Republic of Iraq
Ministry of Higher Education and
Scientific Research University of
Baghdad College of Dentistry

Anomalies and Orthodontic

A Project Submitted to
The College of Dentistry, University of Baghdad, Department of Orthodontics in
Partial Fulfillment for the Bachelor of Dental Surgery

By:

Sarah Saad Abd Al-Aziz

Supervised by:

Dr. Noor Falah Kadhim Al-Khawaja

Lecturer of Orthodontics, College of dentistry / University of
Baghdad. B.D.S /M.Sc

APRIL 30, 2023

بسم الله الرحمن الرحيم

صدق الله العظيم

Certification of the Supervisor

I certify that this project entitled "**Anomalies and Orthodontic**" was prepared by the fifth-year student **Sarah Saad Abd Al-Aziz** under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Dr. Noor Falah Kadhim Al-Khawaja

04-30-2023

Dedication

We dedicate it to our families for their unlimited support throughout all these years and our appreciations and thanks to every one taught us a letter from our childhood until today.

Sarah Saad Abd Al-Aziz

Acknowledgment

First and lastly, all gratefulness, faithfulness and thankfulness to ALLAH for providing me with patience, perseverance and the ability to undertake and finally complete this study. I want to express my great thanks with respect to **"Dr. Raghad Abdul-Razaq Al-Hashimy"**, Dean of the Collage of Dentistry, University of Baghdad for his support to the research student's program. I would like to thank **"Prof. Dr. Dheaa H. AL-Groosh",** the head of Orthodontics Department, for his scientific support, encouragement and advice. Finally I would thank my supervisor **"Dr. Noor Falah Kadhim Al-Khawaja"** for her advice, encouragement, and guidance in planning and conducting this project.

Table of Contents

List of Figures

List of Tables

Introduction

Anomaly (irregular) is opposite from what is known as normal. Disturbance of the epithelium and mesenchyme can markedly alter the normal odontogenesis leading to the developmental anomaly of teeth.

A majority of uncommon dental anomalies occur during childhood years. Developmental dental anomalies are classified according to their abnormalities in number, shape, color, structure, texture, eruption, exfoliation and position **(Jahanimoghadam *et al*., 2015).**

Local as well as systemic factors may be responsible for these developmental anomalies. Such effects may begin before or after birth, therefore both the dentition might be affected **(Tahmassebi *et al*., 2003).**

The precise etiology of dental anomalies complex and not completely understood. Genetic and epigenetic defects throughout the morpho- or histo-differentiation stages of dental development have been considered to be the main aetiological factors **(Vani *et al*., 2016; Laganà *et al*., 2017).**

Aim of study

To study anomalies and their effect on orthodontic and how to manage these anomalies.

Chapter one: review of literature

Graber (1972) classified the local etiological factors as

1.1.1 Anomalies of Teeth Number

Each jaw is designed to hold only a specific number of teeth at a particular age. However, if the number of teeth present increases, or size of teeth is abnormaly large, it can cause crowding or hamper the eruption of succedaneous teeth in their ideal positions. Similarly, if the number of teeth present is less than normal then gaps will be seen in the dental arch. The anomalies in the number of teeth can be of two types: increased number of teeth or supernumerary teeth and less number of teeth or missing teeth **(Gurkeerat *et al*., 2015).**

1.1.1.1 Supernumerary Teeth

Supernumerary teeth are defined as those in addition to the normal series of deciduous or permanent dentition. They may occur anywhere in the mouth. They may appear as a single tooth or multiple teeth, unilaterally or bilaterally, erupted or impacted and in mandible/maxilla or both the jaws. The prevalence of supernumerary teeth varies between 0.1 and 3.8% and is more common in the permanent dentition **(Brook, 1974; Yusofl, 1990; Rajab and Hamdan, 2002;).** The low prevalence of supernumerary teeth in primary dentition is because it is generally overlooked by the parents, is often of normal shape (supplemental type), erupt normally, and appear to be in proper alignment **(Scheiner and Sampson, 1997).** The incidence is considerably higher in the maxillary incisor region followed by maxillary third molar and mandibular molar, premolar, canine and lateral incisors **(Grimanis *et al*., 1991).** Though there is no significant sex distribution in primary supernumerary teeth, males are affected approximately twice than females in the permanent dentition **(Kinirons, 1982; Garvey *et al*., 1999).**

Supernumerary teeth can be classified according to chronology, location (topography), morphology and their orientation. Chronologically, they can be classified as pre-deciduous, similar to permanent teeth, and post permanent or complementary; morphologically as conical, tuberculate, supplemental (eumorphic) and odontome; topographically as mesiodens, paramolar, distomolar and parapremolar, and according to orientation as vertical, inverted and transverse **(Shah *et al*., 2008).** As shown in **[Tables1–3] (Abhishek *et al*., 2011)**

Table 1: supernumerary teeth based on location

mesiodens	located between maxillary central incisors (pre-maxillary region)	conical or peg shaped
paramolar	buccally/lingually or palatally in between second and third maxillary molars, rarely in between first and second maxillary molars	conical or supplemental
distomolar	distal or distolingual to third figlar (maxillary or mandibular, in mandibular often impacted)	conical or tuberculate
parapremolar	additional tooth in premolar region	supplemental
paramolar root	additional root often in mandibular molar	rudimental or fully formed
paramolar tubercle	additional cusp present on buccal surface of a permanent molar	tuberculate

Table 2: supernumerary teeth based on morphology

morphology	appearance	occurrence
conical	small/peg shaped tooth with normal root	**70_80**
tuberculate	barrel shaped crown with rudimentary root, often paired	**10_12**
supplemental	duplication of tooth in the normal series (mostly in deciduous dentition and in permanent maxillary lateral incisor and mandibular premolar)	**6_8**
odontome	no regular shape, disorganized diffuse mass of dental tissue	**3_4**

