



Correlation of pulp stones in patients with systemic disease - A Review

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Abstract

Pulp calcifications stones are discrete calcifications within the pulps of teeth. They are usually detected during radiographic examination as radiopaque areas of variable sizes and shapes. Localized pulp calcifications are microscopically apparent in more than half of the teeth in young adolescents. However, pulp stones extending to the entire dentition are not frequent. Studies indicate that patients with coronary artery disease show higher degree of pulp calcifications. Higher prevalence of pulp stones in multiple teeth may be ruled out as risk predictors for coronary artery disease and some other probabilities of associated diseases.

Key words: Coronary Artery Disease, Pulp Stones, Diabetes Mellitus, Radiography, Risk Predictors.

Introduction

Pulp stones are discrete calcified bodies found in the dental pulp. They have calcium phosphorous ratios similar to dentin and can be seen in healthy, diseased, or even unerupted teeth. Calcification can occur in the dental pulp as discrete calcified stones or as diffuse form that can occur freely in the pulp tissue or is attached to or embedded into dentin. They are not clinically apparent but are common radiographic findings. They have variable radiographic appearance; they may be radiopaque structure within the pulp chamber or in the root¹. Mild to severe pulpal pain is one of the frequent symptoms associated with pulp stones. They can cause obstruction of the root canals which leads to endodontic failure².

Formation of the pulp stone normally associated with long standing irritants such as caries, deep fillings, and chronic inflammation. Authors suggest that pulp stones are a feature of an irritated pulp, attempting to repair itself. Some authors found a unique correlation between pulp stones and arteriosclerosis and other cardiovascular diseases³. So, this review aimed to find out correlation between pulp stones with dental and Systemic Disorders.

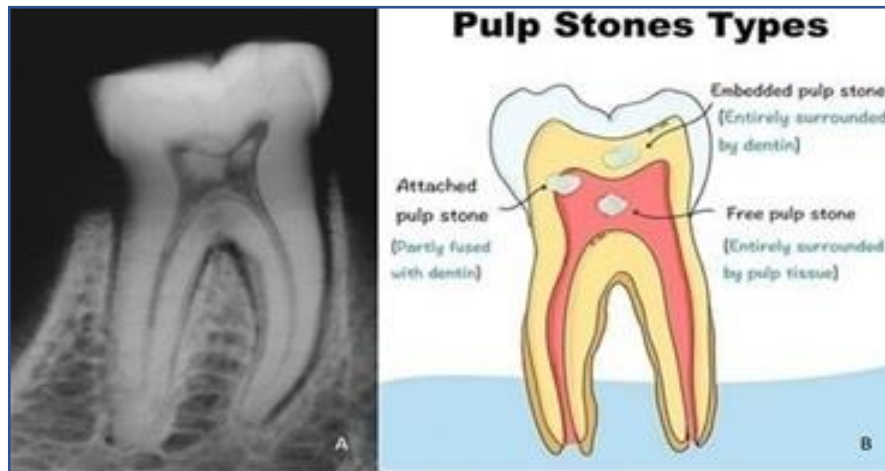


Figure: -1 Pulp Stone (A) Roentgenographic view (B) Schematic diagram⁴

Incidence

Pulp stones occur most commonly in molars, although they occur in all tooth types. Healthy, deceased and even unerupted teeth can have pulp stones. Half the teeth of younger people and in almost all teeth of people older than fifty years of age have pulp stones which are probably apparent microscopically². According to one estimate, 66% of teeth in persons 10 to 30 years of age, 80% in those between 30 and 50 years and 90% in those over 50 years contain calcifications of some type¹.

Aetiology

Etiological factors for pulp stone formation are not well understood. Formation of pulp stones might be related to long standing irritants such as caries, deep fillings and chronic inflammation. A few researchers stated that pulp stones are components of an irritated pulp trying to repair its tissue³. Etiological factors for pulp stone formation are Age, circulatory disturbances in pulp, orthodontic tooth movement, idiopathic factors and genetic predisposition. Most possible factors for pulp stone formation are periodontal disease, carious teeth, restorative procedures, fluoride prophylaxis, cardiac disease and kidney stones. Association with systemic conditions pulp stones have been noted in patients with systemic or genetic disease such as dentin dysplasia, dentinogenesis imperfecta and in certain diseases such as vander woude syndrome^{1,2}. There is also evidence that hypercalcemia, gout and renal lithiasis are pre-disposing factors to pulpal calcification⁵.

Types & classification

The two chief morphologic forms of pulp calcification are discrete pulp stones (pulp nodules, denticles) and diffuse calcification. Pulp stones are classified as per their structure into true denticles and false denticles. True denticles are made up of localized masses of calcified tissue



that resemble dentin because of their tubular nature. True denticles may be further classified into free or attached. Denticles lying entirely within the pulp tissue and not attached to the dentinal walls are called free denticles, while those continuous with the dentinal wall are referred to as attached denticles. Attached denticles are thought to be more common than the free denticles⁶.

Clinical Significance

Pulp stones may block access to canal orifices and alter the internal anatomy. Pulp stones present little clinical difficulty during root canal treatment. The base of all calcifications, including joint calcifications, renal calculi, atherosclerotic plaques as well as pulp stones is made up of calcium phosphate crystals. Calcific atheromas and the calcification of dental pulp may have a similar pathogenesis.

Histopathological examination of the extirpated dental pulp; calcification was noted in both large and small blood vessels of cardiovascular and diabetic patients. Vascular changes seemed more pronounced in the central area of the pulp, because it has limited or no collateral blood circulation in fully developed teeth. Calcifications in diabetics were frequent and often sickle-shaped⁵.

