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SMILE MASTERY SOLUTIONS

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DR AHMAD FAISAL ISMAIL

FOR PRESENTING A WEBINAR TITLED

PURSUING PAEDIATRIC DENTAL ANOMALIES

ON WEDNESDAY, THE 27TH OF JANUARY 2021

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PURSUING PAEDIATRIC DENTAL ANOMALIES: MANAGEMENT AND CONSIDERATIONS IN PRIMARY CARE SETTINGS

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CONTENT

- Introduction
- Classification of dental anomalies
- Managing common dental anomalies in children
- Principle management of unerupted teeth in children

MY MENTORS

INTRODUCTION

- Anomalies of tooth development are relatively common and may occur as an isolated condition or in association with other anomalies/syndromes
- Disorders of the tooth development can be due to:
  - inheritance (genetic) - *generalized*
  - acquired (external exposure) – *generalized/localized*
- Primary dentition begins to form at approximately six weeks *in utero* and the permanent dentition continues through late adolescence.

- Developmental dental anomalies often exhibit patterns that reflect the stage of development during which the malformation occurs
  - hypodontia or supernumerary teeth → disruptions in tooth initiation
  - anomalies of size and shape → disruptions during morphodifferentiation
  - amelogenesis/dentinogenesis imperfecta → disruptions during mineralization
- Dental anomalies can have profound negative consequences for the affected individual and the family → esthetic concerns, masticatory difficulties, tooth sensitivity, financial burdens, and complex dental treatment

CLASSIFICATIONS OF DENTAL ANOMALIES

- Causative factors
  - hereditary/genetic
    - amelogenesis imperfecta
    - dentinogenesis imperfecta
  - environmental/external
    - fluorosis
    - dilacerations of root

**this classification is of less clinical significance*

- Developmental stages
  - dental tissue
    - enamel (amelogenesis imperfecta)
    - dentine (dentinogenesis imperfecta, dentinal dysplasia)
  - tooth size
    - smaller (microdontia)
    - larger (macrodontia)
  - morphology
    - double teeth (fusion/gemination)
    - dens evaginatus/invaginatus
  - number of teeth
    - reduce number (hypodontia)
    - increase number (hyperdontia/supernumerary)

MANAGING COMMON DENTAL ANOMALIES IN CHILDREN

- Early diagnosis of dental anomalies should allow for more comprehensive treatment planning, proper prognosis and less extensive interception
- Previous reports in the literature suggest that the presence of a dental anomaly in the primary dentition may represent a risk factor for the recurrence of the anomaly in the permanent dentition
- However, the prevalence rate of the recurrence as well as the type of dental anomaly in the permanent dentition may vary

CORRELATION BETWEEN PRIMARY AND PERMANENT DENTITION

- 60.9% of sample subject had anomalies of the succedaneous permanent teeth

  Whittingthon and Durward, 1996
- In a Malaysian subjects, it was reported 100% of replication for hypodontia, 59% for double teeth, and 50% for hyperdontia

  Nik-Hussein and Abdul Majid, 1996
- Almost identical prevalence rates were reported for hypodontia and double teeth in a sample of Croatian children

  Skrinjaric´ and Barac-Furtinovic, 1991

- Hypodontia in the primary dentition is almost systematically represented itself in the permanent dentition
- Supernumerary teeth in the primary dentition are not a strong risk factor for hyperdontia in the permanent dentition
- A strong relationship was found between the presence of fusion of primary teeth and hypodontia in the permanent dentition

  Marinelli et al., 2012

GENERAL CONSIDERATION

- Psychosocial aspect of patient and families affected
- Patient's cooperation and determination
- Causative factor ie environmental/genetic
- Underlying medical condition/associated syndromes

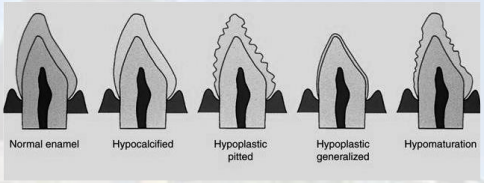
ANOMALIES OF DENTAL TISSUE

- Amelogenesis imperfecta
- Dentinogenesis imperfecta

AMELOGENESIS IMPERFECTA

- Amelogenesis imperfecta (AI) is a term used to describe a group of hereditary conditions that affect the structure and appearance of dental enamel
- Prevalence
  - 43:10,000 in Turkey
  - 14:10,000 in Sweden
  - 10:10,000 in Argentina
  - 1.25:10,000 in Israel
- These values suggests that the average global prevalence is <0.5% (<1 in 200).

- It affects all or nearly all of the teeth in both the primary and permanent dentitions
- The most widely accepted classification:
  - hypocalcified
  - hypoplastic pitted
  - hypoplastic generalized
  - hypomaturation
- The variability of the appearance of the different types of AI makes identification difficult



PRINCIPLE MANAGEMENT OF AI

- Clinicians treating children and adolescents with AI must address the clinical and emotional demands of these disorders with sensitivity
- It is important to establish good rapport with the child and family early
- Early identification and preventive interventions are critical
- Regular periodic examinations can identify teeth needing care as they erupt

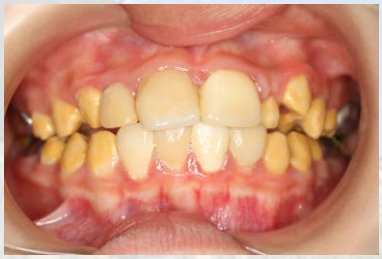
- Fluoride applications and desensitizing agents may diminish tooth sensitivity
- The appearance, quality, and amount of affected enamel and dentin will dictate the type of restorations necessary to achieve esthetic, masticatory, and functional health
- When the enamel is intact but discolored, bleaching and/or microabrasion may be used to enhance the appearance
- If the enamel is hypocalcified, composite resin or porcelain veneers may be able to be retained with bonding

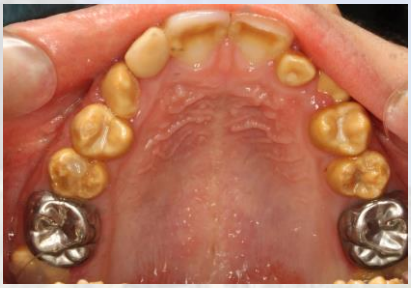
- If the enamel or dentin cannot be bonded, full coverage restorations will be required
- During the primary dentition, it is important to restore the teeth for adequate function and to maintain adequate arch parameters
- The permanent dentition usually involves a complex treatment plan with specialists from multiple disciplines
- The fabrication of an occlusal splint is advocated to reestablish vertical dimension when full mouth rehabilitation is necessary

