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Contents

Scientific Editorial - Bite Mark Analysis

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ABSTRACT:

Bite mark analysis seeks to identify persons by comparison of their dentition to a bite registration material . The technique is a specialized subset of forensic odontology . A brief review below focuses on the his history , importance and the criticism of the Bite Marks.

Keywords: Bite mark, forensic odontology

DISCUSSION:

Keith Simpson published one of the very first manuscripts on accounts involving a conviction based on bite marks as evidence in the “Gorringe case”, in 1948, in which the pathologist used bite marks on the breast of the victim to seal a murder conviction against Robert Gorringe for the murder of his wife Phyllis. Historically lot of work has been done on this aspect of dentistry.Wax bites , Cardboards , various bite registration materials have been used to register bites historically.[1]

Bite mark analysis seeks to identify persons by comparison of their dentition to a bite registration material . The technique is a specialized subset of forensic odontology, the application of dentistry to law. Bite marks are usually seen in cases involving sexual assault, murder, and child abuse and can be a major factor in leading to a conviction. Biting is often a sign of the perpetrator seeking to degrade the victim while also achieving complete domination.

Criticism of BiteMark Analysis:

There are numerous barriers to undertaking high quality research in the field of bite mark analysis, the most important of which is the use of a gold-standard that is acceptable both in terms of diagnostic research but is also forensically relevant.3The bite mark analysis has been used in legal proceedings since 1870,but it remains a controversial topic due to a variety of factors. DeVore and Barbenel and Evans have shown that the accuracy of a bite mark on skin is limited at best. Skin is not a good medium for dental impressions; it is liable to have a number of irregularities present before the imprint that could cause distortion. The bite marks can also be altered through stretching, movement or a changing environment during and after the actual bite. And naturally , the level of distortion tends to increase after the bite mark was made. The above two studies suggest that for the bite mark to be accurately analyzed, the body must be examined in exactly the same position it was in when the bite occurred which can be a difficult if not an impossible task to accomplish. Bite mark distortion can rarely be quantified. Therefore, bite marks found at the scene are often analyzed under the assumption that they have undergone minimal distortion. Only limited research has been done in trying to quantify the level of distortion of a bite mark on human skin since the 1970s. The lack of research may largely be due to the fact that such studies are difficult to organize and are very expensive. Bite mark analysis is also controversial because dental profiles are subject to change due to the loss of teeth or the alteration of arch configuration through a variety of procedures . The onset of oral

diseases such as dental caries has been shown to alter the arch and tooth configuration and must be taken into account when comparing a dental profile to the bite mark after a significant amount of time has passed since the mark was made.

Conclusion :

The science of bite mark analysis is relatively new and potentially valuable. This science has been greatly used in identifying the suspects involved in crimes related to sex, child abuse, and altercations of various types.2Lot of developments have been happening in the field of Bite Marks. From using newer registration techniques to using CT to make a permanent record of the Bite and create an algorithm for ease in investigations. But, considering the serious drawbacks and criticisms Bite marks has drawn , the future of the discipline depends on some nail biting research .

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OCCURRENCE OF UNUSAL LOCALISED MICRODONTIA OF PREMOLARS: CASE REPORTS & REVIEW OF LITERATURE

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ABSTRACT:

Dental anomalies can be broadly considered as being morphologic and numeric. If anomalous is taken to mean an irregularity of the norm, then a dental anomaly is a feature of the dentition that can be expected to occur in the minority of a population. Developmental disturbances of oral region can be in form of an additional as well as reduction in size of teeth which may also be the result of numerous independent pathological mechanisms that can affect the orderly formation of the dental lamina, small development of a tooth Germ at the time of tooth formation. Clinically, microdontia in the permanent dentition, excluding the third molars, is found in 0.8-8.4% of the population. One of the commonest forms of localized microdontia is that which affects the maxillary lateral incisor, a condition called Peg laterals. The next tooth which can be affected is the third molars. True Microdontia is uncommon in especially a non-syndromic patient. The following article throws light on the unusual occurrence of three cases of microdontia in second premolar and two in supernumerary premolars.