Table 3: supernumerary teeth based on eruption and orientation

supernumerary teeth based on eruption	supernumerary teeth based on orientation
erupted: complete coronal aspect is seen in oral cavity clinically	vertical: oriented as normal series of dentition
partially erupted: only occlusal part is visible	inverted: upside down
impacted: cannot be seen in oral cavity clinically, can only be diagnosed using radiograph	transverse: orizontally placed

1.1.1.1.a Aetiology of Supernumerary Teeth

The exact etiology of the supernumerary teeth has not yet completely understood. Several theories have been suggested for their occurrence, such as the phylogenetic theory **(Smith, 1969).** the dichotomy theory **(Liu, 1995).** occurrence due to hyperactive dental lamina **(Primosch, 1981).** And due to a combination of genetic and environmental factors **(Brook, 1984).** Generally, multiple supernumerary teeth are associated with diseases or syndromes **(Scheiner, 1997).** Supernumerary teeth show strong association with developmental disorders such as cleft lip and palate, cleidocranial dysostosis, Gardener syndrome and less commonly with Ehlers-Danlos syndrome, Fabry Anderson's syndrome, chondroectodermal dysplasia, incontinentia pigmenti and tricho rhino-phalangeal syndrome **(Grimanis *et al*., 1991; Rajab and Hamdan, 2002).** Supernumerary teeth may erupt normally, remain impacted, appear inverted or assume an abnormal path of eruption.

1.1.1.1.b The Effect of Supernumerary Teeth

It has been reported that if a significant delay or ectopic or asymmetric eruption of the maxillary permanent incisors is observed clinically, the presence of mesiodens should be suspected **(Primosch *et al*., 1981).** Supernumerary teeth, particularly those in the anterior maxilla, can cause failure of eruption, displacement, rotation of the permanent maxillary incisors, and median diastema **(Nik *et al*., 1990).**

Other rare findings that are thought to be due to the presence of supernumerary teeth are root resorption of permanent teeth, cyst formation, and eruption of the supernumerary tooth into the nasal cavity. Early diagnosis of a supernumerary tooth is vital to reduce possible complications, the extent of surgery, and orthodontic treatment. Supernumerary teeth are detected via a thorough clinical examination and routine radiological examinations **(Leyland *et al*., 2006).**

1.1.1.1.c Treatment

Treatment depends on the type and location of the supernumerary teeth and on its potential effect on adjacent hard and soft tissue structures. Occasionally, supernumerary teeth may lead to complications such as deep caries in the adjacent teeth, which may require restoration or endodontic therapy of the adjacent teeth as well (Fig.1.1) and (Fig.1.2) Supernumerary teeth can be managed either by removal/endodontic therapy or by maintaining them in the arch and frequent observation (Fig.1.3) Removal of the supernumerary teeth is recommended where **(Garvey *et al*., 1999).**

- There is associated pathology.
- permanent tooth eruption has been delayed due to the presence of supernumerary tooth.
- increased risk of caries due to the presence of supernumerary teeth which makes the area inaccessible to maintain oral hygiene.

- altered eruption or displacement of adjacent tooth is evident
- there are severely rotated teeth leading to further complication,
- orthodontic treatment needs to be carried out to align the teeth,
- its presence would compromise alveolar bone grafting and implant placement.
- there is compromised esthetic and functional status

Fig.1.1 Peri-apical radiograph showing completion of endodontic therapy in maxillary right second molar (Abhishek *et al*., 2011).

Fig.1.2 Peri-apical radiograph showing restoration in maxillary second molar (Abhishek *et al*., 2011).

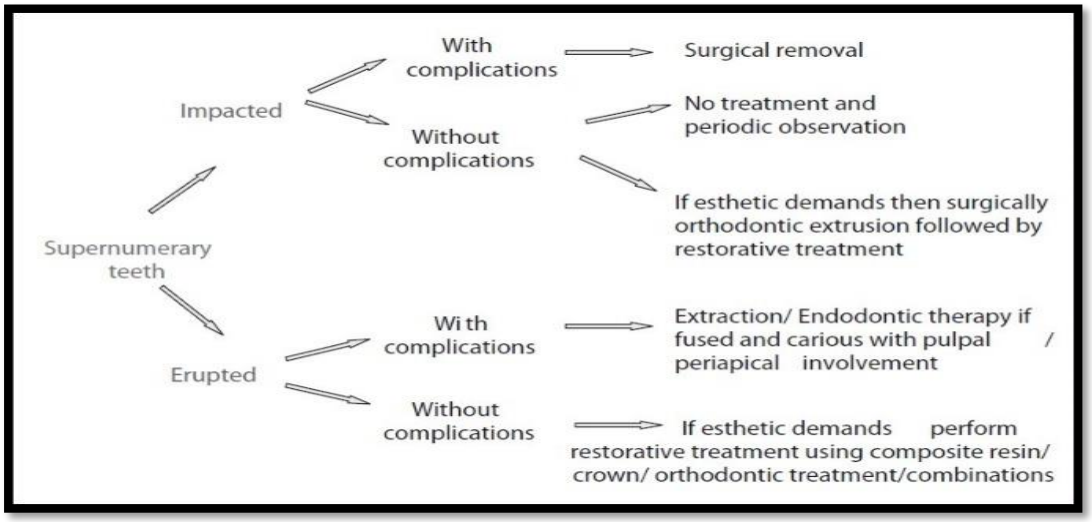

Fig.1.3 Management of supernumerary teeth (Abhishek *et al*., 2011).

