posts, Accidental or occlusal trauma etc., and root fractures in non - endodontically treated teeth is due to Accidental or occlusal trauma. It can also occur due to neurological disorder^[3].

Root fractures can occur in any direction or orientation, and they are classified as

- Vertical fractures (mostly also involving the crown) OR
- Transverse root fracture^[4].

3. HORIZONTAL ROOT FRACTURES/ TRANSVERSE ROOT FRACTURE

Horizontal Root fractures are relatively infrequent, occurring in less than 3% of all injuries of which fracture at the middle third of the root was the commonest (57%), followed by apical third and cervical third of the root(9%)^[5]. Occur mainly in the anterior region of the maxilla with complete root formation. More commonly seen in male than female^[6]. In teeth with incomplete root development, root fractures are not common due to the flexibility of the alveolar bone. Usually, horizontal root fractures are observed in anterior teeth due to direct trauma. In posterior teeth, it often occurs as a result of indirect trauma^[7].

4. MECHANISM OF HORIZONTAL ROOT FRACTURE

Small and sharp objects causes a fracture rather than displacement of the tooth. Due to forces concentrated to a smaller area on the tooth. If a hard but blunt object strikes the crown of the tooth it causes the force to be transmitted to the tooth root, resulting in a root fracture due to the increased area of resistance to the force in the crown^[1]. A crown fracture, concussion, subluxation, lateral luxation, extrusion, or avulsion of the coronal fragment may occur concurrently with a root fracture.

5. CLASSIFICATION OF HORIZONTAL ROOT FRACTURE

They are subclassified on the basis of

1. Location of the fracture (cervical, middle and apical);
2. Extent of the fracture line (partial and total);
3. Number of fractures (simple, multiple and comminuted);
4. Position of the coronal fragment (displaced and not displaced).

Apical fractures are easy to manage and have the best prognosis, whereas coronal root fractures are very complex to manage and may have the worst prognosis^[8].

6. RESPONSES TO ROOT FRACTURES

1. Healing with hard dental tissue.
2. Healing with connective tissue.
3. Healing with bone and connective tissue.
4. No healing where granulation tissue (inflammatory tissue) forms in the fracture line as a result of pulp necrosis and infection of the pulp space in the coronal fragment^[9-11].

7. EXAMINATION AND DIAGNOSIS OF ROOT FRACTURES

If a patient comes to a clinic after trauma, a comprehensive clinical examination such as a visual examination, periodontal probing, percussion, palpation, mobility, pulp sensibility tests, transillumination to detect enamel infractions, checking of the occlusion, and radiographic examination should be performed^[12].

8. EMERGENCY MANAGEMENT

Root fractures in the apical third, middle third, and sub-crestal coronal third should be managed as follows

9. REPOSITIONING AND SPLINTING

If the coronal fragment is not displaced splinting is not required although placing the splint will not harm the tooth. But when the coronal fragment has been displaced or is mobile (i.e., subluxated), then stabilization using splint is mandatory. As long as the fragment is held in the correct position, a simple splint will suffice. Simple splints can be made by using a stainless steel wire which is bonded with composite resin to the labial surface of the affected tooth and on either side of the affected tooth. Initially, 2-3 months was recommended for root fractures at all levels of the root. Fractures in the apical and middle thirds should be treated for 4 weeks, and fractures in the coronal third should be treated for up to 4 months, particularly if they are near the cervical margin of the tooth^[13,14]. For these root fractures, root canal therapy should not be started at the emergency appointment.

Root canal treatment is mostly not required in majority of cases, because most pulps survive and function normally after root fractures. Only the coronal fragment needs the root canal treatment because the pulp in the apical fragment is mostly not affected and does not become necrotic. As a result, root canal filling should be limited to the fracture line.

10. PROGNOSIS

After root fractures, the frequency of pulp necrosis and infection of the root canal system is relatively low. Hence, the prognosis for the pulp in root fractured teeth is good and stresses the recommendation to not remove the pulp as part of the emergency management. Hence, wait and see approach should be favoured. When a definitive diagnosis of pulp necrosis and infection has been made, root canal treatment will still be done later^[15].

11. CONCLUSION

If the fracture is located in the apical or middle third of the root, or sub-crestally in the coronal third of the root, teeth with horizontal, oblique, or transverse root fractures have a very strong long-term prognosis. The best situation for healing is when the displaced fragment is immediately repositioned and stabilized.

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