Missing Premolars: What are the Options?

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At what age can you know second premolars are absent?

- chronological age 8 to 9
- compare to first premolar
- compare to opposing arch
- family history
- late eruption
Missing Second Premolars - Associated Anomalies

Infraocclusion – 25% vs 9%
Distoangular premolar – 8% vs 0.2%


Should we save or extract the E?

- Systematic Review
- Outcomes of preserving vs extract E when 5 missing in normal occlusion
- No evidence to support either extraction or preservation

Missing Premolars
Treatment Options

- Leave primary molars + build up + disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- Decoronation
- TADS to protract molars

4 Principles
Kennedy DB Eur Arch Ped Dent 2009 10 : 201-10

- Establish correct space
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• Establish correct space
• Preserve occlusal table

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• Preserve alveolar ridge
4 Principles
Kennedy DB Eur Arch Ped Dent 2009 10 : 201-10

- Establish correct space
- Preserve occlusal table
- Preserve alveolar ridge
- Correct incisor position

3 Questions

- What would you do if the absent tooth were present?
- Can this malocclusion be satisfactorily treated with extractions?
- What is the likelihood of survival of deciduous molar?
What is the survival rate of deciduous second molar with absent premolar?

- reduced numbers of retained maxillary deciduous molars
- mandibular molars maybe more durable
- mandibular molars show increased infraocclusion
- resorption occurs in about 50%
- sample bias?

Sletten et al  AJODO  2004 : 124 : 625-630
What is the survival rate of deciduous second molar with absent premolar?

- age 36 to 48 years
- negligible root resorption
- no infraocclusion

Sletten et al  AJODO  2004 : 124 : 625-630

What is the survival rate of deciduous second molar with absent premolar?

- If deciduous molar lasts to adulthood without resorption or infraocclusion: excellent prognosis for longevity.

Retained Second Deciduous Molar Problems: **size of molar**

- deciduous molar wider than absent premolar
- results in end on / ½ cusp Class II molar

Retained Second Deciduous Molar Problems: **root resorption**

- resorption progressive
- reduced crown root ratio for restoration
• When ankylosed E is left
• non restorable
• space too wide
• end on molar
• surgical removal
• compromised bone for implant

Retained Second Deciduous Molar
Problems: infraocclusion

• impact magnified with growth
• early ankylosis worse than late
• infraocclusion worse when absent premolar than if premolar present

Kurol 1984 Eur J Ortho 6: 277-93
Kurol 1984 Angle Orthod 54 :283-94
Retained Second Deciduous Molar Problems:
infraocclusion

- infraocclusion magnified with growth
- space loss > leeway space
- adjacent teeth tipping
- reduced vertical growth of adjacent teeth
- midline deflection in unilateral cases

Becker A et al AJO 1992 102 256-264
Becker A et al AJO 1992 102 302-309
Becker A et al AJO 1992 102 427-433
When baby teeth behave badly – thanks Dr. Lesley Williams

Impact of Extraction of Infraoccluded Deciduous Molars - vertical

- don’t let infraocclusion extend beyond proximal contact - non restorable
Can we enhance extraction socket for future implant?

- Random Clinical Trial of coral granules placed in primary molar extraction sites
- Posterior Mx and Mn 93.5 % successful in preserving alveolar width
- No pre-implant grafting needed
- Socket preservation


Missing Teeth Treatment

- Costs to replace missing teeth
  - orthodontic treatment
  - prosthetic replacement
  - adjunctive procedures (CBCT / grafting)
  - maintenance of prosthesis
  - $ 5000 per tooth
  - competes with college funds / availability
  - space closure eliminates these
Treatment Options

- Leave primary molars + build up + disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- Decoronation
- TADS to protract molars

Missing Lower Second Premolars
Class 1 non crowded
Before

After

- interproximal reduction of mandibular second deciduous molars
- limited by root proximity / pulp size
- occlusal build up
Leave upper space to obtain Class I canine and molar
Treatment Options

- Leave primary molars + build up + disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- Decoronation
- TADs to protract molars

Missing Lower Second Premolars – Class 1 minimal crowding
• What would you do if the absent tooth were present?
• Can the malocclusion be satisfactorily treated with extractions or not?
• What is the longevity of the deciduous second molar?

