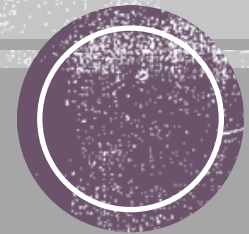


First Permanent Molar Pathology

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1. Introduction

- Angle – “the key of normal occlusion”
- Stockli – “the queen of occlusion chess”
- The dental practitioner will consider the first molar a therapeutic priority - its loss leads to important changes in the SS balance.
- The frequency of destruction of the first permanent molar in Romania is extremely high. The first carious lesions appear on the occlusal surface (6-8 years), proximal on the mesial face, distal after the eruption of the second permanent molar.



Factors influencing vulnerability to caries

- **Formation and mineralization** - takes place in the difficult stages of development -> at birth and postnatal up to 3 years.
- dietary imbalances in the first year of life -> mineralization disorders of hard dental structures.
- the Schoor-Orban line that marks the difficulties during childbirth passes through the grooves and pits on the occlusal surface.



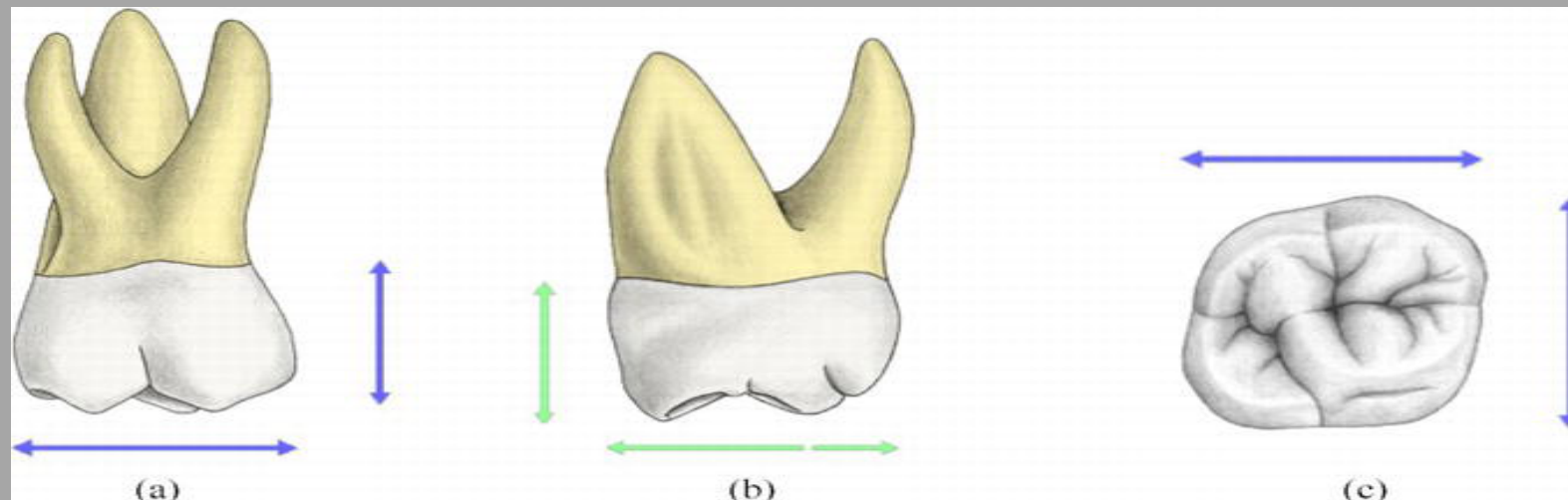
Factors influencing vulnerability to caries

- **The eruption period is very long** - from the moment of the eruption until the occlusion plan is reached (6 months-1 year) -> poor self-cleaning, long non-functional stage.
- **Postoperative maturation** - temporary teeth frequently show carious processes and mobility -> retention is favored and self-cleaning is disadvantaged. Enamel macro- and micro-defects do not benefit from remineralization by salivary mechanisms.