Edds AC et al. (2005) demonstrated that patients with cardiovascular disease have an increased incidence of pulp stones in teeth with noninflamed pulps compared to patients with no history of cardiovascular disease. Their study assessed the association between pulp stones and symptoms of cardiovascular diseases and diabetic mellitus. They determined the pervasiveness of pulp stones with independent variables, such as age, gender, and tooth type⁷.

Sandeep Kumar Bains et al. (2014) suggested that patients with pulp stones have high propensity to develop cardiovascular or cholelithiasis⁸.

Mathew ST et al. (2019) found a significant relationship between pulp stones and older age. They found that the prevalence of pulp stones is significantly higher among patients with systemic diseases, especially in a cardiac and diabetic population⁹.

Table -1. Prevalence of pulp stones in the Systemic condition^{7, 10, 11, 12, 14.}

SN.	Authers	Year	Prevalence	Systemic condition
1.	<i>Edds et al.</i>	2005	74%	Ischemic heart diseases
2.	<i>Nayak et al.</i>	2010	15.86%	Cardiovascular diseases
3.	<i>Khojastepour et al.</i>	2013	68.2%	Cardiovascular diseases
4.	<i>Ezoddini-Ardakani et al.</i>	2015	67.3%	Ischemic heart diseases
5.	<i>Panwar et al.</i>	2019	100%	Coronary artery disease

Ciftçioğlu and Kajander et al. (1998) stated that nanobacteria are known to produce biologic apatite over their cellular covering which is similar to renal calculi and calcified tissues leading to a hypothesis that this might be explained as a common factor between both pulp stones and



the atheromatous plaques seen in Cardiovascular disease¹³. Panwar *et al.* (2019) suggested that coronary artery disease participants have high chances of being affected with pulp stones. Higher prevalence of this entity in multiple teeth may warrant such an individual, in the presence of other compounding risk factors, as a candidate for coronary artery disease to be ruled out¹⁴. Cardiovascular disease is the most common cause of mortality and morbidity in the diabetic population. So, the routine dental radiographs may be useful as a rapid screening method for early identification of potential cardiovascular diseases⁹.

This review proposed that calcification of dental pulp may have a similar pathogenesis as calcified atheromas and could lead to use of routine dental radiographs as a rapid screening method for early identification of potential cardiovascular disease.

Conclusion

According to studies this is suggested that patients with pulp stones have high susceptibility to develop diabetes mellitus and cardiovascular diseases. Cardiovascular disease patients have high chances of being affected with pulp stones. Therefore, patients should be screened to assess such complications at an early stage. Further research is recommended to determine the causes of pulp stone formation.

References

1. Orban BJ, Sicher H, Bhaskar SN. Orban's Oral Histology and Embryology. 12th ed. St. Louis: Mosby; 1972.
2. White SC, Pharoah MJ. Oral Radiology Principles and Interpretation. 4th ed. St. Louis: Mosby; 2000.
3. Ranjitkar S, Taylor JA, Townsend GC. A radiographic assessment of the prevalence of pulp stones in Australians. *Australian Dental Journal* 2002; 47(1):36-40.
4. (A)<https://secure.dentistry.ubc.ca/intranet/visuendo-svn/m1/pulpstones>
(B)<https://www.pinterest.com/pin/430797520610485289>
5. Nupura AV, Vibhute AA, Daule RT, Bansal PP and Mahalle A. Hard Facts about Stones: Pulpal Calcifications: A Review. *J Pat Care*. 2016; 2(1): 1-4.
6. Kannan S, Kannepady SK, Muthu K, Jeevan MB, Thapasum A. Radiographic assessment of the prevalence of pulp stones in Malaysians. *J Endod*. 2015; 41(3):333-37.
7. Edds AC, Walden JE, Scheetz JP, Goldsmith LJ, Drisko CL, Eleazer PD. Pilot study of correlation of pulp stones with cardiovascular disease. *J Endod*. 2005; 31(7):504-6.
8. Bains SK, Bhatia A, Singh HP, Biswal SS, Kanth S, Nalla S. Prevalence of coronal pulp stones and its relation with systemic disorders in northern Indian central punjabi population. *ISRN dentistry*. 2014; 22:2014.
9. Mathew ST, Al-Mutlaq MA, Al-Eidan RF, Al-Khuraishi DM and Adam H. Prevalence of pulp stones and its relation with cardiovascular diseases and diabetes mellitus using digital radiographs: a retrospective study. *Annals of Dental Specialty* 2019; 7(4):18-23.



10. Nayak M, Kumar J, Prasad LK. A radiographic correlation between systemic disorders and pulp stones. *Indian Journal of Dental Research*. 2010; 21(3):369.
11. Khojastepour L, Bronoosh P, Khosropanah S, Rahimi E. Can dental pulp calcification predict the risk of ischemic cardiovascular disease? *J Dent (Tehran)* 2013; 10:456-60.
12. Ezoddini-Ardakani F, Nemayandeh SM, Sadrbafghi SM, Hajihashemi S, Emami M, Kahtouei FG, et al. Diagnostic value of dental pulp stones in the early diagnosis of ischemic heart diseases. *Health* 2015; 7:336-45.
13. Ciftcioglu N, Ciftcioglu V, Vali H, Turcott E, Olavi Kajander E. Sedimentary rocks in our mouth: Dental pulp stones made by nanobacteria. *Proc SPIE Int Soc Opt Eng* 1998; 3441:130-5.
14. Panwar PS, Debkant J, Chowdary NG, Dwijendra KS, Kumar SP, Kumar SM, et al. Pulp stones as risk predictors for coronary artery disease: An intriguing, prevalence study. *Res Cardiovasc Med* 2019; 8:54-8.