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## REVIEWER'S REPORT

**Manuscript No.: IJAR-56994**

**Title: Vertical Root Fractures: A Comprehensive Review of Diagnosis, Etiology, and Management.**

**Recommendation:**

- Accept as it is .....
- Accept after minor revision...Yes.....**
- Accept after major revision .....
- Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality	•			
Techn. Quality	•			
Clarity	•			
Significance		•		

**Reviewer Name:- Dr. Sireesha Kuruganti**

### *Detailed Reviewer's Report*

This manuscript, titled "Vertical Root Fractures: A Comprehensive Review of Diagnosis, Etiology, and Management," provides a detailed overview of Vertical Root Fractures (VRFs). It effectively addresses the challenges of diagnosing a condition that often mimics other endodontic or periodontal diseases. Below is an in-depth review based on the provided text, categorized by thematic sections with specific line references.

#### 1. Abstract and Introduction

- \* **Definition:** The authors correctly define VRF as a longitudinal fracture where segments are incompletely separated, noting its prevalence in endodontically treated teeth.
- \* **Etiology:** The abstract introduces the multifactorial nature of VRFs, dividing causes into natural (root morphology) and iatrogenic (obturation stresses, post placement).
- \* **Significance:** Lines 34–37 emphasize that early diagnosis is critical to prevent progressive bone loss, which can complicate future implant placement.

#### 2. Prevalence and Etiology

- \* **Susceptibility:** The review identifies specific teeth most prone to VRFs, including maxillary and mandibular premolars and the mesial roots of mandibular molars.
- \* **Natural Factors:**
  - \* **Root Anatomy:** Roots with oval cross-sections (larger bucco-lingual diameter) are more susceptible.
  - \* **Dentin Aging:** Lines 95–98 note that older, translucent dentin propagates cracks faster than younger dentin.
- \* **Iatrogenic Factors:**
  - \* **Dehydration:** Root-filled teeth lose water content, reducing fracture toughness and fatigue resistance.
  - \* **Dentin Removal:** Excessive removal of peri-cervical dentin (PCD) during access or preparation increases fracture risk.
  - \* **Restorative Design:** The importance of a ferrule margin (1.5 to 2 mm) for better strain distribution is highlighted in lines 136–139 and 415.

#### 3. Pathogenesis and Diagnostic Methods

- \* **Development:** Unlike acute trauma, VRFs result from a "dynamic cyclical fatigue process" that can take years to manifest.

## REVIEWER'S REPORT

### \* Clinical Presentation:

\* Sinus Tracts: Lines 212–215 describe the "pathognomonic" feature of coronally positioned sinus tracts, often located in the attached gingiva rather than the apical region.

\* Periodontal Defects: The presence of narrow, isolated deep pockets (often on buccal/lingual convexities) is a key diagnostic indicator.

### \* Radiographic Features:

\* Limitations: Conventional 2D radiographs have limited sensitivity for early fractures.

\* Characteristic Signs: Findings include "J-shaped" or "Halo" radiolucencies and diffuse V-shaped bone loss in posterior teeth.

\* CBCT Utility: While CBCT offers 3D assessment, its accuracy is limited by voxel size (detection usually requires a width > 0.15 mm) and artifacts from metal posts or gutta-percha.

## 4. Management and Prevention

\* Management Options: The review presents a comprehensive table of treatments:

\* Conservative: Monitoring or root resection for incomplete fractures.

\* Surgical: Intentional replantation or laser fusion (though the latter is not widely established).

\* Extraction: The most common and predictable treatment for complete VRFs to eliminate infection.

\* Preventive Strategies: \* Minimize compaction forces during obturation.

\* Use posts only when essential for core support.

\* Night guards for patients with bruxism.

### Diagnostic Flowchart Summary (Lines 383–397)

The manuscript provides a logical progression for clinicians:

\* History and Clinical Exam: Check for biting pain and coronally positioned sinus tracts.

\* Conventional Radiography: Use multiple horizontal angulations to find "hair-like" fracture lines.

\* CBCT: If radiographs are inconclusive, check axial views for bone destruction or fractures.

\* Exploratory Surgery: The final step to visualize the fracture line directly via magnification or dye staining.

### Conclusion

The manuscript concludes that while technology is improving, clinical judgment remains the most vital tool in managing VRFs. The emphasis is placed heavily on prevention through conservative dentin preservation and proper restorative design.