Point-Counterpoint: The Case for Nonsurgical Expansion

CORRECTION OF TRANSVERSE MAXILLARY DEFICIENCY IN THE ADULT

Can The Adult Palate Be Expanded Without Surgery?

Pessimistic View of Non-surgical Adult Palate Expansion

- Child RME see interincisal diastema
- Fusion and rigidity of sutures of the face in late teens
- Success of SA-RME
- Pain and swelling with non-surgical expansion

Potential Complications

- Pain and tissue swelling
- Posterior teeth tip
- Mandibular rotation
- Gingival recession

Handelman, C.S.

- Non-surgical rapid maxillary alveolar expansion in adults: a clinical evaluation
  Angle Orthod. 1997; 67:291-308

- Non-surgical rapid maxillary expansion in adults: report on 47 cases using the Haas expander.
  Angle Orthod. 2000; Vol. 70, No. 2
Adult-RME Protocol

- Haas expander
- First day turn 1 or 2 turns
- Succeeding days turn no faster than every other day
  - Patients 30 and older turn every 3rd to 5th day
- Expand until maxillary molars about to go into buccal cross-bite
- Stabilize for a minimum of 3 months
- Upon removal place acrylic palatal retainer

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Bilateral Crossbite

NB ♀ PRETREATMENT 30y 0m

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Rule of Thumb

Maxillary Arch Widths
4-4  27mm
6-6  34mm

Mandibular Arch Widths
4-4  25mm
6-6  32mm

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Adult Trans-arch Widths in Patient’s Without Maxillary Constriction

<table>
<thead>
<tr>
<th>Tooth</th>
<th>A-C 1 N=52</th>
<th>A-C 2 N=30</th>
<th>Non-crowded 3 N=30</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-6</td>
<td>34.3 ± 2.8</td>
<td>36.7 ± 3.1</td>
<td>36.2 ± 1.9</td>
</tr>
<tr>
<td>4-4</td>
<td>26.8 ± 2.3</td>
<td>27.9 ± 2.1</td>
<td>27.7 ± 1.7</td>
</tr>
</tbody>
</table>

1. Handelman, Haas. - Maxillary expansion.
2. Balakrishnan, Handelman. - Maxillary and mandibular expansion.
3. Howe, McNamara, O'Connor. - Non-crowded.

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Bilateral Crossbite

Maxillary Transarch Width

<table>
<thead>
<tr>
<th>Time</th>
<th>Age</th>
<th>Pre Rx</th>
<th>Post Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>30y</td>
<td>17.5</td>
<td>9.1</td>
</tr>
<tr>
<td>T-2</td>
<td>31y, 5m</td>
<td>26.6</td>
<td>-0.1</td>
</tr>
<tr>
<td>T-3</td>
<td>41y, 5m</td>
<td>26.5</td>
<td></td>
</tr>
</tbody>
</table>
Bilateral Crossbite
Maxillary Transarch Width

<table>
<thead>
<tr>
<th>Time</th>
<th>Age</th>
<th>Width</th>
<th>∆</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>30y, 0m</td>
<td>28.4</td>
<td>7.5</td>
</tr>
<tr>
<td>T-2</td>
<td>31y, 5m</td>
<td>35.9</td>
<td>-0.9</td>
</tr>
<tr>
<td>T-3</td>
<td>41y, 5m</td>
<td>35.0</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

NB POST-TREATMENT 31y 5m

Handelman CS, Wang L, BeGole EA, Haas AJ

Non-surgical rapid maxillary expansion in adults: report on 47 cases using the Haas expander.
Angle Orthod. 2000; Vol. 70, No. 2

- **Study Groups**
  - C-RME: Child RME
  - A-RME: Adult-RME, Edgewise Rx
  - A-C: Adults not requiring expansion, Edgewise Rx
Sex, Age, and Treatment Time of the Groups

<table>
<thead>
<tr>
<th>Gender</th>
<th>C-RME N=47</th>
<th>A-RME N=47</th>
<th>A-C N=52</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂</td>
<td>18</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>♀</td>
<td>29</td>
<td>28</td>
<td>31</td>
</tr>
<tr>
<td>Age, Mean ± SD</td>
<td>9.5 ± 1.3</td>
<td>18.8 ± 49.3</td>
<td>20.8 ± 46.3</td>
</tr>
<tr>
<td>Range</td>
<td>7.2 - 12.8</td>
<td>20.0 - 0.8</td>
<td>21.1 - 0.7</td>
</tr>
</tbody>
</table>

Maxillary Trans-Arch Widths Pre-Treatment

<table>
<thead>
<tr>
<th>Tooth</th>
<th>C-RME N=47</th>
<th>A-RME N=46</th>
<th>A-C N=52</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-6</td>
<td>30.6 ± 2.9</td>
<td>31.4 ± 4.3</td>
<td>34.3 ± 2.8*</td>
</tr>
<tr>
<td>E-5</td>
<td>26.6 ± 3.3</td>
<td>27.3 ± 3.9</td>
<td>30.8 ± 3.1*</td>
</tr>
<tr>
<td>D-4</td>
<td>23.6 ± 2.8</td>
<td>23.2 ± 2.9</td>
<td>26.8 ± 2.3*</td>
</tr>
<tr>
<td>C-3</td>
<td>22.4 ± 2.6</td>
<td>21.9 ± 2.2</td>
<td>24.0 ± 2.2*</td>
</tr>
</tbody>
</table>

* Significant difference from A-RME at 0.05 level.