1.1.1.2 Hypodontia (Congenitally Missing Teeth)

Is the developmental absence one or more primary or secondary teeth. The occurrence of congenitally missing teeth may be single or multiple, unilateral or bilateral and in one or both the jaws **(Basavaraj, 2011).** Hypodontia is classified based on severity: **(Simon and Laura, 2019)**

- Mild hypodontia: one or two missing teeth (Fig.1.4a).
- Moderate hypodontia: three to six missing teeth (Fig.1.4b).
- Severe hypodontia/oligodontia: more than six missing teeth (Fig.1.5).
- Anodontia complete absence of teeth in one or both dentitions fig.1.6

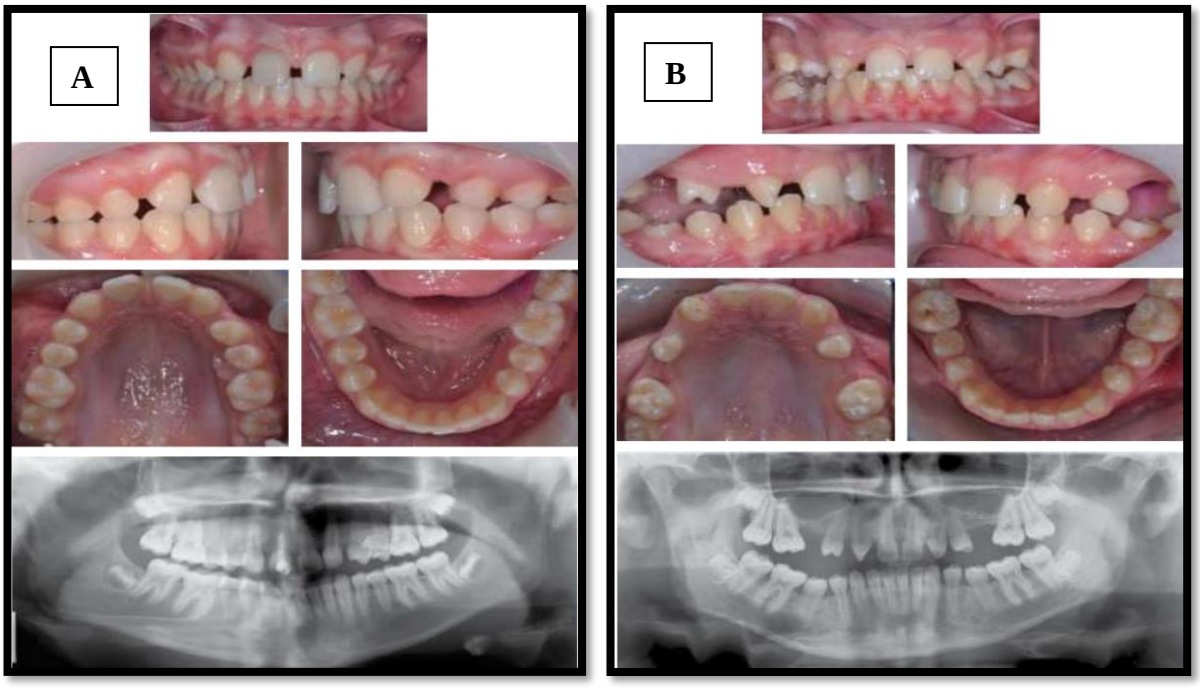

Fig.1.4(A) Mild hypodontia: Intra-oral photograph and x- ray (OPG) show a 13-year-old female with developmentally absent maxillary lateral incisors. The malocclusion was complicated by previous trauma to the maxillary right central incisor requiring endodontic treatment. (B) Moderate hypodontia: Intra-oral photograph and x- ray (OPG) show a 13-year-old female with hypodontia affecting the maxillary lateral incisors and second premolars. (Simon and Laura, 2019).

Fig.1.5 Severe hypodontia: Intra-oral photograph and x- ray (OPG) show a 12-year-old female with developmental absence of UL4,5; UR 2,5; LL1,2,5; and LR1,2,4,5. (Simon and Laura, 2019).

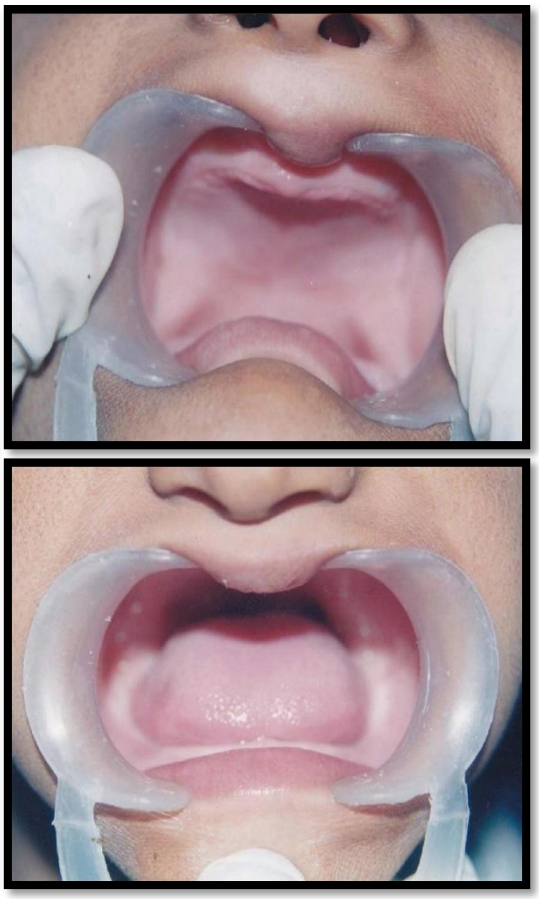

Fig.1.6 Intra-oral photograph show complete anodontia of maxillary and mandibular arch (Suprabha, 2008).

