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## Prosthetic Implications Of Dental Anomalies

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**Abstract:** This paper is aimed to describe a number of dental anomalies which every dental practitioner of all disciplines will be destined to encounter. The dental anomalies, how they affect the particular prosthetic implications and what could be done for treatment, if alterations could be done in the prosthetic implications are discussed in this review article. A number of articles around 40 were collected from search engines like PubMed, scholar and so much more. The articles were thoroughly reviewed to write this article on Dental Anomalies affecting prosthetic implications. Dental anomalies are the abnormalities present in the teeth and oral cavity. Dental anomalies are a wide range of disorders comprising various disorders of the teeth into the categories: acquired abnormalities and developmental abnormalities. Developmental anomalies are divided into five groups for classification. They are abnormalities in size, number, morphology, shape and the location of the tooth. The teeth number anomalies are hypodontia, hyperdontia. In these abnormalities there will be less number of teeth and increased number of teeth respectively. We also have positional anomalies which include transposition. Morphological anomalies include Concrescence, fusion and gemination (double teeth). The other abnormalities are taurodontism, dilaceration including supernumerary roots, Dens Evaginatus and Dens Invaginatus. Structural anomalies include Dentinogenesis Imperfecta and Amelogenesis Imperfecta. Tooth impaction is also one of the developmental anomalies seen. Acquired tooth disorders include tooth ankylosis, resorption. Hypercementosis, pulpstone, tooth fluorosis, abrasion, erosion, Syphilitic Hypoplasia, molar incisor hypo mineralisation are some of the other acquired dental anomalies.

**Keywords:** Dental anomalies ; prosthetic implications ; prosthetic

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### INTRODUCTION

Dental anomalies are caused when there is disturbance in eruption, it may be due to genetic or environmental causes (Jain et al., 2018). It is most commonly observed in orthodontic patients. Eruption can be defined as the sequence of unique and complex events with an eruption motion of tooth germ from its developmental position in the alveolar crypt of the jaw to its functional position or condition in the oral cavity (Vastardis, 2000). There are a number of dental anomalies seen in people and these dental anomalies are classified for easier understanding and management under various categories. These classifications also allow easier treatment plan and management in prosthetic implications or treatment. Dental anomalies play a significant role in affecting the occlusion and alignment of the teeth (Jyothi et al., 2017).

Previous researches focus on the survival of dental implants, the success of the treatment, the process involved in patients with ectodermal dysplasia, which is one of the most common dental anomalies seen. In another research by Freire et al., it has been described in detail about various dental anomalies, their impacts on the morphology of tooth structure and how they affect the teeth (Baccetti, 1998). The possible outcome or solution to treat this situation is also discussed. In the research article by Kirzioglu et al., another common dental anomaly, severe hypodontia has been elaborately considered. It is said that in that article, over denture prosthesis for these cases, will usually allow retention until there is a proper prosthetic rehabilitation (Duraisamy et al., 2019).

The effects and impacts of dental anomalies on dental prosthetic implications has not yet been properly reported. This review article thus serves to complete the function of reporting the impacts on each prosthetic implication

in each different dental anomalies and the proper course of treatment to overcome the problem (Selvan and Ganapathy, 2016). To make the quality of the treatment better, a study of dental anomalies affecting prosthetic implications is very much essential. To overcome the implications and obvious discomfort caused by wearing this prosthetic implication due to the dental anomalies in treatment, there should be alternation made in the prosthetic implications according to each dental anomaly for effective and successful treatment (Ganapathy et al., 2016).

Dental anomalies do represent a wide range of disorders. They are primarily divided into acquired and developmental anomalies. Another set of classification divides dental anomalies into five groups: abnormalities based on size, number, morphology, structure and position of the teeth (Subasree and Murthykumar, 2016).

