

Midwest Dental Conference

Oral Pathology Plus in Pediatrics

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April 14, 2023 9:00am - 12noon

Etiology is speculation

Ectopic eruption with prolonged pre-eruption period

Local pressure from adjacent teeth

Developmental anomaly of dentin

*Infiltration of resorptive cells into the dentin during tooth formation.

No association with gender, race, fluoride, medical or systemic conditions.

Soxman JA, Wunsch PB, Haberland CM. (2019) Eruption disturbances, In: Anomalies of the Developing Dentition. Springer Nature Switzerland, pp 75-77.

May resemble dental caries in both radiographic and clinical appearance.

May be referred to as pre-eruptive caries in the dental literature. (Occult Caries)

Palma-Portaro C, Casian J, Cabrera-Matta A, et al. Atypical developmental defects of enamel in primary incisors versus preeruptive intracoronal resorption (PEIR). *Pediatr Dent* 2020; 42:146-149.

Pre-eruptive Intracoronal Resorption

“...a well-defined radiolucent lesion located in the coronal dentin, just beneath the enamel-dentin junction of unerupted teeth.”

Radiograph necessary for diagnosis.

Soxman JA, Wunsch PB, Haberland CM. (2019) Eruption disturbances, In: Anomalies of the Developing Dentition. Springer Nature Switzerland, pp 75-77.

PEIR typically involves a single tooth.

Lesions usually limited to the outer third of dentin.

Overlying enamel is intact.

Soxman JA, Wunsch PB, Haberland CM. (2019) Eruption disturbances, In: Anomalies of the Developing Dentition. Springer Nature Switzerland, pp 75-77.

Rarely occurs in primary dentition.

Primary second molar is most affected.

May also occur with primary incisors.

Palma-Portaro C, Casian J, Cabrera-Matta A, et al. Atypical developmental defects of enamel in primary incisors versus preeruptive intracoronal resorption (PEIR). *Pediatr Dent* 2020; 42:146-149.

Progression is asymptomatic.

Most often occurs in permanent mandibular second molar, followed by maxillary second premolars.

Wong L, Khan S. Occult caries or pre-eruptive intracoronal resorption? A chance finding on radiograph. *Pediatr Dent* 2014;36:429-432.

Resorptive lesion with replacement of coronal tissue by vascular connective tissue or the invagination of osteoclasts (resorptive cells) into the dentin during crown formation.

Histopathology shows resorptive cells composed mostly of macrophages, osteoclasts and chronic inflammatory cells with no microbial contamination.

Treatment Options

Extraction with orthodontic consult prior

Restore after eruption and monitor pulp

Surgical exposure to hasten eruption

Wong L, Khan S. Occult caries or pre-eruptive intracoronal resorption? A chance finding on radiograph. *Pediatr Dent* 2014;36:429-432.

Molar-Incisor Hypomineralization MIH

“.....MIH is a multifactorial condition that involves the interaction of genetic vulnerability with exposure to systemic and environmental insults.”

Ahmed A T, Soto-Rojas, AE, Dean JA, et al. Prevalence of molar-incisor hypomineralization and other enamel defects and associated sociodemographic determinants in Indiana. *JADA* 2020;151:491-501.

MIH vs Amelogenesis Imperfecta vs Fluorosis

Hypomineralization primarily limited to first permanent molars and incisors with MIH.

Most of the teeth in both primary and permanent dentition involved in amelogenesis imperfecta.

The primary dentition typically is not affected with fluorosis.

Enamel defects vary from small well-demarcated areas of color change to extensive hypomineralization involving the entire crown.

Affected areas have decreased mineral content and increased protein and water content, which changes the optical character of the hypo-mineralized enamel.

Because full thickness of enamel develops the defects are not hypoplastic.

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The hypoplastic appearance post eruption occurs due to enamel wear, fracture and caries.

The more severe the level of hypomineralization, the more likely early loss of enamel and subsequent caries.

Hypersensitivity and difficulty obtaining good anesthesia can occur.

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Difficult to achieve adequate anesthesia.

Ozgul BM, Sakaryall D et al. Does MIH affect preoperative and intraoperative hypersensitivity? J Clin Paediatr Dent 2022;46 (May):204-210.

Demarcated opacities vary from a creamy white to yellow-brown.

Affected enamel is porous and chips off with masticatory forces resulting in exposed dentin.