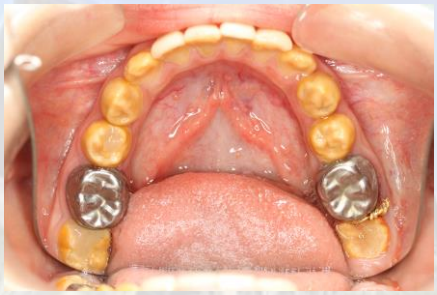
RECOMMENDATION

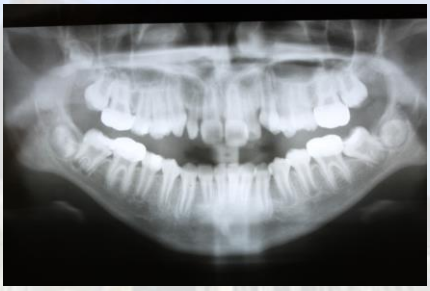
- Primary dentition
  - treatment provided reflects the degree of symptoms
  - glass ionomer or composite direct veneers of anterior teeth to address aesthetics
  - stainless steel crowns (SSC) for primary molars
- Permanent dentition
  - premolars and permanent canines → minimal intervention is the ideal treatment plan
  - full coronal coverage restoration

AI CASE 1









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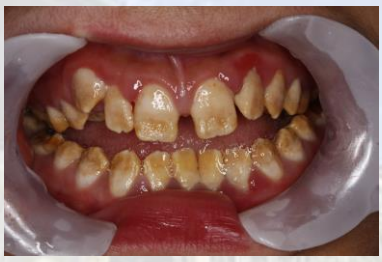
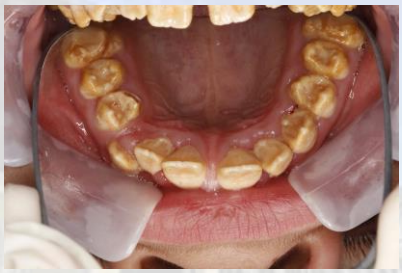
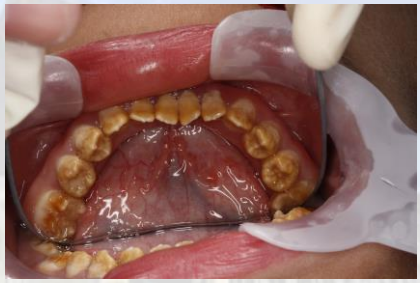
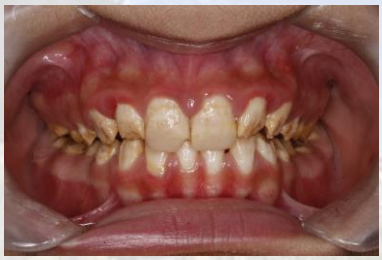
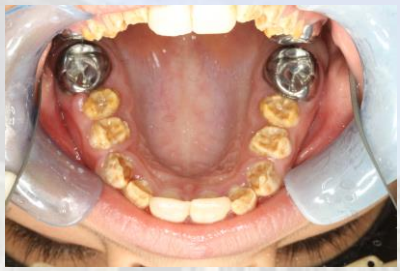


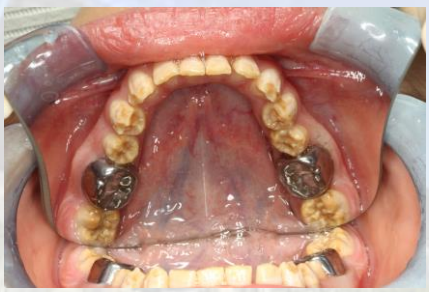




AI CASE 3 – SIBLINGS TO CASE 2







DENTINOGENESIS IMPERFECTA

- Dentinogenesis imperfecta (DI) is a hereditary developmental disturbance of the dentin originating during the histodifferentiation stage of tooth development.
- Shields 1973
  - DI type I (with osteogenesis imperfecta)
  - DI type II
  - DI type III
- Children with unexplained bone fracturing should be evaluated for DI as a possible indicator of an undiagnosed case of OI

- Clinically, the teeth have a variable blue-gray to yellow-brown discoloration that appears opalescent
- Due to the defective, abnormally-colored dentin shining through the translucent enamel
- Due to the lack of support of the poorly mineralized dentin, enamel frequently fractures from the teeth leading to rapid wear and attrition of the teeth

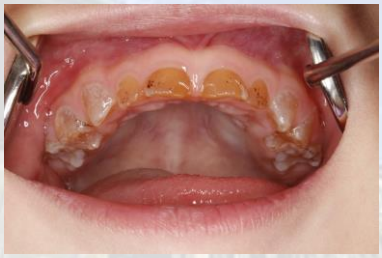
- Radiographically:
  - bulbous crowns
  - cervical constriction
  - thin roots
  - early obliteration of the root canal and pulp chambers
- Periapical abscess, radiolucencies and root fractures are common

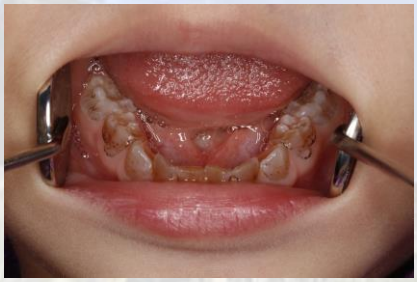
PRINCIPLE MANAGEMENT OF DI

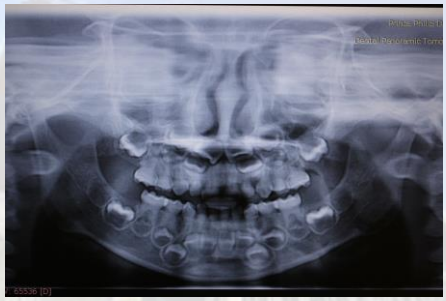
- Dental approach for managing DI will vary depending on the severity of the clinical expression
- Early identification and preventive interventions are critical
- Fluoride applications and desen-sitizing agents may diminish tooth sensitivity
- Routine restorative techniques often can be used effectively to treat mild to moderate DI.