Based on the number of teeth involved in the dental anomaly, dental anomalies are hypodontia, and hyperdontia. Based on size abnormalities, the dental anomalies are Microdontia and Macrodontia (Vijayalakshmi and Ganapathy, 2016). Based on the position, the dental abnormality is transposition. Based on the morphology, the dental anomalies present are: concrescence, fusion and gemination which also means Double Teeth. Some of the other dental anomalies are Taurodontism, Dilaceration, Supernumerary roots, Dens Evaginatus and Dens Invaginatus. The structural dental anomalies are Dentinogenesis imperfecta, amelogenesis imperfecta and Tooth impaction. All of the above mentioned tooth disorders are all classified under Developmental tooth anomalies (Jain, Ranganathan and Ganapathy, 2017). Acquired tooth anomalies are classified as Tooth Ankylosis, resorption which is further divided into internal resorption and external resorption. The other acquired tooth anomalies are hypercementosis, pulp stone, pulp sclerosis, tooth fluorosis, attrition, abrasion, erosion syphilitic Hypoplasia and molar incisor hypomineralisation (Ganapathy, Kannan and Venugopalan, 2017).

The aim of this study is to find appropriate prosthetic implications for patients with various dental anomalies and to provide them with better quality of treatment. A number of dental anomalies which every dental practitioner of all disciplines will be destined to encounter (Ashok and Suvitha, 2016). The dental anomalies, how it affects the particular prosthetic implications and what could be done for its treatment and if at all any alterations to the dental prosthetic implication are very detailedly discussed in this review article (Ashok et al., 2014). Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

## MATERIALS AND METHODS

Research articles were searched from search engines like MeSH, PubMed, Core, Google Scholar and so on. Around forty articles were reviewed. The period considered for the articles was from 1995 to 2020, that is a total of twenty five year range. Information was retrieved by using keywords like Dental anomalies, dental prosthesis, prosthetic implications and dental abnormalities. The inclusion criteria included are articles related to dental anomalies, prosthetic implications and impact of dental anomalies. The exclusion criteria of this review article includes articles related to other categories. The quality of included studies were assessed as per the Health evidence -Quality assessment tool (Health Evidence - Quality Assessment Tool, 2016).

**Table 1 :Quality assessment of included studies.**

S.NO	AUTHOR	YEAR	LEVEL	QUALITY OF STUDY
1	Jain AR, Nallaswamy D et al.,	2018	Level 1	Moderate
2	Vastardis H	2000	Level 3	Weak
3	Jyothi S, Robin PK, et al.,	2017	Level 2	Moderate
4	Baccetti T	1998	Level 1	Strong
5	Duraisamy R, et al.,	2019	Level 1	Strong
6	Selvam SR, Ganapathy D	2016	Level 3	Moderate

7	Ganapathy D, Satyamoorthy A, et al.,	2016	Level 2	Weak
8	Subasree S, Murthy Kumar K	2016	Level 1	Strong
9	Vijayalakshmi B, Ganapathy D	2016	Level 3	Moderate
10	Jain A, Ranganathan H et al.,	2017	Level 1	Strong
11	Ganapathy DM, Kannan A, Venugopalan S	2017	Level 2	Moderate
12	Ashok V, Suvitha S	2016	Level 2	Strong
13	Ashok V, Nallaswamy D, et al.,	2014	Level 1	Weak
14	Gupta SK, Saxena P, Jain S, Jain D	2011	Level 3	Strong
15	Kannan A, Venugopalan S.	2018	Level 2	Moderate
16	Basha FYS, Ganapathy D, Venugopalan S	2018	Level 1	Weak
17	Ajay R, Suma K et al.,	2017	Level 2	Strong
18	Kunz F, Kayserili H	2020	Level 3	Moderate
19	Fekonja A	2005	Level 2	Weak
20	Davis PJ	1987	Level 3	Strong
21	Venugopalan S, Ariga P et al.,	2014	Level 1	Moderate
22	Camilleri S	2007	Level 2	Weak
23	Moharamzadeh K	2018	Level 2	Strong
24	Namdar F, Atasu M	1999	Level 1	Strong
25	Gazit E, Lieberman MA	1991	Level 1	Moderate
26	Rootkin-Gray VF, Sheehy EC	2001	Level 3	Weak
27	Joshi MR, Bhatt NA	1971	Level 2	Strong
28	Chowdhury PH	2018	Level 1	Moderate
29	Tsesis I, Shifman A, Kaufman AY	2003	Level 3	Strong
30	Hasan M	2019	Level 3	Weak
31	MacDonald D	2020	Level 1	Moderate
32	Esposito A, Di Benedetto MG	1999	Level 1	Moderate
33	Issa AGE	2016	Level 2	Weak