Reis PPG, Jorge RC, Americano GCA et al. Prevalence and severity of molar-incisor hypomineralization in Brazilian children. Pediatr Dent 2021;43:270-275.

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Dentin hypersensitivity.

Thermal tactile, osmotic, chemical stimulation.

Increased inter prismatic spaces, higher innervation of the pulp & increased number of immune cells.

Nery de Castro CR, Lima CCB, Costa, LC et al. Hypomineralized teeth have a higher frequency of dental hypersensitivity. Pediatr Dent 2021;43(3): 218-222.

Articaine obtained more successful anesthesia than lidocaine for all interventions.

Martin E, Nimmo A et al. Articaine in dentistry: An overview of the evidence and met-analysis of the latest randomized controlled trials on articaine safety and efficacy compared to lidocaine for routine dental treatment. BDJ Open; 2021;7(July): 27.

SDF

Silver diamine fluoride, SDF, is a topical antimicrobial agent that is effective in treating not only caries but dentinal hypersensitivity.

SDF occludes dentinal tubules, creates fluorohydroxyapatite, and increases mineral density and hardness.

Consent for black stain.

Cover with fluoride varnish.

Reappoint in 2-4 weeks for GI.

This period permits the SDF to arrest caries and decrease sensitivity. If light cure the high-viscosity GI at time of SDF, the silver ions precipitate out of solution and turn the GI black.

Treatment approaches vary according to the severity of the MIH lesions.

Lopes LB, Machado V et al. Molar-incisor hypomineralization: An umbrella review. *Acta Odontol Scand* 2021;79:359-369.

Fluoride varnish

Desensitizing toothpaste

Sealants or traditional glass ionomer

Anti-inflammatory 200mg tid for 2-3 days prior to appointment if sensitivity to air/water. (Little Teeth CHAT AAPD on-line conversations)

Flowable composite - For small areas

Composite - Margins should be on sound enamel. Need good moisture control.

60-90 second NaOCl pretreatment to deproteinize the enamel. Studies show this increases the bond strength.

Weaker bond strength with resin and poor etching pattern with phosphoric acid.

Sodium hypochlorite (NaOCl) to deproteinize enamel after etching may improve bond strength for composite.

Lagarde M, Vennat E, Attal, JP, et al. Strategies to optimize bonding of adhesive materials to molar-incisor hypomineralization-affected enamel: A systematic review. *Int J Paediatr Dent*;2020;30:405-420.

Applying 5.25% sodium hypochlorite (NaOCl) for 60 seconds after etching with phosphoric acid removes the surface inorganic content.

Bond strength of a resin sealant is increased to hypo-mineralized enamel.

Yang, QN, Rosa V, Hong CHL et al. Sodium hypochlorite treatment post-etching improves the bond strength of resin-based sealant to hypomineralized enamel by removing surface organic content. *Pediatr Dent* 2020; 42:392-397.

70

Icon infiltrant resin. (D2990 resin infiltration)

37% phosphoric acid was substituted for the 15% hydrochloric acid, which has greater erosion capability.

Resin infiltration improves mechanical properties by occluding porosities & reduces hypersensitivity. Plaque accumulation & caries reduced with improved brushing.

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10% casein phosphopeptide-amorphous calcium phosphate plus 0.2% sodium fluoride paste (900ppm fluoride) (MI Paste PPlus)

Rub paste into affected surfaces 5 times each day.

Do not eat, rinse or drink for 30 minutes after.

Bagattoni S, Gozzi I, Lardani L et al. Case report of a novel interim approach to prevent early posteruptive enamel breakdown of molar-incisor hypomineralization-affected molars. *JADA* 2021;152:560-566.

Main advantage: Requires no compliance over time as does the application of remineralizing agents.

Disadvantage: Rubber dam isolation is necessary, tooth must be erupted for rubber dam, patient must be sufficiently cooperative. Variable infiltration pattern and unpredictable changes in the micro hardness of the infiltrated enamel.

Luppieri V, Porrelli D, Ronfani L et al. A resin filtration technique for molar hypo mineralization treatment. *Pediatric Dent* 2022;44:322-325.

74

Conventional restorations had moderate to high survival rates when affected tooth structure removed.

Non-Invasive composite and glass ionomer had low survival rates, but alternative until behavior permits more definitive restoration.

Linner T, Khazaei Y et al. Comparison of four different treatment strategies in teeth with molar-incisor hypomineralization related enamel breakdown - A retrospective study. *Int J Paediatr Dent* 2020;30:597-606.