Key-words: Dental Anomaly, Developmental disturbances, Microdontia

INTRODUCTION

Tooth size is variable among different races and between the sexes. Anomalies of the dentition hold a fascination for many dentists. The presence of dental anomalies of the teeth and the likely causes may be more possibly thought provoking than features with profound consequences upon the affected dentition[1]. Developmental dental anomalies are marked deviations from the normal color, contour, size, number and degree of development of teeth[2]. The presence of unusually small teeth is termed as microdontia. Although hereditary is the major factor, both genetic and environmental influences affect the size of developing teeth. The deciduous dentition appears to be affected more by maternal intrauterine influences; the permanent teeth seem to be more affected by environment.[1] Local as well as systemic factors may also be responsible for developmental disturbances. Such influences may begin before or after birth, hence deciduous or permanent teeth may be affected.[2]

Dental anomalies can be broadly considered as being morphologic and numeric. If anomalous is taken to mean an irregularity of the norm, then a dental anomaly is a feature of the dentition that can be expected to occur in the minority of a given

population.[3] Developmental dental anomalies are an important category of dental morphologic variations. Abnormalities in tooth size, shape, and structure result from disturbances during the morpho-differentiation stage of development, while ectopic eruption, rotation and impaction of teeth result from developmental disturbances in the eruption pattern of the permanent dentition.[4]

Anomalies of shape of teeth include microdontia and macrodontia. The term microdontia is used when teeth are smaller than normal (i.e outside the usual limits of variation). According to Shafer et al[2] three types of microdontia is recognized (i) true generalized microdontia (II) relative generalized microdontia (iii) microdontia of single tooth. Microdontia affecting single tooth is a rather common condition. It affects most often the maxillary lateral incisors and third molar.[5] Supernumerary teeth may also be a microdont.[6] Females demonstrate a higher frequency of microdontia and hypodontia. Macrodontia is used when teeth are larger than normal1

Incidence and degree of expression of developmental anomaly can provide important information for phylogenic and genetic studies and help in the understanding of differences within and between populations.[7]

Presented here are case reports on various true microdontia of the unusual occurrence of three cases microdontia of second premolar and two cases of supernumerary premolars in males.

CASE REPORT

CASE 1:

A 45 year old apparently healthy male patient visited our department with a chief complaint of bleeding gums. The patient was moderately built, with no other clinical signs or symptoms. There was no relevant family/medical history or local lymph node enlargement. On intraoral examination, the entire mucosa appeared apparently normal. The upper right posterior quadrant showed small appearing second maxillary premolar. The dimensions of tooth were taken which reveal labiopalatal dimension at crown of 6mm, cervico-occlusal 5mm and mesiodistal at crown of 4.5mm while contralateral side of same tooth reveal labiopalatal dimension at crown of 6.5mm, cervico-occlusal 7.0mm and mesiodistal at crown of 6.0mm. The microdontic tooth was slightly rotated distally with little different morphology as that of second premolar (fig 1). As per the above findings, the diagnosis of microdontia was made.

Figure1: Photograph showing microdontia of maxillary right second premolar

CASE 2:

A 40 year male patient reported to CSMMU dental Hospital, Lucknow with a chief complain of pain in upper left posterior region of jaw. Extraoral examination did not show any abnormality. Intraoral examination reveal periodontal pocket in maxillary left second premolar and smaller looking tooth in right maxillary second premolar with class I occlusion. The maxillary right second premolar was very small in size, distally rotated with reserve

morphology and contour but the cusp of the tooth were not well developed or sharp as that of maxillary second premolar (fig 2). The labiopalatal dimension of microdontic tooth was 3mm, cervico-occlusal 3.0 mm, and mesio-distal at crown was 4mm while the contralateral tooth was also small in size with differ morphology but the size of the tooth is not much significant in model and patient did not allow us for another pouring of model. The diagnosis of isolated microdontia of was made.