- In more severe cases with significant enamel fracturing and rapid dental wear, the treatment of choice is full coverage restorations in both the primary and permanent dentitions
- Restorative stabilization of the dentition should be completed before excessive wear and loss of vertical dimension occur
- Because of pulpal obliteration, apical surgery may be required to maintain the abscessed teeth
- Attempting to negotiate and instrument obliterated canals in DI teeth can result in lateral perforation due to the poorly mineralized dentin

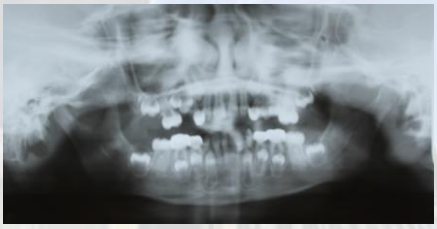
DI CASE 1

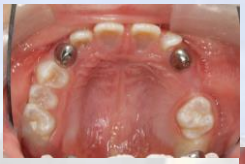


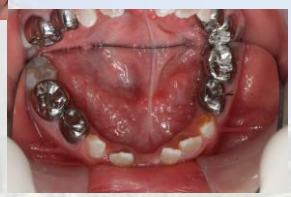




DI CASE 2

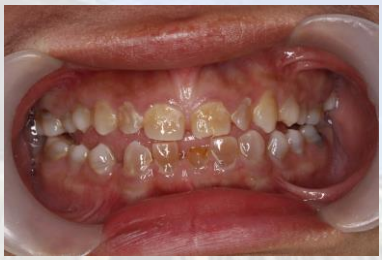


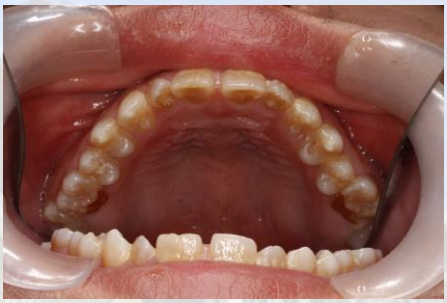


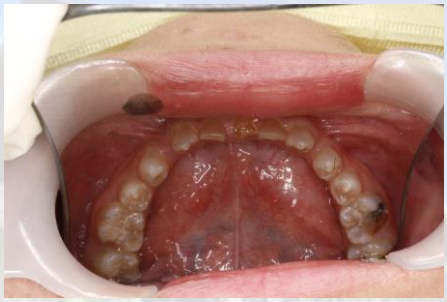


DI WITH OSTEOGENESIS IMPERFECTA

- Type I DI (Shields 1973)
- Radiographically, the teeth have short, constricted roots and dentine hypertrophy leading to pulpal obliteration
- The teeth of both dentitions are typically amber and translucent and show significant attrition
- OI – prone to fracture
  - blue sclera







Orphanet Journal of Rare Diseases

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Hereditary dentine disorders: dentinogenesis imperfecta and dentine dysplasia

OSTEOGENESIS/DENTINOGENESIS IMPERFECTA

ARTICLE

ABSTRACT

Osteogenesis imperfecta (OI) is a genetic disorder that affects all connective tissue. Clinical manifestations of OI include bone fragility, hyperlaxity of joints, hearing loss, abnormalities of stature and facial structure, blue sclerae, and dentinogenesis imperfecta (DI). OI is classified into four groups according to the severity and physical characteristics of the disease, although not all characteristics may be present in one individual. Currently, 20,000 to 50,000 individuals in the U.S. have been diagnosed with this disease. The aim of

Pediatric dental management of a patient with osteogenesis imperfecta and dentinogenesis imperfecta

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ANOMALIES OF TOOTH MORPHOLOGY

- Fusion
- Gemination
- Dens invaginatus
- Dens evaginatus

GEMINATION

- Tannenbaum and Alling in 1963 determined gemination as the formation of equivalent of two teeth from the same follicle
- Geminated teeth arise from a single tooth germ by invagination, resulting as a single tooth with two completely separated crowns
- The anomalous tooth has an enlargement in mesial-distal diameter than normal and is counted as one. Thus, total number of teeth in dental arch is normal

TREATMENT OPTIONS

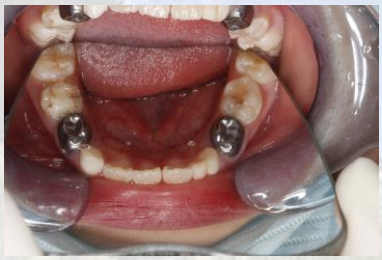
- Preventive – fissure sealant and monitoring
- Endodontic therapy
- Hemisection + endodontic therapy
- Restorative camouflage

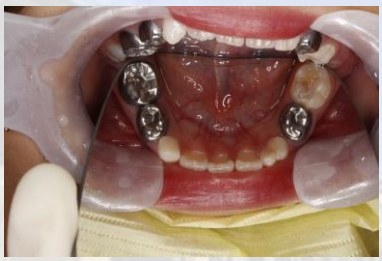
FUSION

- Pindborg defined fusion as the combination of two or more separate developing teeth
- Fusion can be complete or incomplete depending on level of development
- If fusion starts before calcification stage, the teeth unite completely and the crown incorporates enamel, dentin, cementum and pulp of both the teeth

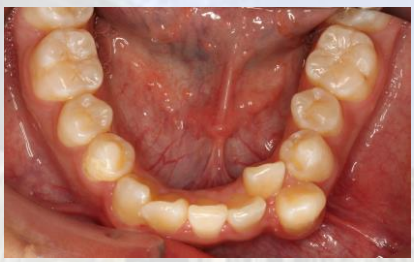
- Incomplete fusion happens at a later level and resultant tooth may exhibitive separate crowns and limited to root alone with combined or separate pulp canals
- Treatment options:
  - preventive
  - endodontic therapy
  - surgical hemisection
  - extraction of anomalous tooth

