Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 05, pp.31883-31886, May, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

RADIOVISUOGRAPHIC ANALYSIS OF INTERDENTAL AND INTERRADICULAR BONE LOSS IN FURCATION INVOLVEMENT OF MANDIBULAR FIRSTMOLARS: A CORRELATION RETROSPECTIVE STUDY

[1,*]Dr. Muzafar Ahmad Bhat, [2]Dr. Mirza Aumir Beg and [3]Dr. Shafia Nisar Kakroo

[1]Registrar, Department of periodontics, Govt. Dental College, Srinagar Jammu & Kashmir
[2]Senior Lecturer Sudha Rastogi College of Dental Sciences & Research, Faridabad
[3]Lecturer Hamdard Institute of Medical Sciences & Research, New Delhi

ARTICLE INFO

Article History:
Received 23rd February, 2016
Received in revised form
16th March, 2016
Accepted 25th April, 2016
Published online 20th May, 2016

Key Words:

Mandibular First Molars, Furcation Involvement, Radiovisuography, Interradicular Bone Loss, Interdental Bone Loss

**Corresponding author:*

ABSTRACT

Background and Objectives: The presence of furcation involvement represents a formidable problem in the treatment of periodontal disease. Advances in radiographic analysis such as radiovisuographic (RVG) aid in the early diagnosis and treatment planning, which is critical for long‑term success. The present investigation aims to correlate the interdental and interradicular bone loss in chronic periodontitis patients so as to explore the potential of interdental bone loss as a rough approximate screening tool for early furcation diagnosis in mandibular first molar. **Materials and Methods**: RVG radiographs with furcation radiolucency in mandibular first molars were selected. The morphometric measurements of mesial, distal interdental bone loss, and interradicular bone loss in mandibular first molars were recorded using RVG. The correlation between mesial and distal interdental bone loss and interradicular bone loss was analyzed. **Results:** In this retrospective investigation, it was observed that distal interdental bone loss was not significantly different when compared with mesial interdental bone loss. The interradicular bone loss was significantly different when compared with mesial interdental bone loss, whereas on analysis between distal interdental bone loss and interradicular bone loss was also found to be statistically significant. **Interpretation and Conclusion**: Interdental bone loss was found to be associated with progressive bone destruction in furcation area which suggests that early detection of interdental bone loss can be helpful in predicting future interradicular bone loss.

Citation: Dr. Muzafar Ahmad Bhat, Dr. Mirza Aumir Beg and Dr. Shafia Nisar Kakroo. **2016** "Radiovisuographic Analysis of Interdental and Interradicular Bone Loss in Furcation Involvement of Mandibular FirstMolars: A Correlation Retrospective Study", *International Journal of Current Research*, 08, (05), 31883-31886.

INTRODUCTION

Periodontitis is an infectious disease which most often leads to progressive attachment loss and bone loss. The presence of furcation involvement or interradicular bone loss is one of the clinical findings that can lead to a diagnosis of advanced periodontitis. Highermorbidity and compromised prognosis formolars with furcation involvement havebeen reported in several retrospective studies of tooth loss (Ramfjord *et al*., 1987; Matthews, 2001). It is observed that the frequency offurcation defects increases with age and its existence increases the risk of tooth loss (Carranza, 2006). Several morphological factors such as furcation entrance width, root trunk lengthand the presence of root concavities, cervical enamel projections, bifurcation ridges, and enamel pearls contribute to the etiology and compromised prognosis offurcation involved teeth. Furcation involvement most often affects the mandibular first molars, followed bymesial furcation of the maxillary firstmolars, whereas the maxillary premolars arethe least frequently involved. The buccalfurcation entrance of the maxillary molarsand buccal and lingual furcation entranceof the mandibular molars are normallyaccessible for examination. The difficultaccess to distal furcation of maxillarymolars presents a formidable problem inclinical diagnosis (Bower, 1979) Ross and Thompson reported that clinicalexamination alone detected furcation involvement in only 3% of maxillary and9% of mandibular molars. The combinationof radiographic and clinical examinationsimproved detection to 65% in maxillarymolars but only 23% in mandibular molars (Ross, 1980). The inherent limitations associated withconventional diagnostic procedures furtherlimit the sensitivity and reliability of furcationdiagnosis (Eickholz, 2000; Schliephake, 2003; Zulqarnain, 1998; Brägger, 2005; Mol, 2004; Benn, 1990; Jeffcoat, 2000; Hefti, 1997) Clinical probing is dependent ona multitude of technical factors, for example,the probing force and angulations, while radiographs may overor underestimate the amount of bone loss due to projectionerrors and lack of three‑dimensional (3D) information (Vandenberghe, 2008). Furcation areas present some of the greatest challenges tothe success of periodontal therapy. It is known that with the progression of periodontal destruction and

the involvementof furcation areas, the severity of periodontitis increasesand treatment is less effective because of limited access (Popova *et al*., 2008). Therefore, furcation defects represent formidable problem in the treatment of periodontal disease thus necessitating an early diagnosis and treatment. The need of a simple, less elaborate, time and cost−efficientdiagnostic tool is required for careful comprehensive examination, diagnosis, and timely intervention of furcationlesions at their earliest, so that the best clinic outcomes can be achieved.