1.1.1.2.a The Aetiology of Hypodontia

The aetiology of hypodontia is varied and that genetic, epigenetic and environmental factors may be contributory factors. As with other conditions, the causes of missing teeth can be classified into general and local. The general category includes cases where there is a genetic cause, particularly syndromes such as Down syndrome, cleft lip and palate and ectodermal dysplasia. Local factors that result in hypodontia include early irradiation of tooth germs, hormonal and metabolic influences, trauma, osteomyelitis and unintended

removal of a tooth germ during the extraction of a primary tooth **(Ibrahim *et al*., 2013).**

1.1.1.2.b The Effect of Hypodontia

A number of dental features are more commonly seen in patients with hypodontia such as small or peg-shaped lateral incisors, palatally impacted upper canines, spacing, malpositioned teeth, centreline shift, deficit due to underdevelopment of the alveolus in the absence of teeth (Fig.1.7) (fig.1.8). Hypodontia is also commonly associated with reduced lower face height and deep overbite (Fig.1.9) **(Joe and Shane, 2019).**

Fig.1.7 Intra-oral photograph show hypodontia can be complicated by other dental anomalies. (a) A 14-year-old female with developmentally absent right maxillary lateral incisor. The left lateral incisor is microdont, the left maxillary canine is ectopic, and the right primary canine is retained. (b) A 13-year-old female with bilateral maxillary incisor agenesis associated with bilateral ectopic canines, which have been surgically exposed prior to commencing orthodontic treatment (Simon and Laura, 2019).

Fig.1.8 Intra-oral photograph show bone deficit may be associated with hypodontia. In this case, the mandible is narrow buccolingually in the second premolar region where the teeth are developmentally absent (Simon and Laura, 2019).

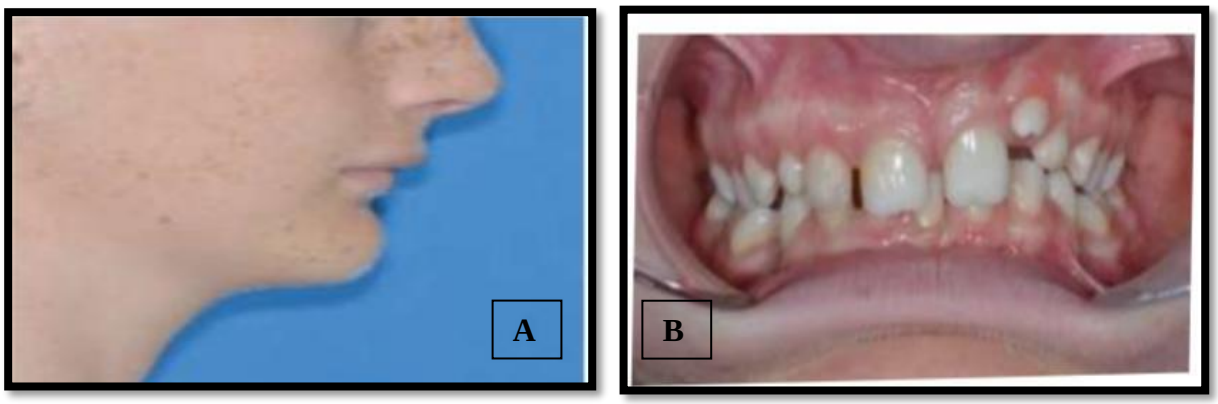

Fig.1.9(A) Extra-oral photograph show decreased lower face height. (B) Intra-oral photograph show deep overbite are commonly associated with hypodontia (Simon and Laura, 2019).

1.1.1.2.c Management of Hypodontia

Hypodontia usually requires extensive and complex treatments, ranging from single restorations to surgery and multiple restorations, associated with lifelong maintenance **(Hobkirk and Brook, 1980).** According to **Gill and Barker (2015).** the management classified into 3 categories:

A. In Primary/early mixed dentition.

1. Removable dentures for psychological and functional reasons.
2. Composite build ups to improve aesthetics of microdont permanent teeth or worn primary teeth and to reduce spacing.
3. Simple orthodontic treatment to help close spacing.
4. Interceptive treatment Extraction of primary canines if permanent canines palatally positioned; extraction of severely infraoccluded molars.

B. In >12 years (Permanent dentition)

1. Orthodontic treatment pontics can be placed on the fixed appliance and the retainer following orthodontics as a temporary measure.
2. Resin bonded bridges following orthodontics for tooth replacement.
3. Composite build ups of microdont or hypoplastic teeth.
4. Overdentures (severe hypodontia)

C. In 16–20 years.

1. Single tooth implants or implant retained fixed or removable prosthesis
2. Orthodontics in combination with orthognathic surgery.

1.1.2 Anomalies of Tooth Size

Anomalies of tooth size may occur as two forms: microcontia or macrocontia. The term microdontia is used to describe teeth, which are smaller than normal. Microdontia can be generalized involving all the teeth in a dentition or localized involving a single tooth. Localized microdontia most commonly affects maxillary lateral incisors (peg lateral) and third molars. The term macrodontia refers to teeth that are larger than normal. Like microconda, macroconda can also be generalized or localized **(Basavaraj, 2011).**

Fig.1.10 Intra-oral photograph show microdontia cause spacing in upper and lower arch https://www.clarencetam.co.nz.

Fig.1.11 Intra-oral photograph show maxillary lateral incisors (leg lateral) https:/dentagama.com/amp/news/microdontia.

Fig.1.12 Intra-oral photograph show a 12-year-old patient with a macrodont cause crowding of teeth (Ivan, 2021).

1.1.2.1 The Aetiology of Microdontia and Macrodontia

Microdontia often have other systemic syndromes, such as pituitary dwarfism, oro-faciodigital syndrome, or oculo-mandibulo-facial syndrome Microdontia can also present in younger patients who have undergone chemoradiotherapy in the past, altering the formation of the developing dentition. Macrodontia, also known as megalodontia, has an unknown etiology; however, genetic and environmental factors have been attributed to the development of this condition **(McKinney and Olmo, 2022).**

1.1.2.2 The Effects of Microdontia and Macrodontia

Microdontia generally affects individual teeth, usually the maxillary second incisor and the third molar. Occasionally, however, many teeth in the same dentition may be affected, in which case the teeth may be spaced apart **(Susan Standring, 2021).** The macrodontia may cause misalignment, crowding and confidence issues **(Manogari Chetty *et al*., 2021).**

1.1.2.3 The Mnagement

Treatment options for the comprehensive management of microdontia include the following: **(Laverty and Thomas, 2016).**

1. Orthodontic treatment – to idealise tooth position of the microdont tooth or teeth.
2. Restorative treatment – using direct and indirect techniques on the microdont tooth or teeth.
3. Joint orthodontics and restorative treatment.
4. Extraction of the microdont tooth or teeth and orthodontics and tooth replacement if required.
5. Extraction and tooth replacement.
6. No treatment – which is unlikely to be acceptable.