Morphology features

- The occlusal face of the lower M6 has deep and retentive pits and fissures.
- The occlusal face of the upper M6 has two deep pits, separated by an oblique enamel groove.
- The mesial surface of M6 suffers due to the presence of temporary second molars, where at the age of 7 the contact surface changes by mesial migrations and closure of the retro-canine space, and after the age of 8, by caries and mobility specific to temporary teeth.



Morphology features

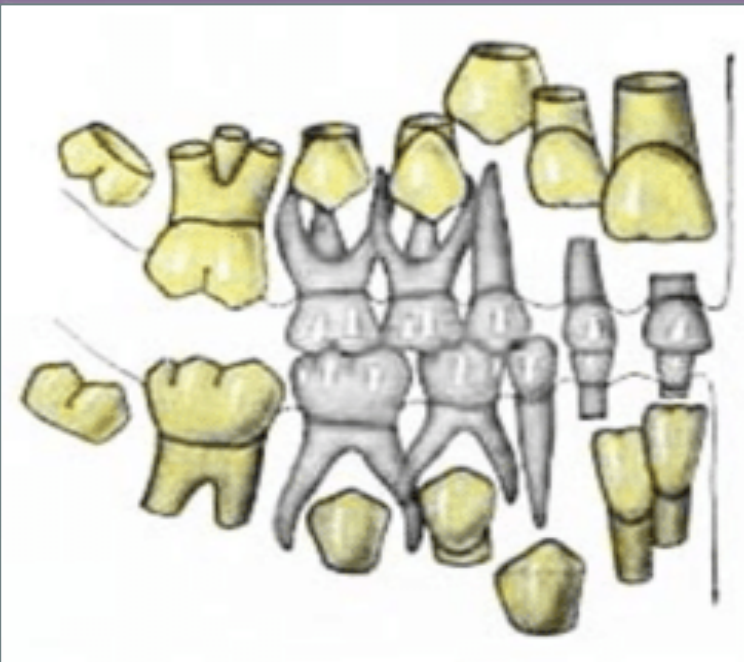
- The distal surface is subject to retention after the second permanent molar eruption, the contacts lack firmness.
- The buccal face of the lower M6 may have deep and retentive pits, and the palatal face of the upper M6 may have retention at the junction with the Carabelli cusp.
- Root formation is completed in a long period of post-eruptive time (on average 4 years), so the apex reaches the diameter of mature teeth around the age of 10 years.



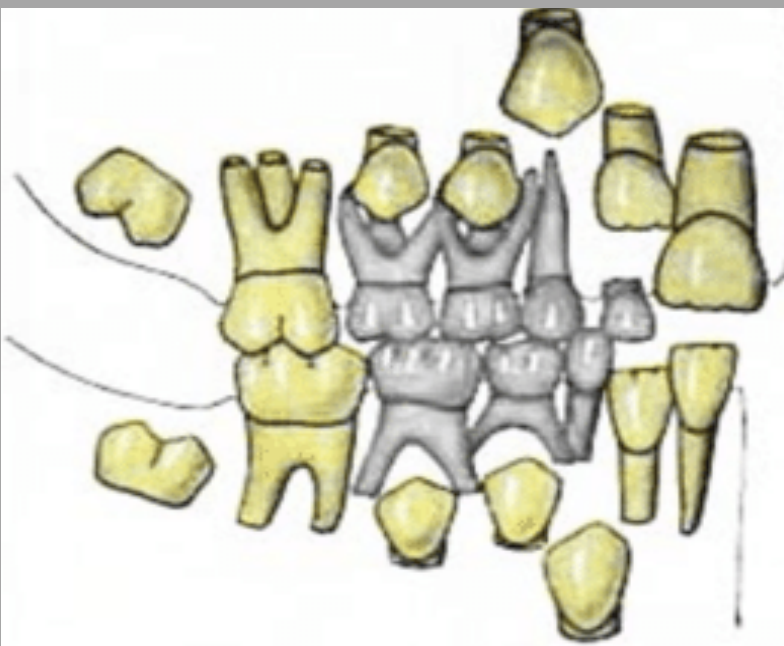
2. The importance of the permanent first molar

- M6 produces the second occlusion elevation and stabilizes the relationships in the vertical plane -> it is the opener of occlusion, and the lower frontal incisors are its closers.
- Through its position it occupies a strategic place, being forced to withstand the greatest pressures, which through root tripodism it transmits to the cranial resistance structures.
- Being the first permanent tooth to erupt, it is the only stable element during mixed dentition and takes over much of the guidance of mandibular movements, until the eruption of the incisors and canines.
- It plays an important role in the normalization of occlusal relations, by balancing the anterior determinant in formation by the eruption of the incisors, with the posterior one represented by ATM.