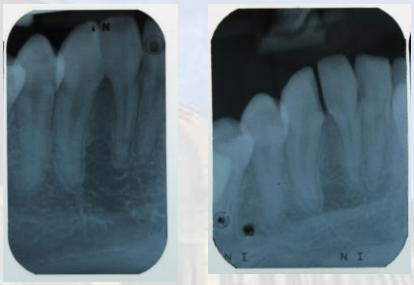
FUSION OF 72, 73 & MISSING 32

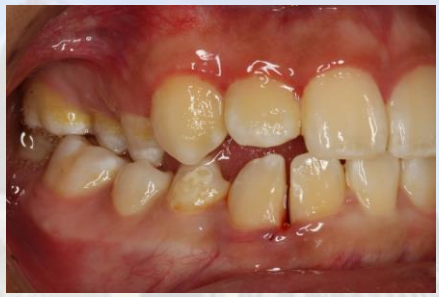




FUSION BETWEEN 42 AND 43



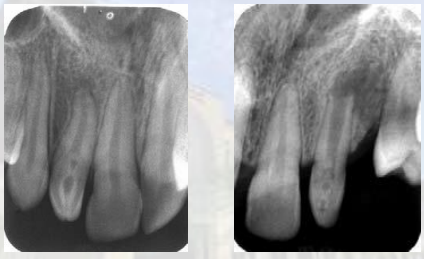




DENS INVAGINATUS

- Dens in dente
- Consequence of an invagination on the external surface area of the tooth crown before calcification
- The invagination ranges from a short pit limited to the crown to a deep invagination into the root
- Most of the cases are encountered in maxilla with the maxillary lateral incisors being mostly affected, followed by central incisors, premolars, canines and molars

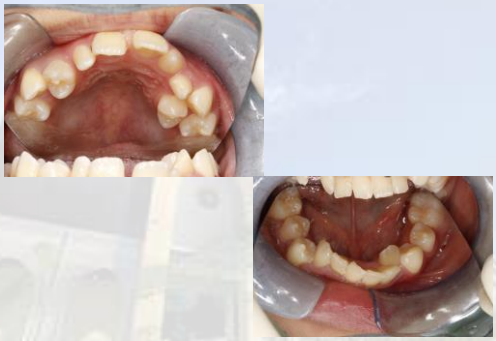
- The classical radiographic appearance is a pear-shaped invagination of enamel and dentin with a narrow structure at the opening on the surface area of the tooth
- The invagination acts as a channel for entrance of irritants and microorganisms; and lead to development of dental caries and abscess
- The endodontic treatment of invaginated teeth may be challenging because of:
  - difficulties in accessing the root canals
  - complex variations of internal morphology



DENS EVAGINATUS

- Developmental aberration of a tooth resulting in formation of one accessory cusp
- Clinically presented as abnormal tubercle, elevation, protuberance, excrescence, extrusion or a bulge
- Tubercle commonly contains pulp tissue; occasionally having slender pulp horn
- Tubercle may have fracture or be abraded as soon as the tooth comes into occlusion, exposing the pulp

- Early diagnosis and management are necessary to prevent occlusal interference, compromised aesthetics, carious developmental grooves, or irritation of the tongue while speech and mastication
- Management:
  - composite restoration to protect tubercle
  - selective grinding of tubercle
  - coronal pulpotomy



ANOMALIES OF TOOTH SIZE

- Microdontia
- Macrodontia

MACRODONTIA

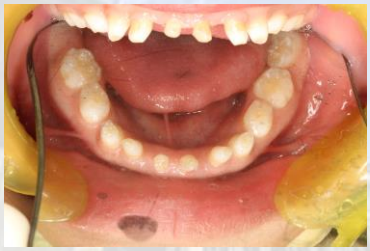
- Refers to teeth that appear larger than normal size
- Reported prevalence is around 0.03-1.9%
- Isolated macrodontia can result from twinning abnormalities during proliferation phase
- Generalized macrodontia usually associated with Klinefelter syndrome and pituitary gigantism

MICRODONTIA

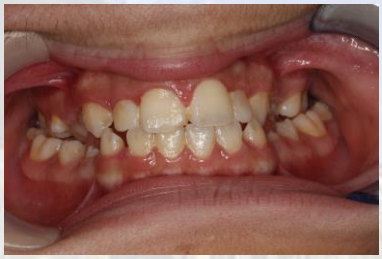
- One or more teeth appear dimensionally smaller outside usual limit of variations
- Classification of microdontia:
  - single tooth microdontia
  - relative generalized microdontia
  - true generalized microdontia

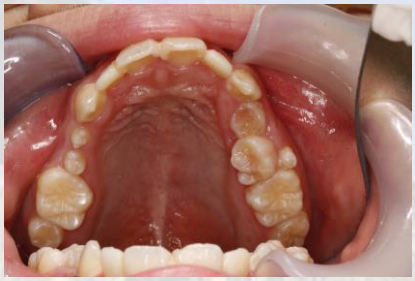
- True generalized microdontia is rare, and usually associated with systemic upset or syndromes
- Treatment options (may be in combination of hypodontia):
  - orthodontic treatment for space distribution
  - restorative treatment
  - extraction
  - combination