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Glass Ionomer

SDF may be applied to decrease sensitivity with glass ionomer later placed over top.

Consent required for black stain.

Remember SMART technique - Patient returns in 2-4 weeks for placement of glass ionomer restoration. Light cure same day causes gray discoloration due to reacting with free silver ions. The light precipitates the silver out of solution. Color change will occur even when using a self-cure GI restorative if placed the same day as SDF.

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Bond strength is reduced by 62% if apply GIC immediately after SDF.

Wait at least one week.

Minimally invasive treatment with removal of soft hypomineralized enamel is essential for restoration longevity in compromised young first permanent molars.

Ng E, Saini S, Schulze KA, et al. Shear bond strength of glass ionomer cement to silver diamine fluoride-treated artificial dentinal caries. *Pediatric Dent* 2020;42:221-225.

Alkhalaf R, de Almeida NA et al. Minimally invasive judgement calls: Managing compromised first permanent molars in children. *Br Dent J*. 2020;229:459-465.

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With cuspal involvement, preformed SSC's are preferable to cast-metal ceramic or all-ceramic crowns during childhood and adolescence, but periodontal status must be followed.

Stainless steel crown or zirconia crown - severe involvement and where cusps are involved.

Opening the contact with an orthodontic separator (a few days) and performing SSC with Hall technique avoids any preparation.

Koleventi A, Sakellari D, Arapostathis KN et al. Periodontal impact of preformed metal crowns on permanent molars of children and adolescents. *Pediatr Dent* 2018;40:117-121.

Orthodontic band with GI or composite - Palmetto Technique to preserve finish line for permanent crown later.

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MIH molars restored with modified Hall Technique, removing unsatisfactory restorations, caries and unsupported hypomineralized tooth structure.

An orthodontic band without buccal tubes can be placed on moderately & severely involved hypoplastic molars.

SSC restorations had higher survival rate than composite resin and changes in occlusion were transitory.

The band is cemented and occlusal is covered with glass ionomer.

De Farias AL, Rojas-Gualdrón DF, Mejía JD, et al. Survival of stainless steel crowns and composite resin restorations in molars affected by molar-incisor hypo mineralization (MIH). *Int J Paediatr Dent* 2022; 32:240-250.

No local anesthesia necessary - topical may be used.

Non-invasive, can be placed as soon as molar adequately erupted and decreases sensitivity.

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This procedure increases the molar's resistance to masticatory forces, reduces the risk of post-eruptive enamel breakdown & improves retention of glass ionomer.

Bagattoni S, Gozzi I, Lardani L, et al. Case report of a novel interim approach to prevent early posteruptive enamel breakdown of molar-incisor hypomineralization- affected molars. JADA 2021;152:560-566.

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20% polyacrylic acid with 3% aluminum chloride hexahydrate for cavity conditioning

20% polyacrylic acid removes the smear layer

Aluminum chloride hexahydrate seals dentinal tubules to decrease sensitivity

Burnish into base of prep and dentin for 10 seconds, rinse, blot dry

Increases the bond between GI and dentin for longevity

Early First Permanent Molar Loss

Third molar development accelerated

Third molar may erupt earlier

Baydas YI, Ikbal A, Dagsuyu IM, Ceylan I. Effects of early loss of permanent first molars on the development of third molars. Am J Orthod and Dentofac Orthop 2006; 130:634-638.

Best outcome if at least half of the second permanent molar's root is developed. (age 9-10)

Leathery dentin removed, cavity cleansing with sodium hypochlorite on a cotton pellet, glass ionomer base & resin composite restoration.

Gaton-Hernandez P, Serrano CR et al. Minimally interventive restorative care of teeth with molar-incisor hypo mineralization and open apex. Int J Paediatr Dent 2020;30:4-10.

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Criteria for Success

Vitality is preserved.

No pain, sensitivity or swelling.

No radiographic evidence of internal or external resorption or other pathologic changes.

Continued apexogenesis.

Obtain PA every 6 months (if possible!).

If permanent first molar (PFM) extracted prior to age 8, 92.0% probability of space closure in maxilla & decreases to 86% with extraction by age 14.

49% of mandibular PFM's had spontaneous closure.

Angulation of second permanent molars and presence of third molars increased probability of space closure.