Figure 2: Photograph showing microdontia of maxillary right second premolar

CASE 3:

A 30 year male patient reported to our department with a chief complaint of food lodgment in lower posterior left side of mandible. Extra oral examination did not reveal any abnormality. Intraoral examination reveals extra small size of tooth located on lingual side of 34. This supernumerary small size tooth was of pin head size with similar morphology and contour as that of second premolar (fig 3). The size of the microdontic tooth was measure which reveal labiopalatal dimension at crown of 3.5mm, cerivoocclusal 3mm and mesiodistal at crown of 2.5mm. The diagnosis of supernumerary microdontia of mandibular premolar was made.

Figure 3: Photograph showing microdontia of supernumerary left mandibular premolar

CASE 4:

A 35 year old male reported to CSMMU dental college, Lucknow with a chief complaint of food lodgment in upper posterior region of jaw since a year. Intraoral examination showed permanent dentition with class I molar relationship and small size mandibular left second premolar. The same tooth was rotated distally with loss of well define morphology as that of mandibular second premolar measuring labiolingual dimension at crown of 3.0 mm, cerivo-occlusal of 2.5mm and mesio-distal at crown of 3.5 mm (fig 4) while the opposite side of same tooth reveal labiolingual dimension at crown of 5.0 mm, cerivo-occlusal of 7.0 mm and mesio-distal at crown of 6mm. Extra oral examination did not show any abnormality. No malocclusions of teeth were observed. Diagnosis of microdontia of mandibular second premolar was made.

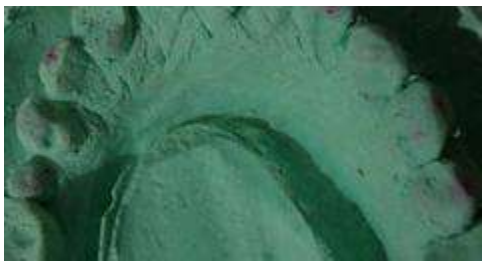

Figure 4: Photograph showing undersized right mandibular second premolar

CASE 5:

A 26 year old male reported to CSMMU Dental College, Lucknow with a chief complaint of smaller looking upper posterior back region of jaw. Intraoral examination showed permanent dentition with class I molar relationship and supplemental mandibular left premolar with dilacerated root (fig 5) located in between of mandibular left second premolar and first molar. This supernumerary tooth was small in size with loss of occlusal morphology but with well develop two cusps. On measuring labiolingual dimension reveal 3.5mm, cerivoocclusal of 3.0mm and mesiodistal dimension of 4.0mm. The extra oral examination did not show any abnormality. No malocclusions of teeth were observed. Final diagnosis of supernumerary mandibular left premolar was made.

Figure 5: Intraoral radiograph showing microdontia of right mandibular premolar

DISCUSSION

Microdontia is a condition where the teeth are smaller than the normal size, which may involve all the teeth or be limited to a single tooth or a group of teeth. Lateral incisors and third molars are the most common among microdontia.8. The expression of developmentally missing teeth may range from the absence of one or a few teeth (Hypodontia), to the absence of numerous teeth (Oligodontia) and to the failure of all teeth which are to develop (Anodontia) 6. Developmentally missing teeth may also be the result of numerous independent pathological mechanisms that can affect the orderly formation of the dental lamina, the failure of a tooth germ to develop at the optimal time, the lack of necessary space imposed by a malformed jaw, and a genetically determined disproportion between the tooth mass and the jaw size. 8

There are three types of microdontia; true generalized microdontia, relative generalized microdontia, both of which affect the entire dentition and thirdly, localized microdontia which involves only a single tooth. True generalized microdontia, in which all of the teeth are smaller in size than normal, is extremely rare, such as in some cases of pituitary dwarfism. In relative generalized microdontia, normal or slightly smaller than normal teeth are present in jaws that are larger than normal, thus giving an illusion of microdontia. Localized microdontia is often associated with a tapering coronal form, making the anomaly. Relatively easy to identify.[9]

One of the common forms of localized microdontia is that which affects the maxillary lateral incisor, and this condition that has been called the “peg lateral”, the prevalence and distribution of peg lateral in Indian population is listed in Table I 10. Instead of exhibiting parallel or diverging mesial and distal surfaces the sides converge or taper together incisally forming a peg shaped or cone- shaped crown. The root on such a tooth is frequently shorter than usual. It is clear that reduced or hypoplastic maxillary laterals are a variable expression of the gene for congenitally missing lateral incisor.[5]

Several studies reported the frequencies of various dental anomalies in different populations, but the results are conflicting.