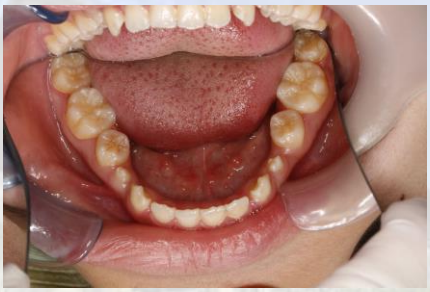
MICRODONTIC INCISORS



MICRODONTIC PREMOLARS



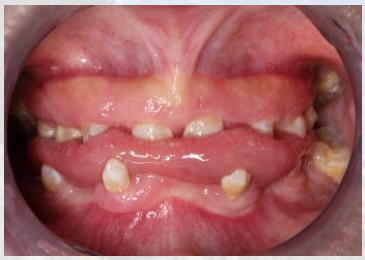


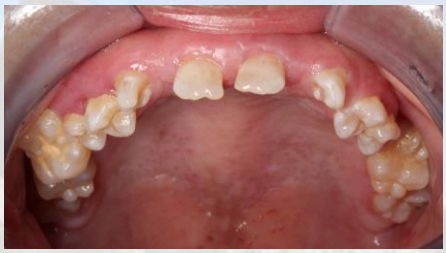


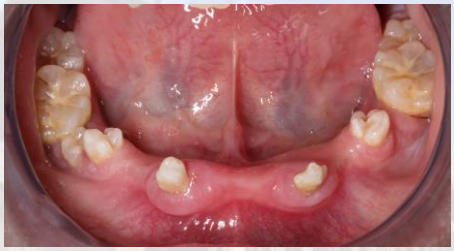
SMALLEST OF THE SMALL

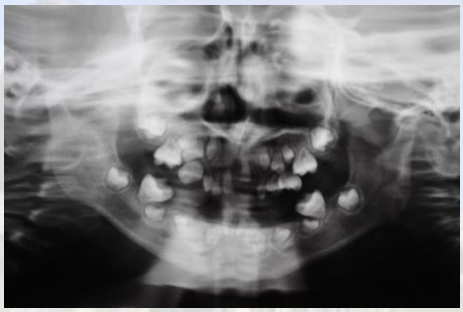
SMALLEST TEETH IN THE WORLD

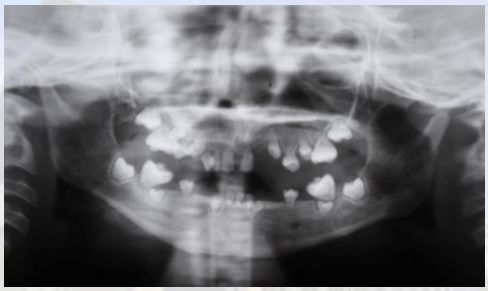
MOPD TYPE II

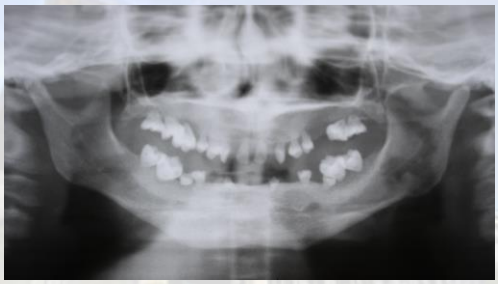


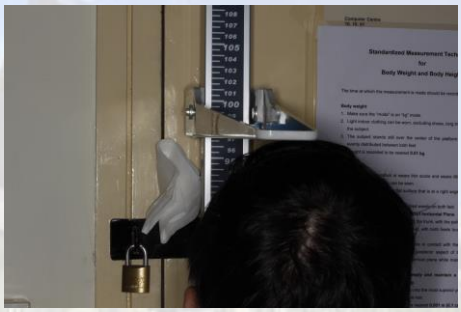












ANOMALIES IN NUMBER

- Hypodontia (less number of tooth)
- Hyperdontia (increase number of tooth)

HYPODONTIA

- Congenital absence of one or more teeth
- Oligodontia – more than 6 teeth missing
- Anodontia – absence of primary and/or permanent dentition
- Prevalence of missing teeth
  - primary dentition – maxillary lateral incisor
  - permanent dentition – 3rd molar > mandibular second premolar > maxillary lateral incisor > maxillary second premolar

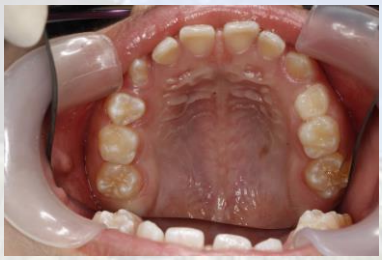
- prevalence of hypodontia ranges from 1% in African and Australian aborigines to 30% in Japanese people
- Missing permanent teeth are seen in 40%-50% of patients who have missing primary teeth
- Aetiology – genetic and environmental
- Hypodontia usually associated with microdontia

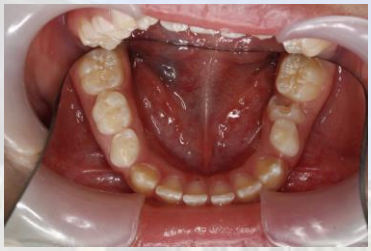
- Hypodontia usually requires extensive and complex treatments, ranging from single restoration to surgery, multiple restorations, with lifelong maintenance
- Treatment depends on:
  - pattern of tooth absence
  - residual spacing
  - underlying malocclusion
  - patient's attitudes

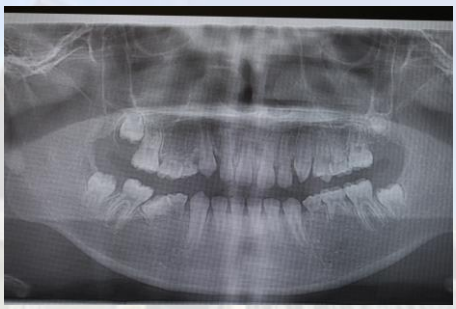
CONSIDERATION AND MANAGEMENT

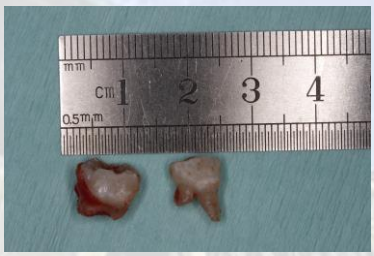
- Often require multidisciplinary intervention
- Composite restoration is strongly advised in masking conical-shaped tooth
- Anodontia – full dentures are required and possibility of early implant placement
- Communication with orthodontist – to open or close spaces