Patel S, Ashley P, Noar J. Radiographic prognostic factors determining space closure after loss of the permanent first molar. Am J Orthod Dentofacial Orthop. 2017;151:718-726.

MTA Pulpotomy

Acceptable development of the permanent dentition can be expected when severely hypomineralized permanent first molars are extracted prior to the eruption of the permanent second molars.

Investigated success of mineral trioxide aggregate pulpotomy as an alternative to root canal therapy in patients age 10-15 years.

Success rate of 90%.

Presents a possible option to endo or extraction.

Jalevik B, Moller M. Evaluation of spontaneous space closure and development of permanent dentition after extraction of hypomineralized first permanent molars. *Int J Paediatr Dent* 2007;17:328-335.

Alqaderi HE, Al-Mutawa SA., Qudeimat MA. MTA pulpotomy as an alternative to root canal treatment in children's permanent teeth in a dental public health setting. *J Dent*; 2014;42(11):1390-1395.

Deep carious occlusal and proximal lesions in permanent molars with irreversible pulpitis in patients age 16-35 years.

Rubber dam isolation, sodium hypochlorite as pulpotomy agent, MTA placed over pulp stumps and restored with resin composite.

Success rates 92.5%-95% at 12 months.

Rechithra R, Aravind A et al. Influence of occlusal and proximal caries on the outcome of full pulpotomy in permanent mandibular molar teeth with partial irreversible pulpitis. *Int Endod J* 2021;54:1699-1707.

Anomalies of Eruption

Soxman JA, Wunsch PB, Haberland CM. (2019) Eruption disturbances, In: *Anomalies of the Developing Dentition*. Springer Nature Switzerland, pp 45-73.

Ectopic Eruption of Maxillary First Permanent Molars

Handbook of Clinical Techniques in Pediatric Dentistry, 2nd ed. ed. Jane A. Soxman Wiley Blackwell 2022, pp. 201-215.

Etiology

Prior to eruption, the tooth germ of the maxillary first permanent molar is positioned backward, downward and outward.

During eruption, the tooth assumes a vertical position.

If this positional change does not fully occur, the distal cusps will emerge before the mesial cusps, resulting in impaction under the distobuccal cusp of the second primary molar.

Larger than normal size of the first permanent molar and inadequate arch length have been suggested as contributing factors.

More common in children with cleft palate.

19.9% prevalence in siblings, suggests a genetic component

Usually presents between five and seven years of age on radiographic exam.

First permanent molar is impacted in the distobuccal root of the second primary molar.

69.4% spontaneously correct.

14.3% pulpal exposure of primary molar.

Barberia-Leache E, Suarez-Clua MC, Saavedra-Ontiveros D. Ectopic eruption of the maxillary first permanent molar: Characteristics and occurrence in growing children. *Angle Orthod* 2005;75:610-615.

Treatment Options

Orthodontic elastic or spring separator

Remove SSC if molar impacted under distal of SSC and place a separator

Disk distal of second primary molar - D9951

Brass wire

Halterman or Ectopic spring loaded distalizer appliance - interceptive ortho tx for redirection of ectopically erupting teeth - D8060

Ectopic Spring Loaded Distalizer

- Appliance is secured to disco-buccal cusp of first permanent molar with ortho cement, composite or flowable composite.
- Chain elastic is cut.

QC Ortho Lab 919-577-2250

Ectopic Eruption & Impaction of Maxillary Permanent Canines

Handbook of Clinical Techniques in Pediatric Dentistry, 2nd 2d. ed. Jane A. Soxman Wiley Blackwell 2022, pp. 217-222.

Anomalies of the Developing Dentition. Soxman JA, Wunsch PB, Haberland CM. Springer 2019, pp. 61-70

Guidance Theory

The adjacent root of the maxillary permanent lateral incisor serves as a guide for the eruption of the maxillary permanent canine.

With agenesis or microdontia of the adjacent lateral, the guidance is absent.

Soxman JA, Wunsch PB, Haberland CM. (2019) Eruption disturbances, In: Anomalies of the Developing Dentition. Springer Nature Switzerland, pp 61-70.

Genetic Theory

Genetic factors linked that include other anomalies such as tooth shape, number and size, particularly congenitally missing maxillary permanent lateral incisors and/or microdontia of the permanent lateral incisors.

Soxman JA, Wunsch PB, Haberland CM. (2019) Eruption disturbances, In: Anomalies of the Developing Dentition. Springer Nature Switzerland, pp 61-70.