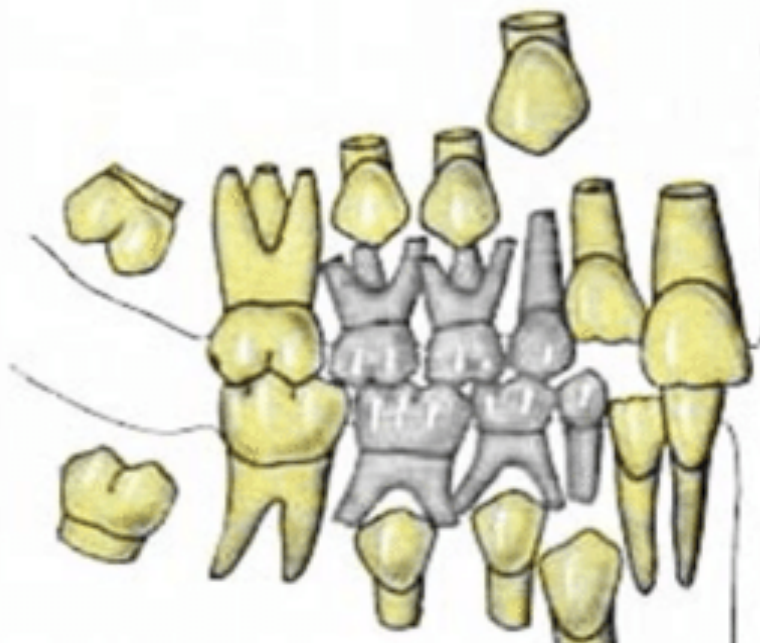




6 years (± 6 months)



7 years (± 6 months)



8 years (± 6 months)



3. Consequences of early loss of first permanent molar

Early extraction of the 6-year-old molar has the following consequences on occlusion:

- **Time factor disorder:** no simultaneous contacts occur in MIP. Some contacts appear simultaneously, others delayed.
- **Load factor disorder:** uneven distribution of forces in the dental arches due to loss of contact points.
- **Multitude factor disorder:** not all points close according to contact patterns.
- **Continuity factor disorder:** Normal, evenly programmed neuromuscular movements are prevented and altered by premature contact and interferences.
- **Disorder of the form factor:** in the spatial orientation, the occlusal field is no longer adapted S.S harmoniously and balanced developed.