The discrepancies in their results were attributed to racial differences, variable sampling techniques, and different diagnostic criteria.[10] Byahatti in 20108 proformed first study to measure tooth crown dimensions by using image analysis in a family with hypodontia, in whom the mutation was identified. The significant smaller tooth crown dimensions which were recorded in this study on affected family members showed that the effect of the PAX9 mutation was seen not only in congenitally missing teeth, but also in smaller crown sizes throughout the dentition.

The disturbance in dental development like tooth agenesis, microdontia and short roots have been reported in a group of patients with high risk neuroblastoma treated with autologous stem cell transplantation after myeloblative therapy with high dose chemotherapy and total body or head/neck irradiation in this study microdontia of six teeth is seen in patient with low risk neuroblastoma. The prevalence of microdontia is generally very low.[11]

A study on children preparing for bone marrow transplantation reported only 4% microdontia 12. Very high prevalence of microdontia 78% in seen with high risk neuroblastoma treated with autologous stem cell transplantation after myeloablative therapy with high dose chemotherapy and/or total body irradiation.13 It seems that the younger the patient the higher the risk for agenesis or microdontia.14 Lower prevalence of 38% was reported by Kaste et al[15] on children with neuroblastoma who received chemotherapy according to a variety of treatment protocols. Case series by Goho[16] reported no presence of microdontia in patient treated with bone marrow transplantation after chemotherapy and total body irradiation. However, the mechanism of developing microdontia during chemotherapy is not known. Chemotherapy may affect tooth development not only through direct toxic effect tooth development not only through direct toxic effects on the odontogenic cells, but also by disturbing cell communication during tooth development[13,14]. Since several signal molecules mediate interactions between epithelial and mesenchymal tissues throughout tooth development[17].

In this study microdontia of premolars are the most affected teeth which are rarely reported. The subjects with microdontia have three cases microdontia of second premolar and two cases of supernumerary premolars. The prevalence of microdontia in southern Chinese children was 6.3% which was much higher than for other ethnic groups. This high prevalence figure may have been because it included cone-shaped teeth, peg-shaped teeth and microdont canines, while the prevalence of 0.2% reported by Clayton and Saito were only for peg-shaped teeth. When considering the overall prevalence of 6.3%, the majority of the teeth were microdont maxillary canines (4.3%) which had no mesial marginal or central ridge and had a shallow cingulum. This finding suggests that microdontia of the primary maxillary canines may be one of the characteristics of the dentition.3 But our study show prevalence of maxillary premolars a rare type of microdontia in males.

The mouth prevalence of microdontia in the primary dentition of 936 five years old southern Chinese girls (443) was 7.7% and boys (493) were 5.1% in Hong Kong3. Prevalence of developmental dental anomalies in a study group of 1123 patients (571 males, 552 females) on Indian Population of permanent dentition was reported to be 2.58% while male were showing 1.93% and female showing 3.26%10, further are listed in Table II[18-23]. The prevalence rates reported by several authors in different populations are given in Table III[24-29].

Among the frequency of microdontia in the primary dentition, the high (>5%) frequency was seen in southern Chinese while moderate (1-5%) in mongoloid and low (<1%) in Caucasians3

In a large study of tooth number and size in British school children, excluding patients with more widespread abnormalities, Brook favoured a multifactorial model with a continuous spectrum, related to tooth number and size, with thresholds, and where position on the scale depends upon the combination of numerous genetic and environmental factors, each with a small effect.23

A considerable amount of evidence exist suggesting that genes play a fundamental role in the etiology of many dental anomalies of significance. It has also been inferred that a common genetic defect may give to different phenotypic manifestations, including tooth agenesis, delayed development and ectopia. [30] Moreover, there seems to be a genetic relationship in the determination of different dental anomalies, considering the high frequency of pattern of association. A single genetic defect may result in different phenotypic expressions, including such various traits as tooth agenesis, microdontia, ectopic tooth position, and delayed development of different teeth.[31] Tooth agenesis clearly has a genetic basis. Patients with agenesis of third molars presented a general and significant reduction in tooth size, more significantly in patients with multiple agenesis was reported by Garn and Lewis[32]. Brook analyzed families of patients with dental anomalies and observed that agenesis and microdontia often occur concomitantly.[23]