• extract lower primary molars / lingual arch
• non extraction treatment to open space for lower second premolar replacements
Impact of Extraction of Infraoccluded Deciduous Molars – ridge width

Ridge changes with missing lower second premolars

• 25% of buccal lingual reduction occurs in first 3 years
• 4% more loss over next 4 years
• limited vertical change
• adequate bone for implant

Ostler & Kokich  J. Prosth. Dent.  1996
• early extraction preserved bone height
• eruption of teeth brings bone with them

Ostler & Kokich  J. Prosth. Dent.  1996

• Other anomalies
• late 1.7
• absent 3rd molars
• absent 3.5 4.5
Implant supported crowns—after growth finished

6 years after implant
Before 3 unit bridge After

• Maryland bridge until growth complete
• less invasive
• less cost
• future implant still an option
Treatment Options

• Leave primary molars ± build up ± disk
• Extract – hold space – restore
• Extract – close space
• Extract early – drift – close
• Transplant
• Decoronation
• TADS to protract molars

Class I mild crowding: missing lower left second premolar
• What would you do if the absent tooth were present?
• Can the malocclusion be satisfactorily treated with extractions or not?
• What is the longevity of the deciduous second molar?

• extract all second premolars
• slightly protrusive incisors
• steep mandibular plane
• encourages mesial drift of molars
Final

Note mesial drift of molars, increased space for third molar eruption, no impact on profile
Treatment Options

• Leave primary molars + build up + disk
• Extract – hold space – restore
• Extract – close space
• Extract early – drift – close
• Transplant
• Decoronation
• TADS to protract molars

Initial - Missing Lower Second Premolars
TSALD
7 mm lower
5 mm upper
Extract Upper 4 and Lower E
Progress – Post Ext / Drift
Progress – Post Ext / Drift
<table>
<thead>
<tr>
<th>Static</th>
<th>Working</th>
<th>Non working</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Static" /></td>
<td><img src="image2.png" alt="Working" /></td>
<td><img src="image3.png" alt="Non working" /></td>
</tr>
</tbody>
</table>

**Final**

![Final Image](image4.png)
More room for 8’s – molars come forward

Initial

Post Drift

Final
• What would you do if the absent tooth were present?
• Can the malocclusion be satisfactorily treated with extractions or not?
• What is the longevity of the deciduous second molar?
• Modified serial extraction
• Place Nance – control molar / midline
• Phase 2 with maxillary expansion and fixed appliances

Post Driftodontics
Missing Lower Second Premolars
Class 2 crowded
• What would you do if the absent tooth were present?
• Can the malocclusion be satisfactorily treated with extractions or not?
• What is the longevity of the deciduous second molar?

**Treatment Plan**

• full treatment
• skeletal camouflage (Class II)
• extraction of upper first permanent first premolars and lower second premolars
Extract lower E / Drift

Post Lower E Extraction and Drift
• midline correction due to extraction timing

• Mesial drift of lower 6 with Minimal incisor retraction
- Mesial drift improves Class 2 molar
• Tipping at lower extraction sites

Phase 2-extract upper 4-critical anchorage
• Mesial drift improves Class 2 molar
• Upper molar held in position
10 years
Dental Changes Following Serial Extraction of Mandibular Second Premolars

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MSc Craniofacial Sciences/Diploma in Orthodontics

Methodology

• Two principal measurement methods:
  – 1) Change in tooth angulation using lateral cephalometric radiographs

Yoshihara 2000
Results – Dental Tipping

- $T_0 = \text{white}$
- $T_1 = \text{blue}$
- $T_2 = \text{red}$

+ change indicates distal tipping of teeth
- change indicates mesial tipping of teeth