Palpate buccal alveolar bone contour around ten years of age.

If canines not palpable by eleven years of age, panoramic radiograph should be obtained.

Rapid resorption of permanent lateral root(s) may occur without intervention.

Significant risk for resorption of permanent lateral incisor root when the impacted canine cusp tip is past the mesial edge of the lateral incisor and in the apical third of the lateral incisor root.

Wang H, Li T et al. Risk actors for maxillary impacted canine-linked severe lateral incisor root resorption: A cone-beam tomography study. Am J Orthod Dentofacial Orthop 2020;158:410-419.

After third molars, maxillary permanent canines are the second most commonly impacted teeth. Palatally displaced canines (PDCs) occurs in about 85% of cases.

Eruption of PDCs is significantly facilitated by extraction of maxillary primary canines.

Almasoud NN. Extraction of primary canines for interceptive orthodontic treatment of palatally displaced permanent canines. Angle Orthod 2017;87:878-885.

CBCT provides more accurate information than panoramic, occlusal or PA.

If CBCT is not available, panoramic shows root resorption and tooth position.

Periapical radiographs are more specific than panoramic to show buccal-lingual position and root resorption.

Tsolakis AI, Kalavritinos M et al. Reliability of different radiographic methods for the localization of displaced maxillary canines. Am J Dentofacial Orthop 2018;153:308-314.

Extract maxillary primary canines after the permanent laterals have fully erupted.

First premolars erupt prior to the maxillary permanent canines.

Adding extraction of the primary first molar may stimulate the first premolar to erupt and have a positive effect on the path of the canines.

Must have a *minimum of one-half root formation* on the premolar if chose to extract the first primary molar or may cause delay in premolar's eruption.

Shapira Y, Kuftinec MM, Stom D. Early diagnosis and interception of potential maxillary canine impaction. JADA 1998;129:1450-1454.

Primary canine and first primary molar extractions were more effective as a preventive approach to promote eruption of permanent maxillary canines that were positioned centrally or palatally.

Bonetti GA, Zanarini M, Parenti SI et al. Preventive treatment of ectopically erupting maxillary permanent canines by extraction of deciduous canines and first primary molars: A randomized clinical trial. Am J Orthod Dentofacial Orthop 2011;139:316-323.

Unilateral or Bilateral Extraction?

Case by case decision depending on the amount of maxillary arch length deficiency.

If unilateral ectopic canine and no arch-length deficiency, may extract only the primary canine on the affected side.

If moderate to significant arch length deficiency, extract both primary canines.

Distally Displaced Premolars

A significant relationship between distal displacement of mandibular premolars & palatally displaced canines was found.

Because DDP is diagnosed earlier than PDC, it can be a valuable developmental risk indicator.

Baccetti T, Leonardi M, Gliuntini V. Distally displaced premolars: A dental anomaly associated with palatally displaced canines. Am J Orthod Dentofacial Orthop 2010;138:318-322.

Maxillary Lateral Morphology

Lateral incisors adjacent to palatally displaced canines had a mean length of 2.1mm shorter and mean root width smaller, particularly in the buccolingual dimension.

Microdontia of lateral incisor(s) may be a risk indicator for palatal impaction of maxillary permanent canine(s).

Liuk IW, Olive RJ, Griffin M et al. Maxillary lateral incisor morphology and palatally displaced canines: A case-controlled cone-beam volumetric tomography study. Am J Orthod Dentofacial Orthop 2013;143:522-526.

Maxillary Expansion

Expansion improves the eruption path of ectopically erupting maxillary canines in patients with maxillary transverse deficiency.

Arboleda-Ariza N, Schilling J et al. Maxillary transverse dimensions in subjects with and without impacted canines: A comparative cone-beam computed study. Am J Dentofacial Orthop. 2018;154:495-503.

Barros SE, Hoffelder L, et al. Short-term impact of rapid maxillary expansion on ectopically and normally erupting canines. Am J Dentofacial Orthop. 2018;154:524-534.

Buccally displaced maxillary permanent canines have best improvement in position with maxillary expansion at 7-8 years of age.

Harada-Karashima M, Ishihara Y et al. Age-related changes in the effect of rapid maxillary expansion on the position of labially impacted maxillary canines: A case-control study. *Am J Orthod Dentofacial Orthop* 2021;159:305-311.