The present investigation aims to correlate the interdental and interradicular bone loss in chronicperiodontitis patients using radiovisuography, so as to explore the potential of interdental bone loss as a rough approximate screening tool for early furcation diagnosis in mandibular firs tmolar.

MATERIALS AND METHODS

This is a retrospective study where a total of 70 RVGsof Mandibular right and left first molars with furcationinvolvement were evaluated from database of outpatientDepartment of Periodontics, Govt Dental College Srinagar. Out of the 70 RVG radiographs, 15 wereexcluded because of radiographic errors. Based on theclinical and radiographic records, the radiographs of patientsdiagnosed with chronic generalized moderatetosevereperiodontitis were selected.

The criteria for radiograph selection were

Inclusion criteria

- RVG radiographs of mandibular first molars with furcation radiolucency.

Exclusion criteria

- Molars with fused roots
- Subjects with endo-perio lesion/periapical lesionaccording to clinical records
- Open contacts with respect to mandibular molars
- Crowding with respect to mandibular molars.

RVGs procured were subjected to morphometricmeasurements defining the interdental and furcation areas.The length of the tooth was measured from cusp tip of thecrown (C) to apex of the root (A) and calibrated with thestandard value using Kodak dental imaging software.The mesial interdental bone loss, the distal interdentalbone loss, and the interradicular bone loss were calculated(Figure 1). Differences among means were compared. The correlationfor the mesial and the distal interdental bone loss to theinterradicular bone loss were analyzed. These were measured by a single examiner to avoid errordue to interobserver variation using the digital software, the‘Kodak dental imaging software’ installed within the RVG.

Statistical analysis: The mean values for the mesial interdental bone loss, thedistal interdental bone loss, and the interradicular bone losswere calculated. Differences among means were comparedusing the two−tailed *t*−test. The correlation for the mesialand the distal interdental bone loss to the interradicular boneloss were analyzed using the Pearson correlation coefficient.

RESULTS

In this retrospective investigation, it was observed that distal bone loss was not significantly different when compared with mesial bone loss whereas interradicularbone loss was significantly different when compared with mesial bone loss. The analysis between distal bone loss and interradicular bone loss was also statistically significant (Figure 2 and Table 1).

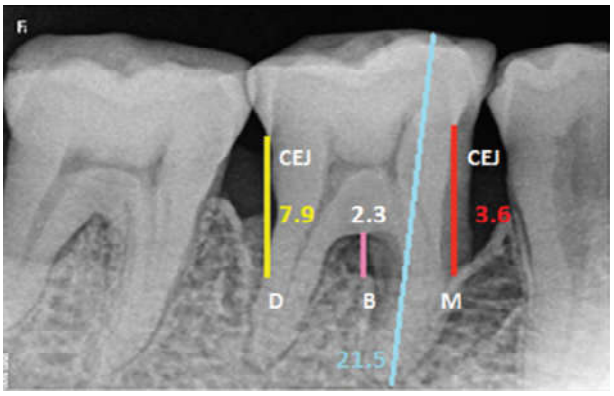

Figure 1. Morphometric measurement of mesial, distal interdental bone loss, andinterradicular bone loss. Mesial interdental bone loss was calculated fromcementoenamel junction (CEJ) to the apical extension of the bony defect (M). Distal interdental bone loss was calculated fro cemento enamel junction (CEJ) to the apical extension of the bony defect (D). The inter radicular bone loss was measured from the furcation fornix to the crest of the intact interradicular bone level (B)