1.1.3 Anomalies of tooth shape

Anomalies of tooth shape often occur in association with anomalies of tooth size. They may predispose to malocclusion **(Basavaraj, 2011).**

1.1.3.1 Talons cusp

Talon cusp is a developmental dental anomaly in which an accessory cusp arises from the cingulum or cementoenamel junction of the anterior teeth in maxilla or mandible. It can affect deciduous or permanent teeth **(Hattab *et al*.,1995).** The maxillary lateral incisors are the most commonly affected (67%) followed by the central incisors (24%) and canines (9%) **(Boudi *et al*., 2017).** The etiology of talon cusp is still unclear and appears to be a balance between both environmental and genetic factors **(Pierre *et al*., 2021).** When large, talon cusp may impact the appearance and cause occlusal interference, tooth displacement, caries, and tongue irritation. Forces from the antagonistic tooth in occlusion with talons cusp may cause labial tipping of the affected tooth **(Hattab *et al*., 1995).** Talons cusp treatment mainly involves reduction of the cusp and management of the developmental grooves associated with it **(Ankit Arora *et al*., 2016).**

Fig,1.13 Intra-oral photograph of the maxillary arch shows talon cuspid on the maxillary right central incisor (Boudi *et al*., 2017).

1.1.3.2 Peg laterals

Peg-shaped anomaly of lateral incisors is one of the most common form of localized microdontia that affects the shape of permanent maxillary lateral incisors (peg lateral). It is characterized by the reduction of the incisal mesiodistal width compared with the cervical region**.** This shape anomaly leads to Spacing in the arch, Migration of adjacent teeth and Abnormal incisors relationship which causes functional and esthetic major concerns for the affected patients **(Nadine *et al*., 2022).** For peg-shaped lateral incisors, many therapeutic treatments could be indicated: full crowns, veneers, and direct or indirect composite resins. Good physical properties, esthetic quality, and marginal integrity make the composite resin a reliable material for such a situation **(Rim *et al*., 2021).**

Fig.1.14(A) Intra-oral photograph show peg-shaped lateral incisors. (B) Intra-oral photograph show preparation design. (C) Intra-oral photograph show management of peg laterals with three-quarter crowns (Rim *et al*., 2021).

1.1.3.3 Mulberry molars/moon's molar

In congenital syphilis, the crowns of first molars are often irregular with globules of enamel on occlusal surface rather than well-formed cusps. Irregular occlusal surface of molars may prevent formal intercuspation of posteriors **Basavaraj, 2011).** Mulberry molars are typically functional and do not need any treatment. If the deformity is severe, there are several cosmetic options. The teeth can be covered with a permanent cast crown, or the molars can be removed, and an implant or bridge can be put in place of the mulberry molar **(Anila *et al*., 2019).**

Fig.1.15 Intraoral photograph showed additional globular cuspal projections seen on the occlusal surfaces of the right and left maxillary permanent first molars (Anila *et al*., 2019).

1.1.3.4 Fusion

Tooth fusion is defined as union between two or more separate tooth germs. The union may be between enamel or enamel and dentin. The terms such as synodontia, connate teeth, joined teeth, or double formations are often used to describe fused teeth Fusion most commonly occurs in the anterior region of primary dentition. It may be seen in unilateral or bilateral region. In cases of fusion, there is one less tooth in the arch **(Suresh *et al*., 2014).**

If contact between two tooth buds occurs before calcification, complete fusion ensues. This may be seen clinically as an abnormally wide crown usually with a groove that separates the mesial and distal moiety. If contact occurs after crown formation, incomplete fusion occurs at the root level. Incomplete fused teeth may present with separate pulp chambers and root canals**.** Can Cause spacing in arch**.** Management of fused teeth usually requires a multidisciplinary approach. Surgical, endodontic, orthodontic, and restorative interventions are usually proposed in combination to manage fused teeth **(Victor, 2020).**

Fig.1.16 Intra-oral photograph showed fused primary right mandibular lateral incisor and canine on lift side and peri-apical radiograph on right side showing (A) Fused 42-43 with separate pulp chambers, (B) Fused 32-33 with merged pulp chambers at the apical third (Hemant and Anju, 2018).

1.1.3.5 Gemination

Geminated teeth are anomalies which arise from an attempt at division of a single tooth germ by an invagination, with resultant incomplete formation of two teeth. The structure is usually one with two completely or incompletely separated crowns that have a single root and root canal. It is seen in deciduous as well as permanent dentition, and, in some reported cases, appears to exhibit a hereditary tendency. increased mesiodistal width of these teeth results in poor

anterior aesthetics, anterior crowding, and incisor rotation**.** In cases of gemination, the number of teeth in the arch is normal **(Sivapathasundharam, 2016).** There are no extras or missing teeth. The first option of treatment is extraction and later prosthodontic treatment. The second treatment is more complicated and extensive, combining a multidisciplinary approach of endodontic, surgical, and later prosthodontic treatment **(Malhotra, 2006).**