34	Witkop CJ Jr.	1988	Level 2	Strong
35	Barron MJ, McDonnell ST et al.,	2008	Level 3	Moderate
36	Alruwaithi M, Jumah A	2017	Level 2	Strong
37	Aranha AMF, Duque C	2004	Level 2	Weak
38	Andersson L, Blomlöf L et al.,	1984	Level 1	Moderate

### DENTAL ANOMALIES

Dental anomalies are basically craniofacial abnormalities that cause disturbances in the form, function or position of the teeth, bone and tissues or position of the teeth, bone and tissues or other structures associated with jaw and mouth. Dental anomalies may range from missing or stained teeth to cleft palates, while many are expressions of other more complex disorders. Many dental anomalies are caused either due to genetic defects or spontaneous genetic mutations. Some dental anomalies are acquired dental anomalies (Gupta et al., 2011).

There are also idiopathic anomalies present which are due to unknown etiology. One example of such is Stafne's bone cavity which is also called by the name lingual mandibular bone concavity or static bone cyst (Kannan and Venugopalan, 2018). Dental anomalies like Fluorosis are caused due to environmental factors. Some other reasons for dental anomalies include the nutritional factors which are due to poor nutritional value ; scurvy and other periodontal defects also occur. Most frequently these dental anomalies affect the morphology of the tooth structure. Depending on the oral status of the health, the restorative dentists would provide foundation for the final prosthesis. The location of the anomaly determines the amount of resection and the type of reconstruction (Basha, Ganapathy and Venugopalan, 2018).

### HYPODONTIA

Hypodontia means the absence of one or more teeth except the third molars during development. It is also known as one of the most common dental abnormalities. It not only has a negative impact on looks, but also on function (Ajay et al., 2017). The associated anomalies with this disorder are : reduction in coronal or radical dimensions, retained primary teeth, ectopic canine eruption, peg shaped maxillary lateral incisors and taurodontism (Kunz et al., 2020). Invasive environmental factors are capable of affecting the development of tooth and changing the position of tooth and changing the position of the tooth which ultimately leads to hypodontia and then tooth extraction. Hypodontia can be treated by using prosthesis to equal the missing teeth. Restorative procedures may be needed for achieving full effectiveness (Fekonja, 2005).

### HYPERDONTIA

Hyperdontia is classified under developmental anomalies which are then further classified under teeth number anomalies. Hyperdontia is a condition in which there is presence of supernumerary teeth, which are present in excess to the normal number of teeth (Davis, 1987). The presence of supernumerary teeth is 0.1% to 3.8% in white people while it is seen to be a bit higher in Asians. Most of the supernumerary teeth are seen in gingival areas, maxillary tuberosity, nasal cavity, soft palate and maxillary sinus (Venugopalan et al., 2014). The signs and symptoms of this dental anomaly includes the presence of supernumerary teeth and disturbances in maxillary incisor area. Gardner's syndrome and cleidocranial dysostosis are usually related conditions with this dental anomaly. The standard treatment for hyperdontia is extraction of supernumerary teeth in the mixed dentition (Camilleri, 2007).

### MICRODONTIA

Microdontia is a size abnormality which is classified under developmental abnormality. In this condition one or more teeth appear smaller in size than the normal teeth. The most affected teeth by this abnormality are the upper lateral incisors and third molars (Moharamzadeh, 2018). The teeth will also be appearing in an abnormal shape. It is an autosomal dominant inheritance type of inherited disorders with full penetration. Treatment is done for aesthetic reasons. The peg shaped lateral incisors are replaced by porcelain restoration (Namdar and Atasu, 1999).

### MACRODONTIA

Macrodonia is a developmental dental anomaly and is further classified as teeth number anomaly. It is also termed as megalodontia, megadontia as the teeth are larger than the original size. This condition may be associated with gigantism (Gazit and Lieberman, 1991). There are three types of macrodonia. They are true

generalised macrodontia, relative generalised macrodontia and single tooth macrodontia. There is no need for treatment. However treatment is done, if aesthetically required(Rootkin-Gray and Sheehy, 2001).

