

# Application of Hounsfield Unit to evaluate Prognosis of a Rehabilitated Tooth with Grade Three Mobility

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## ABSTRACT

The relationship between pulpal and periodontal disease was first described by Simring and Goldberg in 1964. Pathological agents pass between the pulp and periodontium, thereby creating the endoperio lesion. Lateral canals play an important role in the spread of infection from pulp to periodontium. This article reports a case of a 38-year-old patient with a combined endoperio lesion. Bone density is a key factor in predicting bone healing. Application of Hounsfield unit to determine the healing pattern of bone.

**Keywords:** Endoperio lesion, Pixel value, Lateral canal, Periapical abscess, Hounsfield unit.

**How to cite this article:** Hegde MN, Hegde ND, Shrivastava D. Application of Hounsfield Unit to evaluate Prognosis of a Rehabilitated Tooth with Grade Three Mobility. *World J Dent* 2012;3(1):109-111.

**Source of support:** Nil

**Conflict of interest:** None declared

## INTRODUCTION

Total alveolar bone loss due to periodontitis leading to grade three mobility of the tooth is a challenge to any dental practitioner. A careful diagnostic examination consisting of a thorough history, comprehensive clinical examination, and use of appropriate dental radiographs is necessary to arrive at a proper diagnosis of the periodontal-endodontic lesion. Despite these measures, it is not always possible to make an accurate diagnosis, which is imperative to provide the proper therapy in the correct treatment sequence. In some instances, endodontic or periodontal therapy alone may suffice; however, in other instances, a combination of endodontic and periodontal therapy may be required to successfully treat the case.<sup>1</sup>

The type and architecture of bone is considered as an important factor to access the healing pattern and prognosis of the treatment. To date, bone classifications have only provided subjective methods for preoperative and postoperative assessment of healing patterns of bone, determined by the amount of radiolucency or radiopacity of that area and its perception varies from eye to eye of the person.<sup>2</sup> So, its quantification using the software incorporated in direct digital radiography.

## CASE REPORT

### Chief Complaint and History of Present Illness

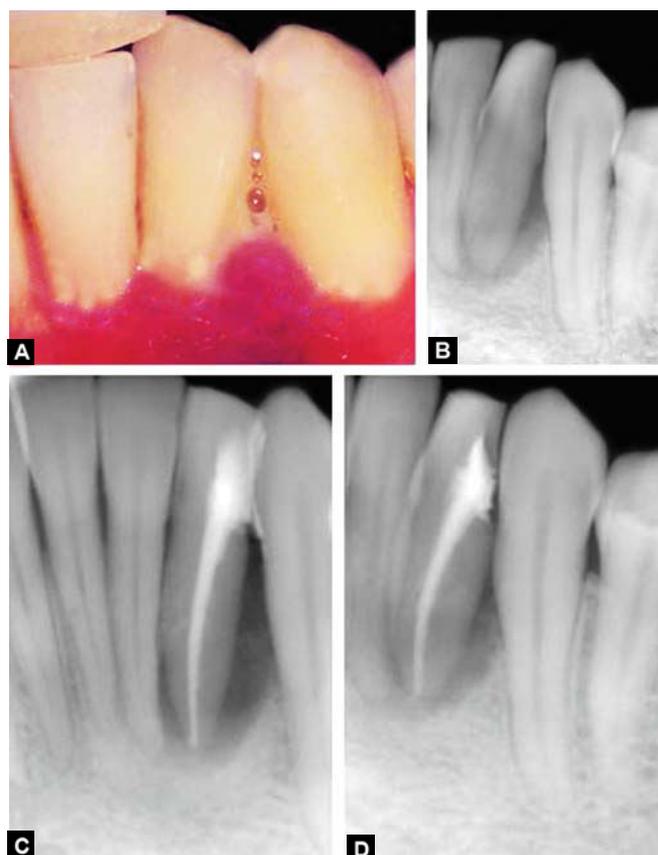
A 38-year-old male patient reported to dental speciality clinic with a complaint of pain and mobility in lower left

lateral incisor. A detailed case history was taken patient reported that there was pus discharge (Fig. 1A) from the tooth since 3 months.

### Clinical and Radiographic Examination

A detailed extraoral and intraoral clinical examination was done. It was observed that the left lower lateral incisor was mesially rotated with swollen, enlarged, rolled out margins of gingiva and had grade three mobility. Purulent discharge with respect to the same featuring acute exacerbation of chronic periodontitis. Pocket depth of 8 mm on distal aspect of the tooth both buccally and lingually. Direct digital radiograph showed radiolucency up till apical third on the distal aspect and periapical region of the tooth (Fig. 1B).