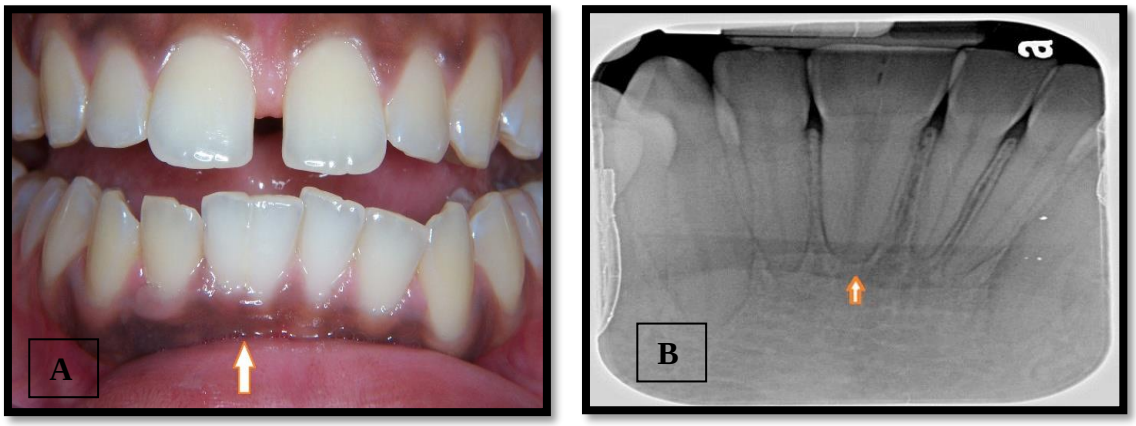

Fig.1.17(A) Intra-oral photographs show gemination tooth. (B) Peri-apical radiograph show the same root and canal https://rickwilsondmd.typepad.com/rick_wilson_dmds_blog/2014/02/gemination-of-teeth.html.

1.1.3.6 Concrescence

Is a developmental anomaly of dental hard tissues. It is a condition showing union of adjacent teeth by cementum. The concrescence leads to a loss of gingival architecture leading to the development of funnels, which may cause plaque accumulation thus, resulting in periodontal tissue destruction **(Sanjay *et al*., 2013).** For patients with normal eruption and normal occlusal function in the absence of corresponding clinical symptoms, the concrescence can be temporarily retained, in combination with long-term follow-up. When there is dental pulp disease, it is recommended to adopt filling or endodontic treatment. Tooth extraction is advisable when the concrescence compromises the

appearance and oral hygiene and may lead to diseases such as periodontal disease, pericoronitis, and root resorption of adjacent teeth **(Yan, 2022).**

1.1.3.7 Dilaceration

Is an abnormal angulation or bend in the root and less frequently, the crown of a tooth. Most cases are idiopathic and have no clinical feature. In limited cases with recognized cause, injury was the first reason **(Nabavizadeh *et al*., 2013).** Minor dilaceration requires no therapy. Dilaceration of a deciduous tooth can alter its resorption and delay eruption of the underlying permanent tooth, occasionally mandating extraction of the bent tooth. Severe dilacerations also can prevent eruption of the affected tooth and create endodontic or extraction difficulties so should be surgically extracted **(Brad *et al*., 2019).**

Fig.1.18 Periapical radiograph of root dilaceration of molars https://www.dentalcare.com/en-us/ce-courses/ce651/dilaceration.

1.1.3.8 Taurodontism

Is a developmental disturbance of a tooth in which body is enlarged at the expense of the roots. An enlarged pulp chamber, apical displacement of the pulpal floor and lack of constriction at the cementoenamel junction are the characteristic features **(Jayashankara *et al*., 2013).** No treatment is needed but Endodontic management of taurodont teeth is stated to be difficult and challenging due to the complexity in the tooth morphology **(Sapna *et al*., 2017).**

Fig.1.19 Periapical radiograph showed taurodontism in lower second molar (Lewis, 2011).

1.1.3.9 Enamel Pearl

It is an ectopic mass of enamel which can occur anywhere on the roots of teeth but is usually found at the furcation area of roots. Maxillary molars are more frequently affected than the mandibular molars. Premolars and incisors are rarely affected. they are not generally treated maintenance of good oral hygiene is recommended **(Ravikiran and Praveen, 2021).**

Fig.1.20(A) Intra-oral photographs showing enamel pearl. (B) Post-operative view after removal of enamel pearl (Anahita, 2018).

Chapter two: discussion

2.1 Discussion

Orthodontic patients have been reported to have high rates of dental anomalies **(Ericson and Kurol, 2000).** Inadequate consideration of these dental anomalies can complicate orthodontic treatment; therefore, their presence should be thoroughly investigated during orthodontic diagnosis and carefully considered during treatment planning.Number of males in current study is less than the females. In earlier studies done on orthodontic patients, higher female to male ratio have been observed **(Majeed *et al*., 2014).** Because females are more concerned about their beauty and esthetics and in many societies esthetics of girls are given importance.

Developmental anomalies of the oral cavity are mainly congenital defects that often compromise the function of the oral cavity and the aesthetics of an individual.Because of the polygenic nature of dental characteristics, it is very challenging to identify one single defective gene responsible for a specific dental anomaly.The dental anomalies have been classified according to the number, morphology and size and structure. Patients with congenitally missing teeth may present undeveloped alveolar bone morphology, making implant reconstruction a challenge. Supernumerary teeth might resemble normal teeth or be amorphous **(Peck *et al*., 1994).**

Several intervention should occur as soon as possible to avoid malocclusion. Some of these interventions are restorative dentistry, extraction, removal or fixed prosthesis or dental implants. Certain cases don’t need any intervention.