Palatal Impaction

With a palatal impaction, surgical exposure and orthodontic force will be necessary to bring the maxillary permanent canine into the arch.

Usually adds 6 months to 1 year of treatment time.

Dental Anomalies Pattern

Congenitally missing #20, 29

Microdontia permanent laterals

Ankylosed primary molars

Delayed dental development

Distal angulation of mandibular second premolar

John H. Taylor, DMD

submerged/infraoccluded
ankylosed primary molar

Handbook of Clinical Techniques in Pediatric Dentistry, 2nd 2d. ed. Jane A. Soxman Wiley Blackwell 2022, pp. 223-228.

Etiology

Genetic or congenital gap in the periodontal membrane.

Excessive masticatory pressure or trauma.

Disturbance in the local metabolism.

Genetic cause most accepted since high frequency in siblings.

Increased association with:

distal angulation of the mandibular second premolar

microdontia of the maxillary permanent lateral incisors

palatally displaced canines

tooth agenesis

Fusion between the root cementum and/or dentin with surrounding bone.

Tooth appears to be submerging as the alveolar height of the bone increases with the eruption of the adjacent teeth.

Interruption of the integrity of the PDL impedes eruptive forces.

Radiographic detection may be difficult since only a small area of the root is affected.

With presence of a permanent successor, if a second primary molar is maintaining arch length and preventing the mesial tipping or shift of the first permanent molar, there is no need for intervention until exfoliation of the contralateral primary molar.

If the premolar is erupting with a mesial or distal path of eruption, determined with a periapical radiograph, the primary molar should be extracted when 2/3 to 3/4 of the premolar's root is developed.

Restoration with a composite build-up, composite crown with reshaping, stainless steel or zirconia crown will keep adjacent teeth from tipping and avoid super eruption of opposing teeth.

The presence or absence of a permanent successor is the primary consideration in a treatment plan.

Orthodontic consultation is recommended with absence of the permanent successor.

With absence of the permanent successor, and decision to maintain the primary molar :

In absence of ankylosis and with flat interproximal bone levels, the primary molar may remain and function for many years prior to exfoliation.

The mesial and distal surfaces of the mandibular primary molar may be disked to achieve the width of a premolar.

The mesiodistal width at the CEJ, measured on a bitewing or periapical radiograph, or comparison to the width of the premolar on the contralateral side, provide good guides for the reduction.

A Boley gauge may also be used to determine the amount of reduction.

The average width of a mandibular second premolar is 7 to 7.5mm.

This size can be placed on the occlusal of the primary molar with a marking pen.

If active surveillance is the chosen plan, risk to alveolar bone development must be considered and followed with periapical radiographs.

Vertical or oblique bone loss signals need for extraction to maintain marginal alveolar bone height along with consideration for space maintenance.

After local anesthesia and rubber dam placement, a carbide fissure or diamond bur are used in an upright position to remove the interproximal enamel, avoiding pulpal exposure.

The occlusal surface may be augmented to achieve a level occlusal plane and composite may be added on the mesial and distal surfaces to prevent caries.

After extraction, a vertical bony defect may be present, but the continued eruption of the adjacent teeth will promote growth of the bone and tissue, eliminating the bony defect.

Kokich VG & Kokich VO. Congenitally missing mandibular second premolars: clinical options. Am J Orthod and Dentofac Orthoped 2006;130:437-444.

transposition

Etiology

May result from interchange of the involved teeth in the dental lamina, multifactorial factors, or a traumatic injury.

Extreme form of ectopic eruption with interchanged position of two permanent teeth

Other anomalies typically occur on the same side of the arch such as microdontia, missing maxillary permanent lateral, maxillary and mandibular premolars and rotation of adjacent teeth.

The transposed teeth may be orthodontically moved to the proper position in the arch, reshaped or orthodontic space closure after extraction.

Most commonly occurs with maxillary canine and first premolar.

Crown Size & Shape

microdontia & macrodontia

Soxman JA, Wunsch PB, Haberland CM. (2019)
Anomalies of Tooth Formation In: Anomalies of the Developing Dentition. Springer Nature Switzerland, pp 7-28.

Etiology

Environmental influences, genetic, radiation, chemotherapy and syndromes

Disruption during the morphogenic stage of tooth formation can result in one, multiple or all teeth affected by this anomaly.

Because disturbance occurs during morphodifferentiation, the function of the ameloblasts and odontoblasts is not impaired.