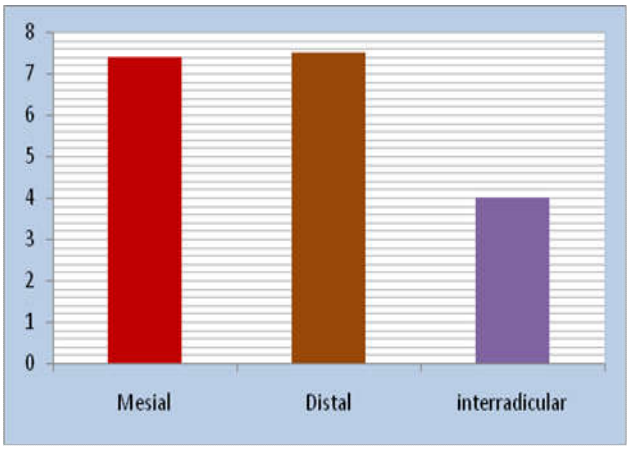

Figure 2. Comparison of mesial, distal, and interradicular bone loss

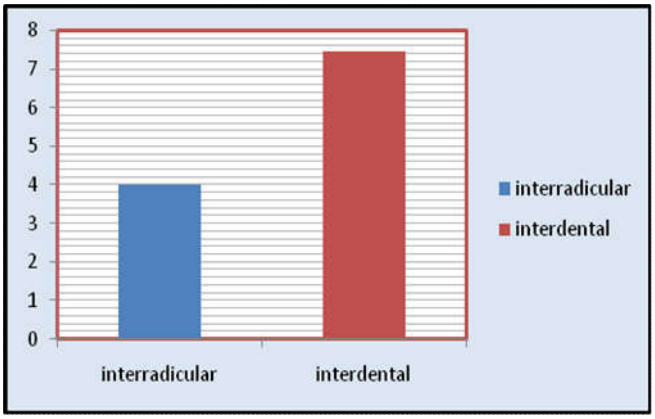

Figure 3. Comparison between interradicular and interdental bone loss

Table 1. Comparison of mesial, distal, and interradicularbone loss

Groups	n	Minimum	Maximum	Mean	SD	Sig
Mesial boneloss	55	1.200	16.700	7.415	2.764	S
Distal boneloss	55	2.700	13.600	7.521	2.299	
Interradicular bone loss	55	1.300	9.100	4.017	1.923	

S=Significant, SD=Standard deviation

It was observed that mean interdental bone loss was significantly different when compared with interradicularbone loss (Figure 3 and Table 1). However, there was no significant difference seen in between mandibular right first molar and left first molar. According to the results of the present investigation, when thebone loss at interdental area was equal or exceeding 3.1 mm,a minimum interradicular bone loss of 1.3 mm was evident.

DISCUSSION

The prevalence of involvement of the furcation area in themaxillary and mandibular molars ranges from 25% to 52%and from 16% to 35%, respectively.(16−20)Teeth with furcation involvement are 2.5 times more likelyto lose attachment as compared with teeth without furcationinvolvement (Wang, 1994). The aim of our study was to correlate the interdental andinterradicular bone loss in RVGs of chronic periodontitispatients and to explore the potential of interdental bone lossas a landmark for screening of early furcation diagnosis. As a general rule, bone loss is always greater than itsappearance in the radiograph. Therefore, it is possible for furcation involvement to be present without radiographicchanges. Variations in the radiographic technique mayobscure the presence and extent of furcation involvement.A tooth may present marked bifurcation involvement inone film but appear to be uninvolved in another (Ramfjord, 1987). With regard to methodology, digital radiography was usedin the present study for the evaluation of bone loss, whereasearlier studies used intraoral periapical radiographs andbitewing radiographs for the analysis of bone loss (Rohner *et al*., 1983; Popova, 2008; Björn, 1982) RVGs were taken from 39 male and 16 female individuals.Based on the gender, there was no statistical significantdifference in the correlation between the interradicular tothe interdental bone loss. This is supported in a longitudinalstudy by Rohner*et al*. (1983). The comparison between the interradicular and interdentalbone loss in males and females were found to be significantin both the genders. In the present study, it was seen that values ranging from 1.20to 16.70 mm for the mesial and those ranging from 2.70 to13.60 mm for the distal interdental bone loss were associated with interradicular bone loss in the range of 1.30–9.10 mm,and both were significantly correlated with each other.The results of the present investigation revealed thatthe smallest amount of interradicular bone loss ofapproximately 1.3 mm and above was observed onlywhen the bone loss at the interdental area was equal to orexceeding 3.1 mm. The findings of the present investigationare consistent with the results of the study conducted byGrover *et al*., where the furcation bone loss with the rangeof 0.80 mm and above were in correlation with interdentalbone loss of above 3.70 mm (Grover *et al*., 2014). The present study demonstrated that interradicular boneloss associated with the progression of bone destructionin multi−rooted teeth of patients with chronic periodontitishad a significant correlation to the loss of bone in the interdental area. The assessment of the interdental bone loss can be used as a screening tool to detect the periodontal disease in the earliest stage. Because treatment of furcation involvement inits advanced stage is complex, expensive, timeconsumingand requires an interdisciplinary approach (Grover, 2014). Therefore, to detect the earliest lesions of furcations, the interdental bone loss can be kept as an approximate guide for the comprehensive management of such patients. This correlation suggests that if the disease progression can be halted with approximate periodontal therapy when the interdental bone destruction has just ensued, it may lead to an improved prognosis for the interradicular areas. Within the limitation of the present study, root trunk length is not considered. Furthermore, radiographs may underestimate the amount of bone loss due to projection errors or lack of 3D information.