Chapter three: conclusion and suggestions

3.1 Conclusion

- Developmental dental anomalies affecting the shape, number and size of the primary and permanent teeth can impact the overall form, function, and development of the jaws.
- Although asymptomatic, these dental anomalies can lead to clinical problems which include delayed or incomplete eruption of the normal series of teeth, attrition, compromised esthetics, occlusal interference, accidental cusp fracture, interference with tongue space causing difficulty in speech and mastication, temporomandibular joint pain and dysfunction, malocclusion, periodontal problems and increased susceptibility to caries.
- While some developmental anomalies are mild deviations from normal with no indicated interventions, others require minor to comprehensive dental treatments using an interdisciplinary approach during the primary, mixed or permanent dentition stages.
- The developmental anomalies of teeth show variations and no two anomalies of the same type are alike. So knowledge of various criteria which have been put forward for the identification and classification of the different anomalies is essential to diagnose the condition and institute appropriate treatment.

3.2 Suggestions

1. Further studies are required to determine the effects of anomalies of teeth on orthodontics and patients.
2. Further research for etiological factors of dental anomaly can create awareness and guide preventive strategies to minimize the dental and orthodontic complexities.

References

(A)

Abhishek Parolia, M Kundabala, Marisha Dahal, Mandakini Mohan, and Manuel S Thomas (2011) Management of supernumerary teeth. Journal of Conservative Dentistry, 14(3), 221–224.

Anahita Punj. (2018). Periodontal Management of a Case with Enamel Pearl - Scientific Figure on ResearchGate. J Dental Sci 3(6), 000190.

Anda Kfir, Nurit Flaisher Salem, Lobna Natour, Zvi Metzger, Noa Sadan & Shlomo Elbahary. (2020). Prevalence of dens invaginatus in young Israeli population and its association with clinical morphological features of maxillary incisors

Anila Koneru, Santosh Hunasgi, Vardendra Manvikar, M Vanishree. (2019). Nonsyphilitic occurrence of mulberry molars: A rare case report. Journal of Oral and Maxillofacial Pathology, 23(1), 106–110.

Ankit Arora, Padmaja Sharma, Surendra Lodha. (2016). Comprehensive and Conservative Management of Talon Cusp: A New Technique. Journal of Clinical Orthodontics, 46(2):111–114.

(B)

B Sivapathasundharam. (2016). Textbook of oral pathology. Third edition page 201

Basavaraj Subhashchandra Phulari (2011). Orthodontics: Principles and Practice

Brad Neville, Damm, Allen, Angela. (2019). Pathology of Teeth. Color Atlas of Oral and Maxillofacial Diseases, Pages 41-78.

Brook AH. A unifying etiological explanation for anomalies of human tooth number and size. Arch Oral Biol 1984;29:373-8.

Brook AH. Dental anomalies of number, form and size: Their prevalence in British school children. J Int Assoc Dent Child. 1974;5:37–53.

Ericson S, Kurol J. Resorption of incisors after ectopic eruption of maxillary canines: a CT study. Angle Orthod 2000; 70(6): 415-23.

(F)

F. N. Hattab, O. M. Yassin, and K. S. al Nimri. (1995)"Talon cusp-clinical significance and management: case reports," Quintessence International, vol. 26, pp. 115–120.

(G)

Garvey MT, Barry HJ, Blake M. Supernumerary teeth- an overview of classification, diagnosis and management. J Can Dent Assoc. 1999;65:612–6.

Garvey MT, Barry HJ, Blake M. Supernumerary teeth- an overview of classification, diagnosis and management. J Can Dent Assoc 1999;65:612-6

Gill and Barker. (2015) The multidisciplinary management of hypodontia: a team approach. British Dental Journal, 218, 143–149

Grimanis GA, Kyriakides AT, Spyropoulos ND. A survey on supernumerary molars. Quintessence Int. 1991;22:989–95.

Gurkeerat Singh (2015) Textbook of ORTHODONTICS.Third edition page 201.

(H)

Hemant Sawhney, Anju Anu Jose. (2018) Type-I Fused Deciduous Dentition in Mandibular Arch-Report of a Case and Clinical Considerations. Journal of Clinical and Diagnostic Research, 12 (10).

Hobkirk and Brook . The management of patients with severe hypodontia. J Oral Rehabil. 1980;7(4):289–298.

(I)

Ibrahim AlShahrani, Rafi A Togoo, Mohammed Ali AlQarni. (2013) A Review of Hypodontia: Classification, Prevalence,Etiology, Associated Anomalies, Clinical Implications and Treatment Options. World Journal of Dentistry, 4(2), 117-125.

(J)

Jahanimoghadam F, Hosseinifar R. Case report: Simultaneous presence of primary and permanent teeth. Anat Sci 2015;12:145-7.

Jayashankara, Anil Kumar Shivanna, KS Sridhara, Paluvary Sharath Kumar. (2013). Taurodontism: A dental rarity. Journal of Oral and Maxillofacial Pathology : JOMFP, 17(3), 478.

Joe Iwanaga and Shane Tubbs (2019). Anatomical Variations in Clinical Dentistry first edition pag 215.

(K)

Kinirons MJ. Unerupted premaxillary supernumerary teeth. A study of their occurrence in males and females. Br Dent J. 1982;153:110.

(L)

Laganà G, Venza N, Borzabadi-Farahani A, Fabi F, Danesi C, Cozza P. Dental anomalies: prevalence and associations between them in a large sample of non-orthodontic subjects, a cross-sectional study. BMC Oral Health 2017; 17: 62.

Laverty and Thomas. (2016) The restorative management of microdontia. BRITISH DENTAL JOURNAL, page 7.

Lewis R. Eversole.(2011). Clinical Outline of Oral Pathology: Diagnosis and Treatment fourth edition Page 571

Leyland L, Batra P, Wong F, Llewelyn R. A retrospective evaluation of the eruption of impacted permanent incisors after extraction of supernumerary teeth. J Clin Pediatr Dent. 2006;30:225–231.

Liu JF. Characteristics of premaxillary supernumerary teeth: A survey of 112 cases. ASDC J Dent Child 1995;62:262-5.

(M)

Malhotra, N. Macrodontic Incisors Aetiology, Clinical features and Management. Synopses2006, 35, 1–5.