In 1956 study was performed in children with tooth agenesis and found that up to half of their siblings and parents also had tooth agenesis, a high prevalence when compared to the expected population rate. A twin study interestingly found a high concordance rate for tooth agenesis in monozygotic twins not in dizygotic twin pairs. These studies suggested that the mode of transmission could be explained by a single autosomal dominant gene with incomplete penetrance[33]. Vastardis, et al in 2000[34], study a large family with agenesis of all second premolars and third molars, identified a mutation in the MSX1 gene on chromosome [4]. It is further suggested that delayed eruption, as well as microdontia, constitute a partial expressivity of the same gene leading to tooth agenesis[32,35] according to Byahatti in 2010 significantly smaller tooth crown dimensions could be due to effect of the PAX 9 mutation .[8]

Various dental manifestations are seen in syndromic patient such as one of dental anomaly that is microdontia is seen in Dubowitz syndrome[36] and Sanjad-Sakati syndrome[37]. But our finding of microdontia is seen in non syndromic patient.

A conservative treatment is advised for microdontia keeping in view the age and sex of the patient, clinical crown length, crown-root ratio etc. an interim esthetic restoration can be replaced by a permanent restoration such as a porcelain jacket crown at a later date. Not all the cases need to undergo treatment, unless there is requirement. Dental clinicians should keep in mind that there are good possibilities with conventional Prosthodontics technique to help patients with severe dental anomalies.

CONCLUSION

Certain human dental anomalies frequently occur together, supporting the accumulated evidence of the shared genetic control of dental developmental disturbances. The clinical implications of genetically controlled patterns of dental anomalies are very important. Early diagnosis of dental anomality may alert the professional to the

possible development of others the same patient or other family members.

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REVIEW: OZONE IN DENTISTRY

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ABSTRACT:

Pain is what drives most of us insane, pain is what leads our researchers to search for something painless, something permanent, and less damaging. Dental pain, drives us to the dentist, the sound of the drill, at first panics most of our patients and once they prepare themselves for the dreaded drill, they expect that after the dramatic session, they will be at ease, and will be comfortable forever. However skillful we are or how much ever technique sensitivity we profess; the restoration will fail because of a microscopic microbe which did not budge even after thorough cleaning. In this process, all what we loose is a little more dental tissue. Ozone provides a non invasive mode of treatment and for deeper lesions, it serves the purpose of sterilizing the cavity, resulting in lesser almost nil chances of failure of a restoration, also ozone has been used to combat infections, post surgical debridements, and implant patients with infectious complications.

This paper stresses on the uses of Ozone in dentistry.

Key-words: Ozone gas, ozonated water, ozonated oils

INTRODUCTION

Ozone is a triatomic molecule, consisting of three oxygen atoms, molecular weight is 47, 98g/mol and thermodynamically highly unstable compound that, dependent on system conditions like temperature and pressure, decompose to pure oxygen with a short half life. Ozone is a potent oxidant after fluorine and per sulfate. Ozone's oxidation potential is 1.5 times higher than chloride when used as an antimicrobial agent against bacteria, viruses, fungi and protozoa. It also has a capacity to stimulate blood circulation and immune response. These features justify the application in medicine and dentistry and has been indicated for treatment of 260 different pathologies.

1839, Christian Friedrich Schonbein, first noticed the emergence of a pungent gas with an electric smell during electrolysis of water, and in Greek he called it Ozone. After that, he published a paper on it at the Basel Nature Science Society.

1870, Dr. C. Lender purified blood in test tubes. Medical applications became widespread in Europe and America. By, 1929 there were 114 disease curable by oxygen/ozone therapy.

1930, a German dentist, Dr. E. A. Fisch, used Ozone in his dental practice on a regular basis and published numerous researches on it.