Conclusion

Interradicular bone loss was associated with the progression of bone destruction in multi−rooted teeth in patients with chronic periodontitis. Interdental bone loss was also found to be associated with progressive bone destructionin furcation area which suggests that early detection of interdental bone loss can be helpful in predicting futureinterradicular bone. Future studies with root trunk length consideration can precisely mark the limits of bone loss inchronic periodontitis when the involvement of the furcationis present.

REFERENCES

Benn DK. 1990. A review of the reliability of radiographicmeasurements in estimating alveolar bone changes. *J Clin Periodontol*., 17:14−21.

Björn AL, Hjort P. Bone loss of furcated mandibular molars.A longitudinal study. J ClinPeriodontol 1982;9:402−8.

Bower RC. 1979. Furcation morphology relative to periodontaltreatment. Furcation root surface anatomy. *J Periodontol,* 50:366−74.

Brägger U. 2005. Radiographic parameters: Biological significance andclinical use. *Periodontol,* 2000. 39:73−90.

Carranza FA., Henry HT. 2006. Carranza's Clinical Periodontology.10th ed. Philadelphia: W.B. Saunders Company.

Eickholz P., Hausmann E.2000. Accuracy of radiographic assessmentof interproximal bone loss in intrabony defects using linearmeasurements. *Eur J Oral Sci.,*108:70−3.

Goldman MJ., Ross IF., Goteiner D.1986. Effect of periodontal therapyon patients maintained for 15 years or longer. A retrospectivestudy. *J Periodontol.,* 57:347−53.

Grover V., Malhotra R., Kapoor A., Mankotia CS., Bither R. 2014. Correlation of the interdental and the interradicular boneloss: A radiovisuographic analysis. *J Indian Soc Periodontol*., 18:482−7.

Hefti AF. 1997. Periodontal probing. *Crit Rev Oral Biol Med.,* 8:336−56.

Hirschfeld L., Wasserman B. 1978. A long−term survey of tooth loss in600 treated periodontal patients. *J Periodontol.,* 49:225−37.

Jeffcoat MK., Reddy MS. 2000. Advances in measurements ofperiodontal bone and attachment loss. *Monogr Oral Sci*., 17:56−72.

Matthews DC., Smith CG., Hanscom SL. 2001. Tooth loss in periodontalpatients. *J Can Dent Assoc.,* 67:207−10.

McFall WT. Jr. 1982. Tooth loss in 100 treated patients with periodontaldisease. A long−term study. *J Periodontol.,* 53:539−49.

Mol A. 2004. Imaging methods in periodontology. Periodontol2000, 34:34−48.

Popova C., Mlachkova A., Emilov D. 2008. Correlation of interdentaland interradicular bone loss radiographic assessment. J IMABAnn Proc (Scientific Papers) 2:35−7.

Ramfjord SP., Caffesse RG., Morrison EC., Hill RW., Kerry GJ., Appleberry EA. *et al.1987.* 4 modalities of periodontal treatmentcompared over 5 years. *J Clin Periodontol.,* 14:445−52.

Rohner F., Cimasoni G., Vuagnat P. 1983. Longitudinal radiographicalstudy on the rate of alveolar bone loss in patients of a dentalschool. *J ClinPeriodontol.,* 10:643−51.

Ross IF., Thompson RH Jr. 1980. Furcation involvement in maxillaryand mandibular molars. *J Periodontol.,* 51:450−4.

Schliephake H., Wichmann M., Donnerstag F., Vogt S. 20003. Imagingof periimplant bone levels of implants with buccal bone defects. *Clin Oral Implants Res.,* 14:193−200.

Vandenberghe B., Jacobs R., Yang J. 2008. Detection of periodontal boneloss using digital intraoral and cone beam computed tomographyimages: An *in vitro* assessment of bony and/or infrabony defects. *Dentomaxillofac Radiol*., 37:252−60.

Wang HL., Burgett FG., Shyr Y., Ramfjord S. 1994. The influence ofmolar furcation involvement and mobility on future clinicalperiodontal attachment loss. J Periodontol 1994;65:25−9.

Wood WR., Greco GW., McFall WT. Jr. 1989. Tooth loss in patients withmoderate periodontitis after treatment and long−term maintenancecare. *J Periodontol.,* 60:516−20.

Zulqarnain BJ., Almas K. 1998. Effect of X−ray beam verticalangulation on radiographic assessment of alveolar crest level. *Indian J Dent Res.,* 9:132−8.

****