Manogari Chetty, Khaled Beshtawi, Imaan Roomaney, Salma Kabbashi. (2021) MACRODONTIA: A brief overview and a case report of KBG syndrome

McDonald RE, Avery DR. Dentistry for Child and Adolescent. 5th edition. St. Louis, Mo, USA: The C. V. Mosby; 1983. Fusion of teeth; pp.121–122.

McKinney R, Olmo H. (2022) Developmental Disturbances of The Teeth, Anomalies Of Shape And Size First edition page 123.

Majeed MM, Ahmed I, Uzair M, Atif M. Prevalence of missing, impacted and supernumerary teeth in patients under ortho- dontic treatment in a teaching hospital of Karachi, Pakistan. Int J Dent Health Sci 2014; 1(1): 39-46.

(N)

Nabavizadeh, Sedigh Shamsi, Moazami, Abbaszadegan. (2013). Prevalence of Root Dilaceration in Adult Patients Referred to Shiraz Dental School (2005-2010). Journal of Dentistry, 14(4),160–164.

Nadine Omeish, Ali Nassif, Sara Feghali, Brigitte Vi-Fane, Julia Bosco. (2022). Esthetic and functional rehabilitation of peg-shaped maxillary lateral incisors: Practical recommendations. Clinical Case Reports, 35261773

Neville BW, Damm DD, Allen CM, Bouquet JE. Oral and Maxillofacial Pathology. 2nd edition. Philadelphia, Pa, USA: WB Saunders; 2002. Abnormalities of teeth; pp. 74–75.

Nik-Hussein NN. Supernumerary teeth in the premaxillary region: its effects on the eruption and occlusion of the permanent incisors. Aust Orthod J. 1990;11:247–250.

Nunn JH, Carter NE, Gillgrass TJ, Hobson RS, Jepson NJ, Meechan JG. The interdisciplinary management of hypodontia: Background and role of paediatric dentistry. Br DentJ 2003;194:245-51.

(P)

Pierre-Hadrien Decaup ,Elsa Garot ,Patrick Rouas. (2021) Prevalence of talon cusp: Systematic literature review, meta-analysis and new scoring system. Archives of Oral Biology Journal,125, 105112.

Primary fused teeth and findings in permanent dentition. Açıkel H, İbiş S, Şen Tunç E. Med Princ Prac. 2018;27:129–132.

Primosch RE. Anterior supernumerary teeth - assessment and surgical intervention in children. Pediatr Dent. 1981;3:204–215.

Primosch RE. Anterior supernumerary teeth -assessment and surgical intervention in children. Pediatr Dent 1981;3:204-15.

Peck S, Peck L, Kataja M. The palatally displaced canine as a dental anomaly of genetic origin. Angle Orthod 1994; 64(4): 249-56.

Peck S, Peck L, Kataja M. The palatally displaced canine as a dental anomaly of genetic origin. Angle Orthod 1994; 64(4): 249-56.

(R)

R.Boudi, H.El Khammal, K.El Harti, B.El Mohtarim, H.Chhoul. (2017). Restorative Management of a Talon Cusp: A Case Report. ARC Journal of Dental Science, 2(4), 5_7.

Rajab LD, Hamdan MA. Supernumerary teeth: Review of the literature and a survey of 152 cases. Int J Pediatr Dent. 2002;12:244–54.

Ravikiran Ongole, Praveen. (2021). Textbook of Oral Medicine, Oral Diagnosis and Oral Radiology E-book third edition page 43.

Rim Kallala, Sarra Nasri, Amani Adli, Rihab Dakhli, Chaouch Mohamed Habib, Touzi Soumaya, Nouira Zohra, Belhassen Harzallah, Mounir Cherif. (2021). Peg-Shaped Lateral Incisors Treated with Ceramic Three-Quarter Crown. Case Rep Dent, Pages 1305-1310.

(S)

Sanjay Venugopal, Smitha, Prithyani Saurabh. (2013). Paramolar concrescence and periodontitis. Journal of Indian Society of Periodontology, 17(3): 383–386.

Sapna Sonkurla, Manoj Mahadeo Ramugade, Shubha Hegde, Gopal Tawani. (2017). Endodontic Management of Taurodontism Using CBCT as A Diagnostic Tool- 2 Rare Case Reports. Journal of Clinical Advances in Dentistry, page 6.

Scheiner MA, Sampson WJ. Supernumerary teeth: A review of the literature and four case reports. Aus Dent J. 1997;42:160–5.

Shah A, Gill DS, Tredwin C, Naini FB. Diagnosis and management of supernumerary teeth. Dental Update. 2008;35:510–20.

Simon J. Littlewood, Laura Mitchell (2019). An Introduction to Orthodontics fifth edition page 308

Smith JD. Hyperdontia: Report of a case. J Am Dent Assoc 1969;79:1191-2.

Suprabha BS. Hereditary ectodermal dysplasia: A case report. J Indian Soc Pedo Prev Dent 2002;20:37-40

Surgical and orthodontic management of fused maxillary central and lateral incisors in early mixed dentition stage. Ramamurthy S, Satish R, Priya K. Case Rep Dent. 2014;2014:109301.

Susan Standring. (2021) Gray's Anatomy forty second edition page 636-663.

(T)

Tahmassebi JF, Day PF, Toumba KJ, Andreadis GA. Paediatric dentistry in the new millennium: 6. Dental anomalies in children. Dent Update 2003;30:534-40.

(V)

Vani NV, Saleh FMT, Tubaigy FM, AM I. Prevalence of developmental dental anomalies among adult population of Jazan, Saudi Arabia. Saudi J Dent Res 2016; 7: 29–33.

(Y)

Yan Xu, Jin Sun. (2022). Concrescence of the right maxillary second and third molars: A case report. Clinical Case Reports, 10 (5), e05824.

Yusof WZ. Non-syndromal multiple supernumerary teeth: Literature review. J Can Dent Assoc. 1990;56:147–9.