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AN IN VIVO RADIOGRAPHIC CORRELATION OF THE CONDITION OF TOOTH & PREVALENCE OF PULP STONE IN BANGALORE POPULATION

Dental Science

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ABSTRACT

Aim: To assess the correlation of dental status with the prevalence of pulp stone in a Bangalore population radiographically.

Methodology: All the patients of age 17-40 years were screened for the presence/absence of pulp stone using periapical or bitewing radiographs of maxillary or mandibular molars. Patient's radiograph were assessed using a magnifying lens in a darkened room using a light box with an even diffuse light source. Pulp stones are scored as: Present or absent & the status of each tooth categorized as: 1. Unrestored & intact 2.Restored 3.Carious 4.Restored & carious.

Result: Out of 1100 teeth examined, 38% (420) of the whole teeth revealed presence of pulp stone, whereas 62% (690) of the teeth examined showed absence of pulp stones. Out of the 420 tooth with pulp stones, 44% were non intact where as 56% were intact which shows a bilaterally equal prevalence of pulp stones irrespective of the dental status.

Conclusion: Irrespective of the dental status, pulp stones are becoming more prevalent even in younger age groups which require more attention while encountering it.

KEYWORDS

Pulp stones,dental status

INTRODUCTION

Pulp stones are nodular,calcified masses appearing in either or both the coronal or root portions of pulp organ. Johnson & Bevelander stated that a single tooth may have stones ranging from 1 to 12 or even more with sizes varying from minute particles to large masses that occlude pulp space.[1] It is also noted in patients with systemic or genetic diseases like Dentine Dysplasia,Dentinogenesis Imperfecta & in syndromes like Van der Wounde syndrome.[2]

The exact cause is unknown. But some of the postulated ones are, Pulp degeneration due to age changes, Circulatory disturbance, Orthodontic tooth movement, Long standing irritants like caries/deep filling/chronic pulp inflammation & Genetic predisposition.

The mode of development can be of two ways: Calcification of necrotic tissue component (Appleton et al & Bab et al) or due to Epithelio-mesenchymal interaction (Baume et al).[3]

Denticle prevalence varies from 8% to 95%.[2] Pulp stones may remain asymptomatic until the patient presents the same tooth with decay. They may also present with pain without any other defects with the sole cause being impingement of pulp stone over the nerves of the pulp chamber. In spite of this strong prevalence, they have not gained much interest in the textbooks.[4] Success in root canal treatment is based on proper debridement, disinfection & obturation of root canal system. Obstruction due to calcification or pulp stones often creates difficulties during meticulous instrumentation. Hence, retrieval of pulp stones & negotiation of calcified canals is of paramount importance for successful root canal therapy.[5,6]

AIM & OBJECTIVES

The aim of the study is to calculate the prevalence of pulp stones in a young Indian population using radiographs; to explore possible association between pulp stones & condition of tooth. The study focuses on finding the major etiological agents among caries, restoration, secondary caries & idiopathic factors. This paper also discusses the treatment planning for a tooth with pulp stone.

METHODOLOGY

The study sample included 1100 teeth identified in intra oral periapical radiographs or bitewing radiographs of patients between the age 17-40 years, reporting to the Department of Conservative Dentistry & Endodontics. The study excluded patients having any non carious lesions or have undergone/ undergoing orthodontic treatment. The maxillary & mandibular molars were examined radiographically by two clinicians in a darkened room using light box with an even diffuse light source. Pulp stones were identified as definite radiopaque masses inside the pulp chamber of first & second molars of maxillary & mandibular arches.

Pulp stones were scored as Present or Absent. The status of each tooth was categorized as (1) Unrestored & intact (2) Restored (3) Carious (4) Restored & carious (Secondary caries)

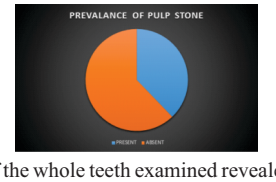
The extent & type of restoration was not analysed in detail but only caries involving the dentin was taken for the study.

STATISTICALANALYSIS

Examiner reliability was calculated through replicate observation derived from double determination in all samples. Concordance for replicate identification of pulp stones & dental status were both 98.5%, indicating that the scoring methods were highly reliable. Percentage Analysis Method was used for analysing the data which were collected for this study. Data were collected on the basis of judgemental sampling technique.