MISSING PREMOLARS

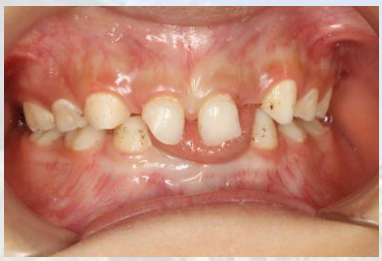


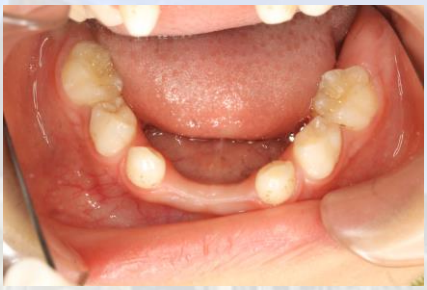


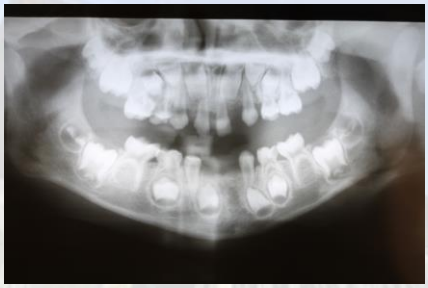




MISSING INCISORS AND PREMOLARS







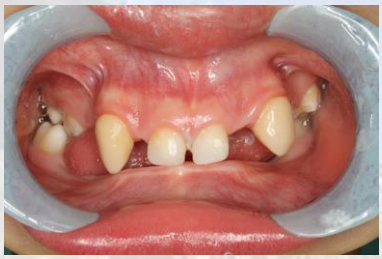
ECTODERMAL DYSPLASIA

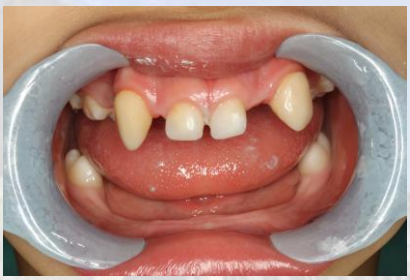
- Characterized by thin, sparse hair, dry skin, oligodontia and absence of sweat glands
- Heat intolerance → unable to cool themselves → hyperthermia
- Tooth agenesis is common in many different type of EDs, can affect the growth of the jaws
- Genetic association – EDA, EDAR, WNT10A

CONSIDERATION FOR ED

- Multidisciplinary team management
- Coordinated preventive strategies
- Minimize of inappropriate treatment
- May consider early implant placement
- Genetic counseling

ECTODERMAL DYSPLASIA CASE 1





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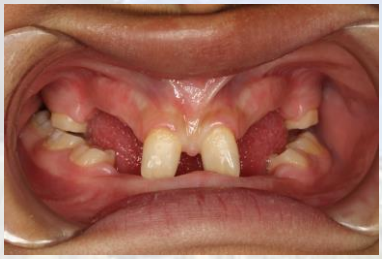
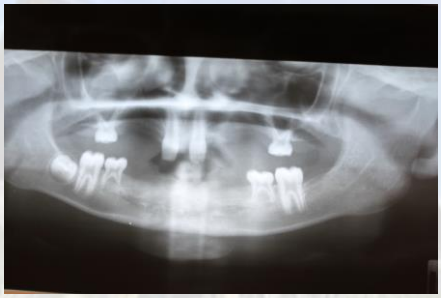
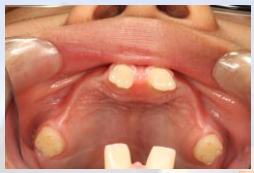
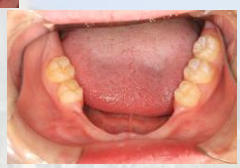
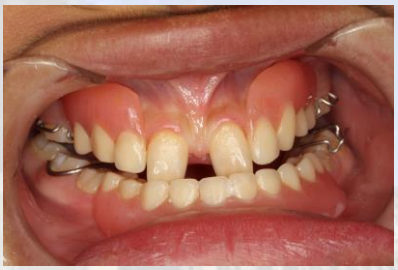










SUPERNUMERARY TOOTH

- Mesiodens is the most common supernumerary tooth, with a reported prevalence between 0.15 to 1.9 %
- Most common sequelae of mesiodentes are impaction (26–52 %) and ectopic eruption (28–82 %) of the unerupted permanent central incisors
- Patients with multiple mesiodentes typically have an associated craniofacial disorder; such as Gardner syndrome, cleidocranial dysplasia (CCD), or cleft-lip and/or cleft palate

RECOMMENDATION

- Sufficient arch space has to be ensured or orthodontically created
- Early surgical extraction of a mesiodens or mesiodentes (ideally before 7 years of age)
- Re-evaluation after 2–3 months to assess for any natural eruption of the permanent tooth
- Application of orthodontic traction in the event of non-eruption

SUPERNUMERARY

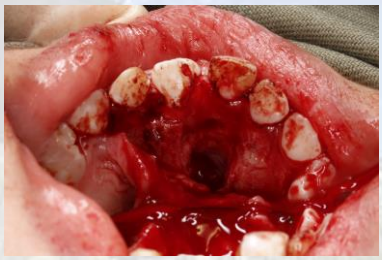
- Supernumerary teeth are considered to be a numerical anomaly, characterised by an excessive number of teeth
- May appear as an isolated finding, or associated with different syndromes such as Gardner's syndrome, cleido-cranial dysosthosis
- Prevalence ranges between:
  - 0.5 to 3.8% in patients with permanent teeth
  - 0.35 to 0.6% in patients with primary dentition

- This anomaly is usually detected in routine exams and 90% of the cases are located in the anterior region of the maxilla
- Complications associated with unerupted supernumerary:
  - delayed/unerupted permanent tooth
  - displacement/crowding
  - incomplete closure during orthodontic treatment
  - resorption of adjacent root

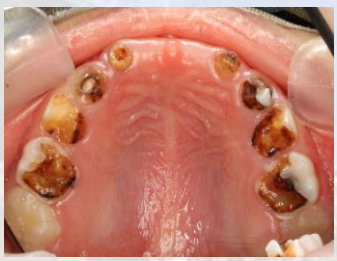
PRINCIPLE MANAGEMENT

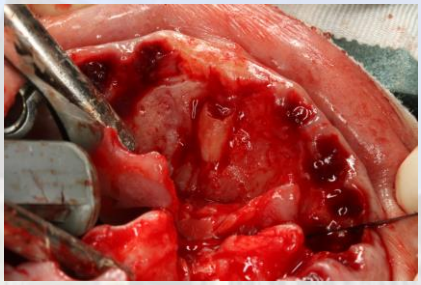
- Localization and identification of possible complications
- If teeth are causing no complications and are not likely to interfere with tooth movement, they can be monitored with yearly radiographic review
- If supernumerary teeth are associated with complications, it is usual to extract such teeth, which usually involves a surgical procedure