### **TRANSPOSITION**

In a dental arch, when two teeth displace or are not in a correctly allotted position, it is transposition. 88% of the transpositions are unilateral with greater prevalence in maxilla than mandible. Treatment includes orthodontic alignment(Joshi and Bhatt, 1971). It is a positional anomaly classified under developmental disorders. Sometimes the etiology is due to intraosseous migration or development of a tooth in a far away ectopic location. Several studies show some specific areas at the maxillary and mandibular regions. Mandibular lateral incisor - canine is a very common site where transmigration occurs(Chowdhury, 2018).

### **TAURODONTISM**

Taurodontism literally means “bull like teeth”. It is the enlargement of the root trunk, pulp chamber of a multi rooted tooth. This occurs as a result of apical movement of pulp floor and tooth furcation(Tsesis, Shifman and Kaufman, 2003). It may be presented as a sign of syndrome. The growth of a taurodont tooth is reliable on the proliferation of Hertwig’s epithelial root sheath. It is generally associated with cleft lip, cleft palate and hypodontia. It is most oftentimes seen in permanent molar teeth, it is also seen in permanent and deciduous dentition(Hasan, 2019). Performing Root canal treatment on this kind of teeth Is challenging and requires the use of magnification for exploring the orifices, ultrasonic irrigation and a refined filling technique. There is no need of treatment in this case of dental disorder(MacDonald, 2020).

### **GEMINATION**

Gemination is also called double teeth. It is a developmental anomaly classified under morphological anomalies. It often occurs in anterior teeth but seldom molars are also affected. It is a rare kind of developmental anomaly that occurs in the dental hard tissue. Enamel or dentin may be hypocalcified in this condition(Esposito and Di Benedetto, 1999). Since it is a rare dental anomaly, there is a high chance of misdiagnosis. Failure to identify this abnormality may lead to a wrong treatment plan due to misdiagnosis and result in permanent injury and loss of teeth. The use of magnification aids are of utmost significance during treatment. For treatment, the fissure of the teeth should be sealed. In some cases full crowns are also used. Usually, there will be a link between the root canal systems of the germinated teeth. It should be treated as a single matter(Issa, 2016).

### **DENTINOGENESIS IMPERFECTA**

Dentinogenesis Imperfecta is a dental anomaly classified under structural anomaly. In this disorder, both enamel and dentin will appear thinner than the original size. It is one of the most prevalent hereditary disorders that occurs in dentin(Witkop, 1988). It has an autosomal dominant pattern. It is divided into three types : type 1, type 2 and type 3. In teeth that have almost normal sized teeth and root, it will respond properly to full coverage restoration(Barron et al., 2008).

### **TOOTH ANKYLOSIS**

It is an acquired tooth anomaly. Its etiology is not yet found. Though trauma is a widely accepted cause for this dental anomaly. This condition may occur even due to interrupted metabolism. There is attachment between alveolar bone and cementum or dentin(Alruwaithi, Jumah and Alsadoon, 2017). It may take place before or after an eruption. Deciduous teeth are more likely to be ankylosed when compared to permanent teeth. Likewise mandibular teeth are more likely to be ankylosed than the maxillary teeth(Aranha et al., 2004). Almost all of the ankylosis cases occur in deciduous or mixed dentition. The treatment plan for this kind of dental anomaly is based on if the ankylosed tooth belongs to mixed or deciduous dentition, the time and stage at which diagnosis was made and finally, the ankylosed tooth’s location. The prosthetic treatment suggested is increased length of clinical crown in the primary ankylosed tooth(Andersson et al., 1984).Our institution is passionate about high quality evidence based research and has excelled in various fields ( (Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Chandrasekar et al., 2020; Mathew et al., 2020; R et al., 2020; Samuel, 2021)

### **CONCLUSION**

This review highlights the different dental anomalies, its treatment and impact on prosthetic implications. We are also able to trace the pattern and association of various dental anomalies. The inter relation between various tooth anomalies are also established, which will prove helpful in the earlier diagnosis of one anomaly and not cause a risk factor for the other. An astounding rate of dental anomalies are recorded in patients with orthodontic problems. This study will allow a better treatment plan and understanding of dental anomalies.

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