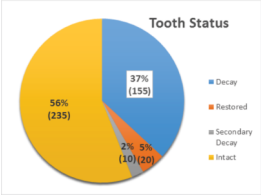
RESULTS

DIAGRAM 1:Prevalance of pulp stone in maxillary & mandibular molars



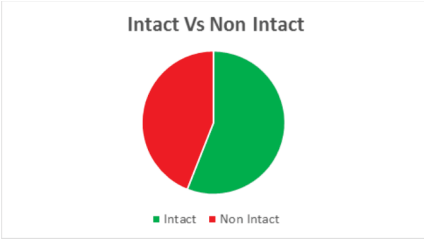
Inference: 38% of the whole teeth examined revealed presence of pulp stone, whereas 62% of the teeth examined showed absence of pulp stones (Diagram 1.1)

DIAGRAM 2: Data of status of tooth where pulp stones were present



Inference: Out of 420(38.1%) teeth, 235 teeth (55.9%) were intact. 155 teeth (36.9%) with pulp stone had dentinal caries, of which 70 teeth (16.6%) had class1 decay & 85 teeth (20.2%) had class 2 decay. There was not much significant difference between prevalence of pulp stone in restored teeth(4.7%) & teeth with secondary decay(2.3%) (Diagram 2).

DIAGRAM 3: Correlation of presence of pulp stones in Intact & Non intact teeth



Inference : Out of the 420 tooth with pulp stones, 44% were non intact where as 56% were intact which shows a bilaterally equal prevalence of pulp stones irrespective of the dental status. (Diagram 3)

DISCUSSION

Pulp stones are discrete calcifications that are present in the pulp chamber which may or may not extend these calcific process into the canals thereby completely or partially obstructing the canals. [7] The major problems associated with pulp stones are pain which are of an idiopathic nature may be caused by pulp stones (Seltzer & Bender 1984) with higher incidence of unexplained dental pain, given the higher prevalence of pulp stone & pulp calcifications.[2] Large size pulp stones may block the access to canal orifice & alter the internal morphology. The attached stones may deflect/ engage the tip of the exploring instrument, preventing their easy passage down the canal. (Pashly et al 2002)[3]

The detection of pulp stones using dental radiographs is possible when they are larger than 200 micrometer in diameter.[8] Although the true prevalence is likely to be higher in microscopic examinations of teeth than figures from radiographic studies, the latter is the only noninvasive technique available for evaluating pulp stones in clinical investigations. Furthermore, in histological observations the limited number of sections through each tooth may result in underreporting (Willman 1934).[9] But evaluation using CBCT to detect pulp stone has overcome the limitations of conventional radiographs & histological examinations.[10] This study followed radiographic method as they are more economical & easy technique.

The result of the present study has given a prevalance of 38.1% within the age group of 17-40 yrs.Similar study done in a South Indian population showed pulp stone prevalence of 14.4%.[12] In another study done in Bangalore, the prevalence rate of pulp calcifications was 6.4% of the total teeth examined.[13]

Studies by Sisman *et al*., Tamse *et al*., and Ranjitkar *et al*. & Hamasha *et al*., found that highest distribution of pulp stones was in first & second molars. The high distribution in molars may be due to the fact that, Molars are the first teeth to erupt into the oral cavity , Large surface area bear most of the occlusal forces, which may lead to early degenerative changes & rich blood supply that may lead to precipitation of calcification in the molars.[2,16,17]

Any irritation to pulp caused by chronic irritants (caries, restoration) have been suggested to have deleterious influence on the pulp. Study by Sathya et al. showed that pulp stones were found significantly more in molars that were not intact (either restored or carious), predominantly in restored teeth. The present study showed that 44.04% of tooth with pulp stones were non intact ie, either restored,decayed or with secondary decay. A higher occurrence of pulp calcification has been noted in carious, unrestored teeth than in restored teeth, presumably because the pulps have some degree of chronic inflammation due to the caries and restorations.[18] A high incidence of mineralized canals has been observed following pulpotomy & direct pulp capping (Langeland et al 1971,Seltzer & Bender 1984) when pulpotomy or pulp capping procedure fails.[19]

Pulp stones were reported in young teeth and developing tooth germs, which indicates that pulpal pathology is not the sole etiologic factor for the formation of pulp stones. Recent theory also includes calcifying nanoparticles in the air as an etiologic factor for pulp stones.[2,3] The present study reported 55% of the intact tooth had pulp stones pertaining to any idiopathic causes or irritation during developmental stages or underlying systemic illness.