A detailed case history and blood evaluation ruled out any medical complication. Application of the pixel value software incorporated in direct digital radiograph was used to measure the density of bone.



**Figs 1A to D:** (A and B) Preoperative, (C) obturation, (D) after 4 weeks

## TREATMENT PLAN

Complete oral prophylaxis was done followed by subgingival scaling.

### Endodontic Treatment

Access in the pulp space was gained using diamond bur. Patency of the canal was obtained and was obturated till working length (Fig. 1C).

### Periodontal Treatment

Full flap periodontal surgery was done with respect to 32 (Fig. 2A).

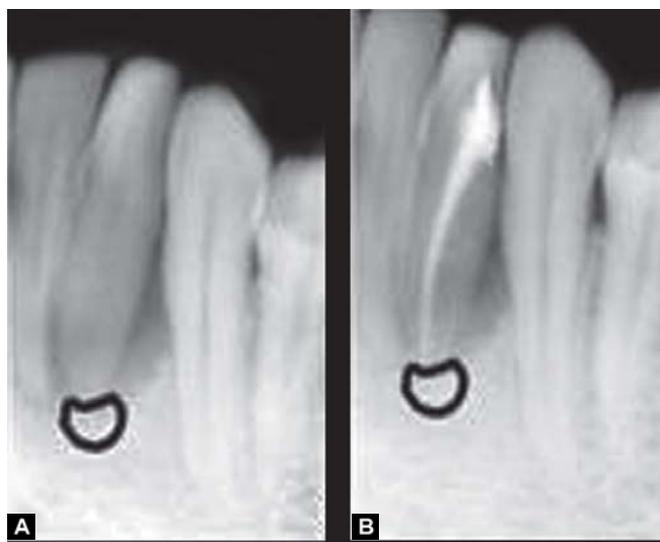
### Follow-up

Postoperative clinical examination after 4 weeks revealed reduction in the mobility of the tooth (Fig. 2B). Direct digital radiography showed increase in the density of bone on the distal aspect of the tooth (Fig. 1D). Restoration of the tooth was done with composite resin to ease in the maintenance of the interdental region (Fig. 2C).

## DISCUSSION

Endoperio lesion are caused due to inflammatory products found in the pulp and periodontal tissue. The pulp and periodontium have embryonic, anatomic and functional interrelationships which are ectomesenchymal origin.<sup>3</sup> As, the tooth matures three avenues are created between pulp and periodontal ligament (i.e) dentinal tubules, lateral, accessory canals and apical foramen through which pathologic agents pass between the pulp and periodontium.<sup>4</sup>

Pulp necrosis is always associated with periapical response. It results in the formation of abscess or establishment of balance between host response and bacterial challenge.<sup>5</sup> In case of abscess formation inflammation spread



**Figs 3A and B:** Radiograph showed increase in pixel value at the same location: (A) preoperative, (B) postoperative

to the periodontium and drain into the gingival sulcus, narrow deep probing site. Radiographically loss of bone uptill apical third as reported in this case.

The clinical features showed 8 mm of pocket along with radiolucency on the distal aspect of the root hypothesis for diagnosis of periodontal lesion was made. Pulp vitality testing was done, tooth was nonvital hence second hypothesis of necrotic pulp of 32 with secondary involvement of periodontal ligament space through lateral canal.<sup>6</sup> Follow-up of patient after 1 month showed reduction in tooth mobility. Direct digital radiography showed satisfactory bone healing which was quantified using the pixel value software incorporated in it, which showed increase in mean pixel value by 140 units<sup>7</sup> (Figs 3A and B). The Hounsfield unit (HU) scale is a linear transformation of the original linear attenuation coefficient measurement where radiodensity of water 0, increase in value shows increase in radiodensity. Composite restoration was done to prevent food impaction and to support dental arch.<sup>8</sup>



**Figs 2A to C:** (A) After periodontal surgery, (B) healing after 4 weeks, (C) after restoration

In this case, a patient with endoperio lesion was treated endodontically followed by a regular full flap thickness periodontal surgery. Emphasized the need for careful evaluation of complicated case with grade three mobility where conventional therapy and proper follow-up helped in eliminating the cause. Through the incorporation of pixel value software quantification of healing pattern of the bone was done.

## CONCLUSION

Hence, this case report demonstrates the nature of periodontal lesion as a secondary involvement to an originally endodontic lesion involving the tooth. As well as it demonstrates that lateral canal can be one of important criteria deciding for the periodontal involvement of periodontal tissue in endodontic lesion, and in turn on prognosis of the tooth. Finally, with higher bone density, Hounsfield units can be used as a diagnostic parameter to predict bone healing in endoperio lesion.

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