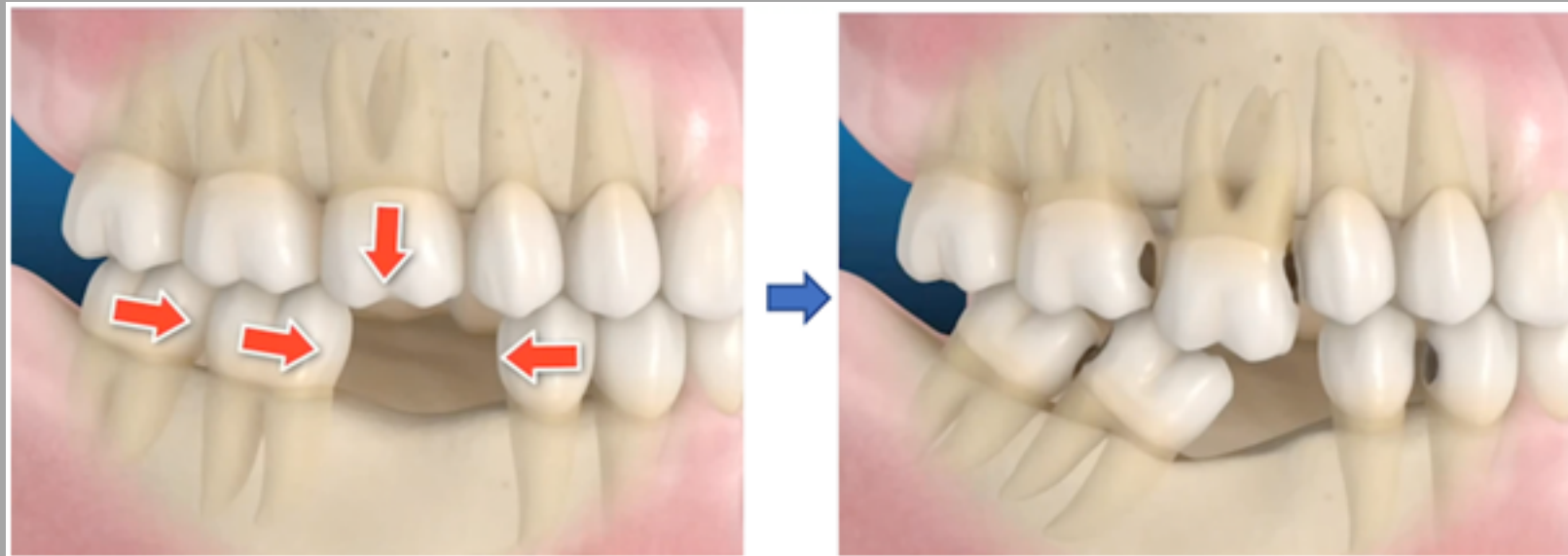


The migrations of adjacent teeth appear in the sagittal plane and take place according to several rules:

- The amplitude of movement is bigger as the loss of the tooth took place at a younger age.
- The amplitude of movement is higher at the upper arch and smaller at the lower arch.
- The amplitude of movement is greater for the distal teeth of the edentulous space and more limited for the mesial ones.



- Early loss is followed by corporeal shifting and therefore by the simultaneous translation of the coronary part and the root.
- Late loss is followed by displacement by tilting the coronary part accompanied by holding the roots in place, resulting in their tilting.



Periodontal changes

- After the extraction, the tipping of the teeth appears, which leads to the reduction of the distance between the alveolar ridge and the CEJ in the mesial part and the loss of the biological distance.
- Effects: compression of the gingival fibers-> decrease in gingival tonus-> appearance of false periodontal pockets.
- Self-cleaning and sanitation become difficult by classical methods and in the edentulous area appears food retention, accumulation of bacterial plaque and calculus that causes the appearance of localized chronic periodontitis.



Occlusal changes - occlusal trauma

- By interrupting the dental arch, the functional stress to which the supporting structures of the adjacent teeth are subjected, is modified.
- Premature contact and interference lead to neuromuscular activity disorder having a destructive effect on marginal periodontium leading to the formation of deep periodontal pockets and pathological mobility.

Effects:

- migrations of antagonistic teeth
- eruption accidents of the wisdom teeth
- tooth attrition
- modification of the vertical occlusion dimension
- laterodeviations of the mandible
- TMJ dysfunction
- imbalances of the digestive process due to insufficient grinding of food
- negative psychological consequences.



4. Therapeutic particularities in treating the first permanent molar

- The special vulnerability to caries of the first permanent molar requires constant attention and age-appropriate clinical behavior:

6-8 years	8-10 years	10-12 years
- Pits and fissures sealing/enameloplasty for health teeth within 6-12 months after eruption	- Treatment of simple carious lesion	- Treatment of simple carious lesion
- Treatment of simple carious lesion	- Treat/extract immediately/late teeth with irreversible pulpopathy, depending on the degree of root development or coronary destruction	- Treatment for teeth with irreversible pulpopathy to which coronary destruction is limited or can be prosthetically restored
-Teeth with irreversible pulpopathy are extracted immediately / later, if the root is incompletely formed, and coronary losses are > 2/3		- The teeth with pulpopathy are extracted, especially before the eruption of the second molars (10-11 years) and when the coronary destruction is total or very important.