This finding was in accordance with a study conducted by Satheeshkumar *et al*., where he concluded that aging and the reactive process may not be the only reason for pulp calcifications.[20]

Sayegh and Reed concluded that systemic variations such as arteriosclerosis and renal lithiasis can be considered as factors predisposing to pulpal calcification which was later confirmed by Moura and Paiva in their radiographic study. Edds et al. found a significant (75%) relationship between preexisting cardiovascular disease and pulp stones.[2]

The primary clinical relevance of pulp stones remains in the field of endodontic treatment from the stage of diagnosis to the completion of debridement & shaping of root canals. Some of the risks associated during endodontic therapy are; Perforation, Lack of getting 'drop', Difficulty in orifice location, Failure to get straight line access to the canals.[2,3,5,19,21]

Factors to be considered before access opening are, Canal space in normal root canal anatomy is always in the cross- sectional center of the root. Pulp chamber is (or was, before calcification) located in the cross sectional center of the crown. In a tooth with a calcified pulp chamber, the distance from the occlusal surface to the projected pulp chamber is measured from the preoperative periradicular film, or preferably from a bite-wing film, which maximizes accuracy.[3]

Factors to be considered after access opening are, After the initial access opening, the bur is left in place and three radiographs are taken: 1. Straight – on to the bucco- lingual dimension to determine the position of the head of the bur in the root canal in the mesio- distal dimension 2. Radiograph taken with a 20 degree horizontal angulation with the cone shifted distally. 3. Radiograph taken with a 20 degree horizontal angulation with the cone directed mesially. The last two radiographs give information regarding the relation of the bur to the canal lumen in the bucco- lingual dimension. The laws given by Krasner and Rankow have to be considered in locating calcified canal orifices.[3]

Embedded denticles can be removed using CAV1 & dentin removal tips (VDW ultra) embedded on a scaler ultrasonic device along with copious irrigation with sodium hypochlorite. Free denticle can be removed using excavator & probe after plexus anaesthesia & trepanation. Adherent denticle can be removed using gates-gliden chisel & excavator.[21]

CPR 2D or BUC 1 tips can be used to vibrate or tease out pulp stones. BUC 2 tip can be used for planning the surface. Ultrasonic tip, Start X™ #1 & 3 can be used for scouting of the calcified canal. The addition of sodium hypochlorite & EDTA has a synergetic effect coupled with other mechanical means of removal.[21]

DG-16 can be used for orifice location where a sticky sensation is felt. Adjuvant use of path finders, EDTA & 10K files is also helpful. The LN bur and thin ultrasonic tips are especially useful for locating calcified canals. Micro- Orifice Opener are specialised instruments with fine nibs.[3]

Periodic radiographs should be taken between each drilling to evaluate the depth reached, Removal of crown & fabrication of temporary prosthesis in pulp chamber if fully obstructed & canals are patent,

Patients after orthodontic treatment should be approached with caution with thorough radiographic diagnosis to avoid risk of preforation.[5,19]

Biomechanical preparation to be followed is coronal flaring in crown down fashion. Incremental instrumentation is achieved by creating new increments between the established widths by cutting off a portion of the file tip, thus making it slightly wider in diameter.

In extremely sclerotic canals, only 0.5 mm segments are trimmed, increasing the instrument width by 0.01mm and making a size 10 into a size 11, etc. Liquid EDTA solution introduced into the pulp chamber using a cotton pellet act as an adjuvant for root canal preparation.[3]

CONCLUSION

The features of pulp stones noted in this study may provide additional information about the dental morphological features in Bangalore population. The development of a more discriminatory system to score the number and size of pulp stones observed on radiographs would further assist in forensic applications. Smith reviewed the literature concerned with calcific metamorphosis and collected the following data: Calcified teeth that were not treated endodontically developed radiographic or clinical symptoms in upto 16% of the cases.

Studies of the success and failure of conventional endodontic therapy reported failure rates of 10% to 19%.[3]

When these failure rates are compared, it appears that a calcified tooth treated endodontically would have no better chance of success than if it were left alone. Pulp stones generally have no clinical significance. [3] However, they might obstruct the pulp chamber and root canals, causing difficulties during root canal treatment. Such clinical difficulties may be eliminated by magnification; good access and using appropriate instruments during endodontic therapy.[22]