Microdontia is often associated with hypodontia.

Higher incidence in females.

Microdontia of a permanent lateral incisor is often associated with a missing lateral incisor in the same arch.

Palatal impaction of the maxillary canine is associated with microdontia.

macrodontia

No treatment indicated unless for esthetics.

Enameloplasty with interproximal stripping with macrodontia, but must be aware of possible pulp exposure with risk of vitality.

If severe with central incisor, may extract and orthodontically move laterals into space or replace with Maryland Bridge or implant.

Treatment may involve multiple disciplines.

Etiology

Both environmental and genetic.

Occurs in the dental lamina formation stage during induction and proliferation.

Local hyperactivity of the dental lamina has been suggested along with both autosomal recessive and dominant genes.

Occurs twice as often in males, supporting an X-linked mode of inheritance.

Timing of treatment

Early:

Must consider possibility of damage to the developing adjacent tooth germs

To induce spontaneous eruption of permanent incisors

Prevent anterior space loss and surgical/ortho treatment later

mesiodens

Complications

Arrested root development or root resorption of adjacent incisors

Rotation or impaction of permanent incisors

Cystic degeneration

Nasal eruption

Over-retention of primary incisors

Delayed eruption

Late:

Await eruption of mesiodens

Wait for complete root formation of adjacent teeth in order to avoid iatrogenic damage to adjacent roots

Patient age for cooperation

Easier surgery

shovel incisors

Deep lingual fossa with accentuated marginal ridges.

Different degrees of shoveling.

Most often central and lateral maxillary incisors.

Primarily in Asians and nearly 100% in Inuit & Native Americans. Rare or absent in African and European populations.

Primarily genetic factors.

Accessory Cusps - Tubercle

dens evaginatus

talon Cusp

cuspid of carabelli

protostylid

Chen J-W, Huang GT-J, Backlund LK. Dens evaginatus
Current treatment options. JADA 151:358-367.

Reshaping or restoration of the clinical crown may be necessary to achieve ideal overjet or overbite during orthodontic treatment.

Examination to reveal deep fissures or enamel defects to avoid ingression of caries with the large, young pulp.

Disruption during the Bell stage of tooth development.

Abnormal proliferation of inner enamel & ectomesenchymal cells within the dental papilla.

Cells fold into the stellate reticulum of the enamel organ resulting in a tubercle or extra elevation on the enamel surface.

Genetic & environmental factors - Asian descent more often than European.

Accessory cusp may be in traumatic occlusion.

Difficulty fitting orthodontic band with protostylid.

Any reduction of an accessory cusp should be cautiously performed since pulp tissue may extend into the accessory cusp.

Talon Cusp

Protruding cusp from the cingulum of the maxillary permanent or primary lateral incisors.

May be unilateral or bilateral.

Pulp tissue may extend into the cusp.

Genetic influences: Asian, Arab, Inuit, Native Americans.

Multiple Syndromes especially Rubenstein-Taybi.

Type I - cusp extends at least half of the distance from the CEJ to the incisal edge.

Type II - semitalon 1mm or more in size extending less than half the distance from the CEJ to the incisal edge.

Type III - trace talon bifid, conical, tuberculate extending from cervical third of root.

Cusp of Carabelli

Protruding cusp from the mesiolingual surface of maxillary molar.

90% prevalence in Caucasians & rare in Asian.

Protostylid is a comparable cusp on mesiobuccal surface of mandibular permanent first molar

Dens Evaginatus

Protruding cusp from the occlusal surface of a premolar.

Often accompanies shovel shaped incisors.

Females, Inuit, Asians

Radiograph should be obtained to determine if pulpal tissue extends into the tubercle.

Enamel Pearl

Radiopaque nodule of ectopic enamel projecting from the root of a maxillary permanent molar followed by mandibular permanent molar. Rarely premolars and incisors.

Etiology is localized bulge of odontoblastic layer. Bulge may cause contact between Hertwig root sheath and the developing dentin, triggering enamel formation.

Most are incidental findings and require no treatment.

Precludes normal periodontal attachment with connective tissue.

Meticulous oral hygiene and monitoring pocket depth.

If enamel pearl exposed and removal recommended, be aware that pearl may contain pulp tissue.

Neville BW, Damm DD, Allen CM, Chi AC. Oral and Maxillofacial Pathology. Elsevier 4th ed. 2016 p.85-86.