Systematic extraction of the first permanent molar

In general, extraction must become selective and restricted to special situations:

- Children with high vulnerability to caries, respectively those in the group of intense carious activity.
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- Teeth with pulpal diseases, in which the root is incompletely formed.
- Teeth with large coronary damage, affecting at least two-thirds of the crown volume.



Orthodontic extraction of the first permanent molar is recommended in the following situations:

- The child is 8-9 years old and dental crowding is obvious.
- Occlusal relations are type I Angle class.
- Overocclusion is normal or reduced.
- The first permanent molars are decayed.
- The unerupted lower second premolar must not be inclined distally, spaced from the first molar or out of the way of the roots of the temporary second molar.



The results of the systematic extraction of 6-year-old molars can be accepted, but the method is a treatment that should not be easily instituted.



The ectopic eruption of the 6-year-old molar has a low frequency of 2-4% and the dental practitioner must report this clinical situation early, in order to intervene therapeutically effectively. Studies have shown that approximately 66% of ectopically erupted molars recover in a normal position without therapeutic intervention. The doctor must decide when and if orthodontic treatment is needed.



Particularities in the restoration of the first permanent molars with extensive lesions

When the possibilities for direct restoration are exceeded, indirect methods will be used. It is recommended to use inlays, onlays, overlays, prefabricated metal crowns, partial crowns, covering crowns and radicular posts.



5. Treatment of the first permanent molar edentulousness

In the therapy of the first permanent molar edentation, several principles must be observed:

- M6 edentation should be considered a dental emergency. The expectant attitude based on the ability of the young organism to adapt to the functional disorders caused by edentulousness must be replaced by an active therapeutic attitude.
- M6 edentulous therapy has a curative and prophylactic character, in terms of preventing occlusal, periodontal and TMJ disorders. Space maintenance timing can only be indicated with strict observance of occlusion reports.



The therapeutic plan for the treatment of M6 edentation will include several stages depending on the condition of the S.S:

- Establishing a program of hygiene and health education according to the patient
- Stopping the evolution of active caries through direct techniques
- Surgical therapy that includes the extraction of root parts, conservative interventions such as resections and premolarizations.
- Elimination of premature contacts and interference and "centering" of the mandible. These are achieved by coronoplasty of the antagonist and restoration of the occlusal plane, as well as by preparations of the teeth adjacent to the gap.
- Orthodontic therapy can include both mobilizable and fixed devices, aiming to straighten the teeth adjacent to the gap, balanced transmission of occlusal forces, recalibration of the gaps, prevention of periodontal disease.



Possibilities of prosthetic restoration of the first permanent molar edentation

- Prosthetic restoration of M6 edentulousness poses several problems, especially related to the patient's age.
- Treatment options include fixed prosthetic restorations (cast crowns, partial crowns, total crowns with different modes of aggregation), the implant solution at the right age.
- Oral hygiene must be very good, and subgingival preparation will be done only under special conditions. The most recommended type of preparation is chamfer.



Particular clinical situations in the treatment of the first permanent molar edentation

- Antagonist extrusion -> The extruded tooth must be returned to the normal occlusion plane.
- Mesial tilting of the second permanent molar and the wisdom tooth -> preparation begins with the mesial surface of the third molar, to allow access to the distal face of the second molar and to achieve a correct occlusion plan.
- Distal migration of the second premolar -> if the space appeared by the distal inclination of PM2 is 0.5-1 mm, enameloplasties are performed to allow the insertion of FPR in the axis, without affecting the vitality of the pulp. For greater inclinations, without orthodontic treatment, devitalizations can be performed for prosthetic purposes.



Types of fixed prosthetic restorations used in the treatment of first molar edentulosity



The use of implants in the edentation of the first permanent molar in adolescents

- In the posterior maxillary region, the great variability of vertical growth can cause a problem by overloading the implants due to increased masticatory forces. Implant insertion will be postponed until the age of 15 for girls and 17 for boys.
- In the posterior mandibular region, transverse and antero-posterior mandibular growth, associated with rotational growth, raises particular issues.