DISCUSSION:

APPLICATIONS-

Clinical Uses-

Operative Dentistry: Ozone can be used as a non invasive mode of treatment for carious lesions just at their onset, or it can also be used as a disinfectant after the cavity preparation and thorough cleaning of the cavity. The disinfectant effect of ozone is very helpful to reduce post treatment sensitivity and pain. Can be used for Primary Pits & Fissures Caries Lesions, disinfecting Proximal Caries Lesions,

Cervical Root(s) Caries Lesions, to reduce sensitivity in Hyper-Sensitive Teeth and in Cracked Tooth Syndrome.

Root Canal Therapy and Peri-Apical Lesions: Ozone is highly indicated in root canal therapy due to its strong disinfection property and absence of cytotoxicity as well as other negative side effects at the recommended used concentration and form (gas or dissolved in water). Ozonized oils can also be used as a temporary canal(s) dressing in infected necrotic cases. In peri-apical lesions, ozone gas infiltration contributes in the non-surgical management of these lesions.

Periodontal Therapy: Gingival and Periodontal diseases represent a major concern both in dentistry and medicine. The majority of the contributing factors and causes in the etiology of these diseases are reduced or treated with ozone in all its application forms (gas, water, oil). The beneficial biological effects of ozone, its anti-microbial activity, oxidation of bio-molecules precursors and microbial toxins implicated in periodontal diseases and its healing and tissue regeneration properties, make the use of ozone well indicated in all stages of gingival and periodontal diseases. According to the clinical case, different application modalities are available using ozone gas, irrigation with ozonated water and in-office use of ozonized oil as well as home use.

Post-Extractions and Surgery: The use of ozone is indicated during the surgical intervention as well as post-surgery as a topical disinfectant and healing agent. Use of ozone gas is not convenient due to the inability to properly seal the treated area; hence, Ozonated water and oils are used for application. Can be used Post-Extraction, Post-Extraction Alveolitis, Surgical Procedures and Peri-Implantitis.

Prosthesis: After seating a prosthesis, generally there is hypersensitivity of the prepared tooth, or there might be a black layer formed on the sides of a veneer which is due to presence of bacteria during cementation. To overcome these shortcomings, using air abrasion before ozone is an advantage to completely remove microscopic debris and smear layer from the surface of the abutments and to leave a clean dentin for ozone disinfection. Ozone use does not affect the adhesive bonding procedures. Can be used for Crowns & Bridges - Veneers. Ozone gas can also be used along with Removable Partial Dentures to reduce the soreness of the tissues due to denture stomatitis.

Soft Tissue Lesions: Infectious, inflammatory, traumatic, burns, wounds, soft tissue lesions respond very well to topical ozone treatment. The most soft tissue lesions encountered are herpes, aphthae, removable denture ulcers, traumatic wounds and cuts, cheilitis, cysts, Candida, etc.

Whitening with Ozone: Due to strong oxidation power of ozone, it is quite possible to use ozone as a whitening agent in near future. Ongoing research has shown promising results.

TMJ Peri-Articular Ozone Gas Injection - Trigger Points: The biostimulation and anti-inflammatory effects of ozone help in the management of articulation inflammatory diseases and muscular trigger points. Chronic oxidative stress and elevated levels of pro-inflammatory cytokines are commonly found in these skeletal chronic inflammations where ozone gas infiltration can contribute in stimulating the anti-oxidant defense mechanism and in balancing the immune response by modulating the production of cytokines.

Non Clinical Uses-

Dental Unit Water Lines Disinfection - Office Tap Water Disinfection: Ozone has the capability to disinfect the entire water line

and also remove the microbial biofilm, which causes the dirty smell. So, efficient cleaning and disinfecting of the entire dental unit waterline can be done with Ozone.

CONCLUSION:

With the modern advents in dentistry, treatment has become easier and less traumatic for the patients. Ozone is the latest upcoming treatment modality, it is non invasive and also cheaper. The treatment form is less scary for the patients, and also gives a better result than most other chemicals for disinfecting. Incorporating ozone in daily dental care can result in better patient compliance and a painless dental clinic solution.

Lets pledge for Smiles for the patient and peace for the dentist with Ozonic Era.

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