REFERENCES

1. Vibhute N, Vibhute A, Daule R, Bansal P, Mahalle A. Hard Facts About Stones: Pulpal Calcifications: A Review. Journal Of Pattient Care. 2016;2(1):1-4.
2. Goga R, Chandler NP, Oginni AO. Pulp Stones: A Review. International Endodontic Journal. 2008 Jun;41(6):457-68.
3. Thomas B, Chandak M, Patidar A, Deosarkar B, Kothari H. Calcified Canals–A Review. IOSR Journal Of Dental And Medical Sciences. 2014 May;13(5):38-43.
4. Cohen S, Liewehr F. Diagnostic Procedures. Pathways Of The Pulp. 1998;8:1-30.
5. Nanjannawar GS, Vagarali H, Nanjannawar LG, Prathasarathy B, Patil A, Bhandi S. Pulp Stone--An Endodontic Challenge: Successful Retrieval Of Exceptionally Long Pulp Stones Measuring 14 And 9.5 Mm From The Palatal Roots Of Maxillary Molars. J Contemp Dent Pract. 2012 Sep 1;13(5):719-22.
6. Jain P, Patni P, Hiremath H, Jain N. Successful Removal Of A 16 Mm Long Pulp Stone Using Ultrasonic Tips From Maxillary Left First Molar And Its Endodontic Management. Journal Of Conservative Dentistry: JCD. 2014 Jan;17(1):92.
7. Pashley DH, Walton RE, Slavkin HC. Histology And Physiology Of The Dental Pulp. Endodontics 5th Ed. Ingle JI, Bakland LK. BC Decker Inc, Hamilton. 2002:25-60.
8. Moss-Salentijn L, Klyvert MH. Epithelially Induced Denticles In The Pulps Of Recently Erupted, Noncarious Human Premolars. Journal Of Endodontics. 1983 Dec 1;9(12):554-60.
9. Kannan S, Kannepady SK, Muthu K, Jeevan MB, Thapasum A. Radiographic Assessment Of The Prevalence Of Pulp Stones In Malaysians. Journal Of Endodontics. 2015 Mar 1;41(3):333-7.
10. Hsieh CY, Wu YC, Su CC, Chung MP, Huang RY, Ting PY, Lai CK, Chang KS, Tsai YW, Shieh YS. The Prevalence And Distribution Of Radiopaque, Calcified Pulp Stones: A Cone-Beam Computed Tomography Study In A Northern Taiwanese Population. Journal Of Dental Sciences. 2018 Jun 1;13(2):138-44.
11. Sisman Y, Aktan AM, Tarım-Ertas E, Çiftçi ME, Şekerci AE. The Prevalence Of Pulp Stones In A Turkish Population. A Radiographic Survey. Medicina Oral, Patologia Oral Y Cirugia Bucal. 2012 Mar;17(2):E212.
12. Yousuf MA, Antony S. Radiographic Assessment Of Prevalence Of Pulp Stones In South Indian Population. Drug Invention Today. 2018 Nov 2;10.
13. Hamasha AA, Darwazeh A. Prevalence Of Pulp Stones In Jordanian Adults. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, And Endodontology. 1998 Dec 1;86(6):730-2.
14. Turkal M, Tan E, Uzgur R, Hamidi MM, Çolak H, Uzgur Z. Incidence And Distribution Of Pulp Stones Found In Radiographic Dental Examination Of Adult Turkish Dental Patients. Annals Of Medical And Health Sciences Research. 2013;3(4):572-6.
15. Ertas ET, Veli I, Akin M, Ertas H, Atici MY. Dental Pulp Stone Formation During Orthodontic Treatment: A Retrospective Clinical Follow Up Study. Nigerian Journal Of Clinical Practice. 2017;20(1):37-42.
16. Hamasha AA, Darwazeh A. Prevalence Of Pulp Stones In Jordanian Adults. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, And Endodontology. 1998 Dec 1;86(6):730-2.
17. Kannan S, Kannepady SK, Muthu K, Jeevan MB, Thapasum A. Radiographic Assessment Of The Prevalence Of Pulp Stones In Malaysians. Journal Of Endodontics. 2015 Mar 1;41(3):333-7.
18. Gulsahi A, Cebeci AI, Özden S. A Radiographic Assessment Of The Prevalence Of Pulp Stones In A Group Of Turkish Dental Patients. International Endodontic Journal. 2009 Aug;42(8):735-9.
19. Ngeow WC, Thong YL. Gaining Access Through A Calcified Pulp Chamber: A Clinical Challenge. International Endodontic Journal. 1998 Sep;31(5):367-71.
20. Nagaraj T, Sinha P, Goswami R, Veerabasaviah B. A Radiographic Assessment Of The Prevalence Of Idiopathic Pulp Calcifications In Permanent Teeth: A Retrospective Radiographic Study. Journal Of Indian Academy Of Oral Medicine And Radiology. 2014 Jul 1;26(3):248-7.
21. Rcić-Konjhodžić, Alma & Korac, Samra & Jakupovic, Selma & Vukovic, Amra. (2014). DENTICLES (PULP STONES) - A CHALLENGE IN ENDODONTIC THERAPY - MULTIPLE CASE REVIEW. Stomatološki Vijesnik. 3. 141-146.
22. Ravanshad S, Khayat S, Freidonpour N. The Prevalence Of Pulp Stones In Adult Patients Of Shiraz Dental School, A Radiographic Assessment. Journal Of Dentistry. 2015 Dec;16(4):356.