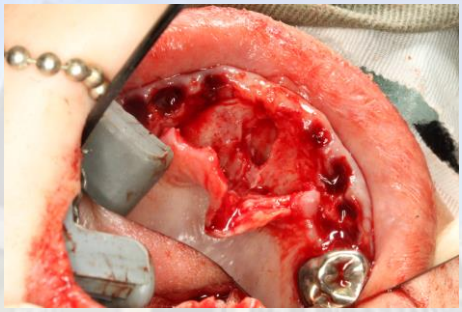
MESIODENS 1



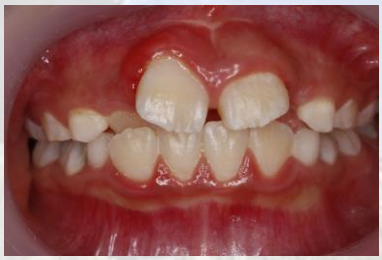
MESIODENS 2

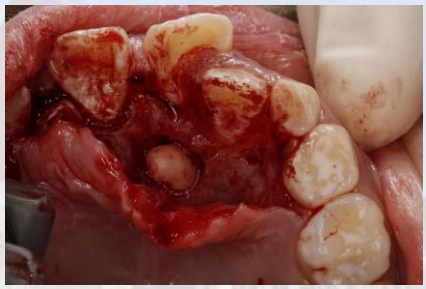


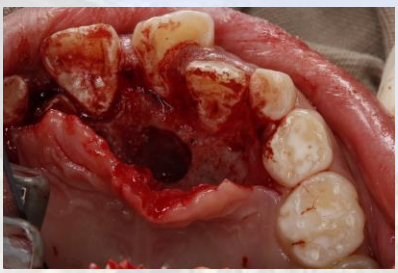




MESIODENS 3







SURGICAL REMOVAL OF SUPERNUMERARY TEETH UNDER GENERAL ANAESTHESIA

Surgical removal of supernumeray teeth GA.MOV

SURGICAL REMOVAL OF SUPERNUMERARY TOOTH UNDER LOCAL ANAESTHESIA

Surgical removal of unerupted supernumerary tooth_Trim.mp4

MANAGEMENT OF UNERUPTED TOOTH IN CHILDREN

- The maxillary incisor is considered unerupted when:
  - there is no history of previous extraction
  - eruption of contralateral incisor has occurred 6 months earlier
  - both maxillary incisors are unerupted but the lower incisors have erupted one year previously
  - deviation from the normal sequence of eruption such as lateral incisors erupt before the central incisors
- Aetiologies:
  - congenital (odontomes, ectopic position)
  - environmental (retained deciduous, previous trauma, scar tissue)

INTERCEPTIVE MANAGEMENT

- Can be prevented with proper treatment timing and early diagnosis at ages 6 to 8 years
- The earlier removal of the causative factor, the better is the prognosis
- Teeth that have not erupted 6 months after normal eruption time should be investigated radiographically
- Retained deciduous teeth should be removed if the incisor is close to eruption

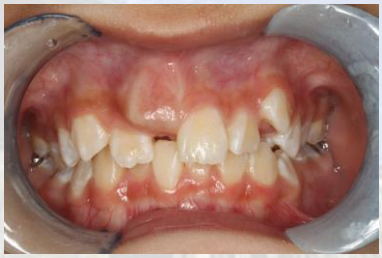
- When space is created for eruption, 75% will erupt spontaneously
- Obstructions should be removed as early as possible
- Presence of supernumerary teeth --> 54%-74% will erupt spontaneously within 16 months provided sufficient space is available

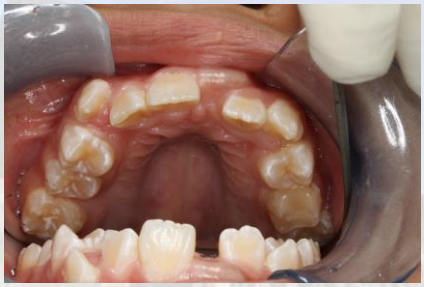
MANAGEMENT PRINCIPLE OF UNERUPTED INCISOR

- Create/maintain space
- Removal of physical obstruction (if any)
- Monitor eruption / orthodontic traction

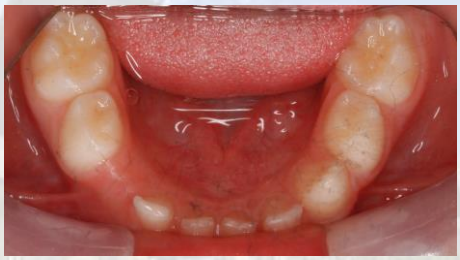
If the tooth still does not erupted → surgical intervention

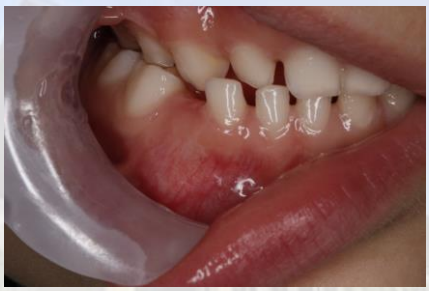
DELAYED ERUPTION 11

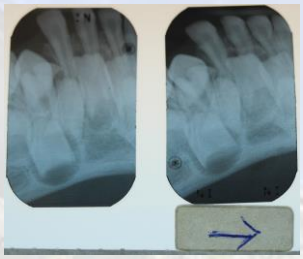


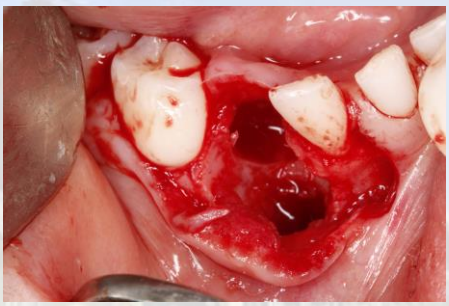


UNERUPTED 83









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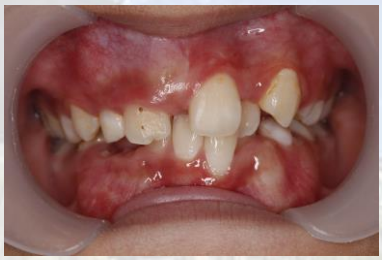