**Group 1: Early extraction of lower 5’s**

<table>
<thead>
<tr>
<th>Palatal Plane</th>
<th>$T_0 \rightarrow T_1$</th>
<th>$T_1 \rightarrow T_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mandibular</td>
<td>-6.0°</td>
<td>+10.1°</td>
</tr>
<tr>
<td>First Molar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mandibular</td>
<td>+13.5°</td>
<td>-13.8°</td>
</tr>
<tr>
<td>First Premolar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mandibular</td>
<td>+7.3°</td>
<td>-8.3°</td>
</tr>
<tr>
<td>Canine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mandibular</td>
<td>+1.2°</td>
<td>-3.0°</td>
</tr>
<tr>
<td>Central Incisor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology

- Two principal measurement methods:
  - 2) Changes in occlusal curves
    - Digitize plaster models
    - Placement of points on digitized models
    - Analysis via spheres

Curve of Spee | Curve of Wilson | Monson’s Sphere
Results – Occlusal Curves

Curve of Spee from T0-T1-T2

- Group 1: Early ext 5’s
- Group 2: Early ext E’s
- Group 3: Late ext 5’s
- Group 4: Control

Curve of Wilson from T0-T1-T2

- Group 1: Early ext 5’s
- Group 2: Early ext E’s
- Group 3: Late ext 5’s
- Group 4: Control
**Results – Occlusal Curves**

![Graph showing Monson's sphere from T0-T1-T2]

Group 1: Early ext 5's
Group 2: Early ext E's
Group 3: Late ext 5's
Group 4: Control

**Treatment Options**

- Leave primary molars ± build up ± disk
- Extract – hold space – restore
- Extract – close space
- **Extract early – drift – close**
- Transplant
- Decoronation
- TADS to protract molars
Missing all second premolars
Class 1 minimal crowding

Extract all second primary molars / driftodontics

• What would you do if the absent tooth were present?
• Can the malocclusion be satisfactorily treated with extractions or not?
• What is the longevity of the deciduous second molar?
Post E Extraction

5 years of Drift

Before

After
• Mesial drift of 6 with
  Minimal incisor retraction

Final
Early extraction results in mesial drift of posterior teeth.
Spontaneous Space Closure after Extraction

- 11 patients mean age 11.8 years
- Class I non crowded with missing second premolars
- models before, 1, 2 and 4 years
- cephalograms before, 2 and 4 years

Spontaneous Space Closure after Extraction

- 55% Mx space closed in 1st year
- 46% Mn space closed in 1st year
- at year 4 - 89% of Mx space closed : 0.9 mm left
- at year 4 - 80% of Mn space closed : 2.0 mm left


Spontaneous Space Closure after Extraction

- Mx premolar tipped 7° by year 4
- Mx molar tipped 4.5° by year 4
- Mn premolar tipped 9° by year 4
- Mn molar tipped 5.7° by year 4
- most tipping occurred in 1st year

Spontaneous Space Closure after Extraction

- minimal incisor movement
- Mx incisor retroclined 3.5°
- Mn incisor retroclined 3.0°
- Mn incisors 0.9 mm posterior to A-Pg line
- unilateral case showed midline shift


Treatment Options

- Leave primary molars + build up + disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- Decoronation
- TADS to protract molars
Premolar to Premolar Transplant
Class II Camouflage Tx / Missing Premolar

Initial
Final

- static occlusion
- working occlusion
- non working occlusion
Donor tooth

Immediate post transplant

During orthodontics

Final
Treatment Options

- Leave primary molars + build up + disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- **Decoronation**
- TADS to protract molars
Decoronation

- Preserve vertical bone
- Preserve buccal lingual bone
- Must be done before growth spurt
- No research available yet on primary molars

Treatment Options

- Leave primary molars + build up + disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- Decoronation
- TADS to protract molars
Initial - Extract Upper 4 Lower E

Buccal and Lingual sliding mechanics for lower space closure

Progress
Indirect anchorage
Lace 3 and 4 to TAD

Buccal and Lingual
sliding mechanics
for lower arch
space closure

Final
Missing Premolars:
What are the Options?

- Longevity of primary molar
- Leave primary molars ± build up ± disk
- Extract – hold space – restore
- Extract – close space
- Extract early – drift – close
- Transplant
- Decoronation
- TADS to protract molars

Thank You