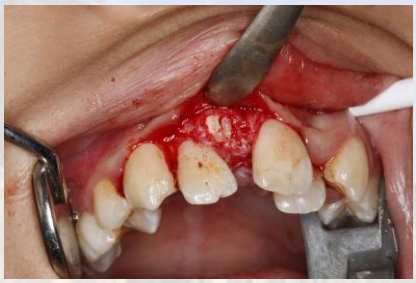

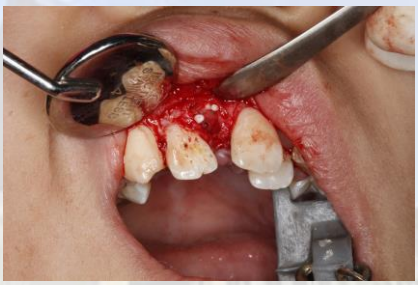

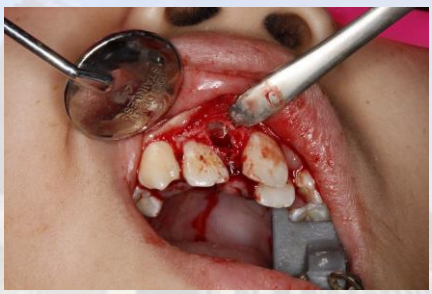

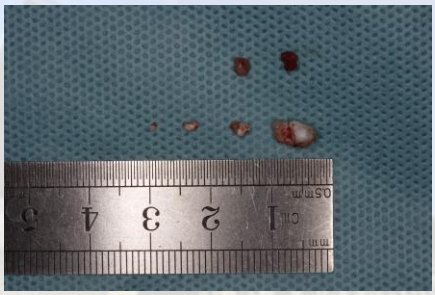

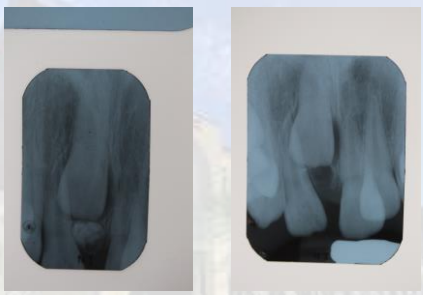

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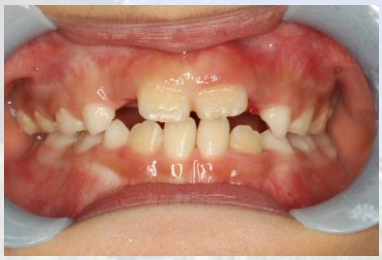

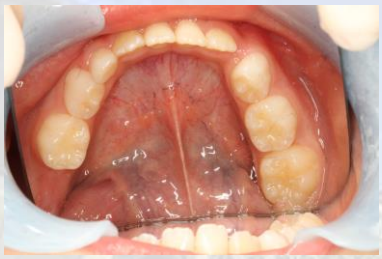

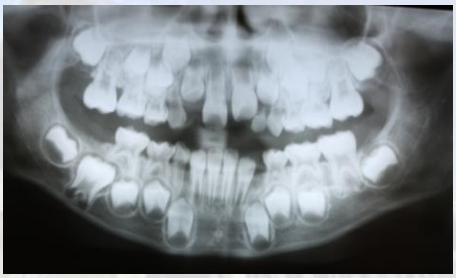

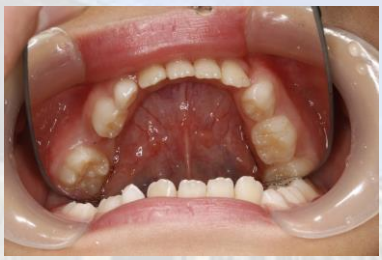

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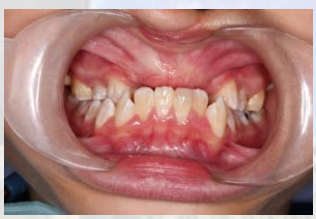

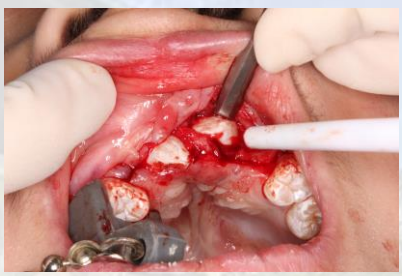

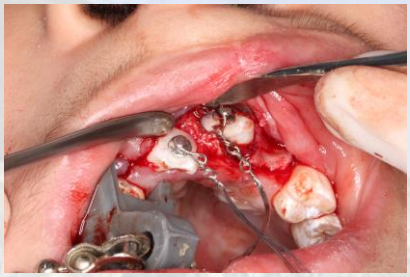

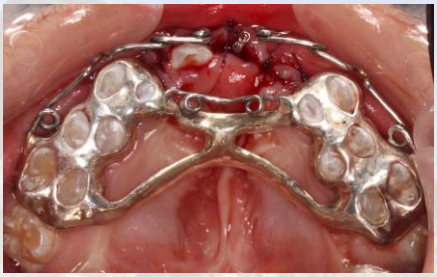

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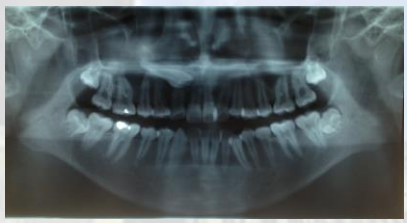

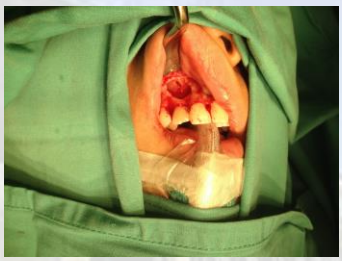

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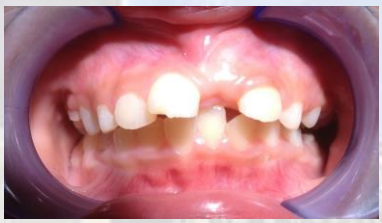

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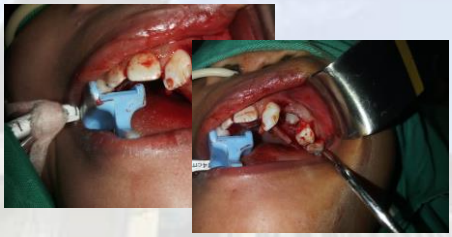

SELF-REFLECTION QUESTIONS

- Do I have sound knowledge/understanding of the anomaly?
- Is there any underlying conditions?
- Does patient and parents have the favorable behavior?
- Will patient benefit/require comprehensive management?
- Am I comfortable to do the procedure?
- Does my clinic have the necessary equipment?

TAKE HOME MESSAGES

- Common things occurs commonly
- Dentist may be the first to recognize anomalies
- Presence of generalized dental anomaly may be associated with underlying condition
- Anomaly in primary dentition may be associated with anomaly in permanent dentition

You don't have to rely on textbook. Write your own.

- Dr Frances Andreasen

You cannot stop learning. Being a specialist means you need to learn throughout your career.

- Prof Mark Hector

You have to love your job to be great

- Prof Piranit Kantaputra

THANK YOU

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