Maxillary Trans-Arch Widths (mm) T1-T2 Difference

<table>
<thead>
<tr>
<th>Tooth</th>
<th>C-RME N=47</th>
<th>A-RME N=46</th>
<th>A-C N=52</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-6</td>
<td>5.7 ± 2.4</td>
<td>4.6 ± 2.8</td>
<td>-0.2 ± 1.1*</td>
</tr>
<tr>
<td>E-5</td>
<td>5.7 ± 2.5</td>
<td>5.5 ± 2.4</td>
<td>-0.6 ± 1.5*</td>
</tr>
<tr>
<td>D-4</td>
<td>4.9 ± 2.7</td>
<td>4.7 ± 1.8</td>
<td>0.0 ± 1.2*</td>
</tr>
<tr>
<td>C-3</td>
<td>4.2 ± 2.8</td>
<td>2.8 ± 1.8</td>
<td>0.0 ± 1.3*</td>
</tr>
</tbody>
</table>

* Significant difference from A-RME at 0.05 level.

Potential Complications

- Pain and Tissue Swelling
- Posterior Teeth Tip
- Mandibular Rotation
- Gingival Recession

Pain and Tissue Swelling

- 9 / 47 A-RME subjects when turned 1x / day
- Following turn back and slower expansion schedule, all completed treatment
To Avoid Pain and Tissue Swelling

- Turn Haas expander in older patients, once every 3rd to 5th day
- In late teens and early 20's, turn once every other day
- Properly fitting
- Relief on distal
- Relief on gingival

Molar Angulation Measurement

Molar and Palatal Angle in Non-Surgical Adult RME

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Pre-Tx (T1)</th>
<th>Post-Tx (T2)</th>
<th>T1-T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molar Angle</td>
<td>46</td>
<td>164.5 ± 9.8</td>
<td>158.3 ± 11.3</td>
<td>-6.2 ± 11.5*</td>
</tr>
<tr>
<td>Palatal Angle</td>
<td>46</td>
<td>52.8 ± 11.5</td>
<td>60.7 ± 11.2</td>
<td>7.9 ± 7.8*</td>
</tr>
</tbody>
</table>

* Significant at 0.05 level.

Posterior teeth will tip

- 3 degrees per side
- Occlusion was established
- Over-expansion important
- Similar to palatal tip

Mandibular Plane and Lower Facial Height in Adult RME Group

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Pre-Tx (T1)</th>
<th>Post-Tx (T2)</th>
<th>T1-T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN-GoGn°</td>
<td>35</td>
<td>37.3 ± 8.2</td>
<td>37.3 ± 7.9</td>
<td>0.0 ± 1.9</td>
</tr>
<tr>
<td>ANS-Menton (mm)</td>
<td>35</td>
<td>75.4 ± 6.7</td>
<td>75.7 ± 6.5</td>
<td>0.3 ± 1.7</td>
</tr>
</tbody>
</table>

NS, not significant at 0.05 level.

- The Mandible Will Rotate?
  - Mandible was stable
  - Stable in hyperdivergent subjects
  - No need for occlusal coverage expanders

Palatal Depth

<table>
<thead>
<tr>
<th>T1-T2 Difference</th>
<th>C-RME</th>
<th>A-RME</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gingival Height</td>
<td>1.1 ± 1.7</td>
<td>0.0 ± 1.2</td>
<td>-0.1 ± 0.6</td>
</tr>
<tr>
<td>Molar Cusp</td>
<td>1.5 ± 1.2</td>
<td>0.0 ± 1.2</td>
<td>0.0 ± 0.7</td>
</tr>
</tbody>
</table>
Crown Height and Gingival Recession(?)

Buccal Gingival Height Loss (mm); Females T1-T2 Difference

<table>
<thead>
<tr>
<th>Tooth</th>
<th>N (F + L)</th>
<th>Maxilla T2-T3</th>
<th>N</th>
<th>Mandible T2-T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Molar</td>
<td>39</td>
<td>0.6 ± 0.8</td>
<td>34</td>
<td>0.4 ± 0.6</td>
</tr>
<tr>
<td>2nd Premolar</td>
<td>39</td>
<td>0.6 ± 0.7</td>
<td>35</td>
<td>0.5 ± 0.7</td>
</tr>
<tr>
<td>1st Premolar</td>
<td>30</td>
<td>0.5 ± 0.6</td>
<td>29</td>
<td>0.4 ± 0.9</td>
</tr>
</tbody>
</table>

*Significant difference at 0.05 level.

Gingival Height Loss

- Not significant in males
- Modest recession in females
- Gingival height loss since root rarely exposed
- Future recession not accelerated
- Advance recession infrequent

Serino G, Wennstrom JL, Lindhe J, Eneroth L
The prevalence and distribution of gingival recession in subjects with a high standard of oral hygiene

Problems with CBCT Studies of Buccal Bone

- Studies of Hyrax expanders do not apply
- Inaccurate estimates of buccal bone width due to thinness of buccal bone relative to voxel size
- Thinner bone appears thinner; thicker bone appears thicker
- Buccal bone has same density as cementum making distinction difficult
- Buccal bone is still not fully mineralized immediately after expansion
- Distortion from metal artifacts (expanders or restorations)
High Alveolar Expansion

The posterior teeth were expansion with the palatal alveolar housing rather than through a static osseous structure.

Periodontal Membrane

Periosteal Membrane

Beyond the Ligament: A Whole-Bone Periodontal View of Dentofacial Orthopedics and Falsification of Universal Alveolar Immutability

- Williams, MO and Murphy, NC
Semin Orthod 2008; 14:246-259

- “Histological appearance of biopsy specimens demonstrate a “reactive” woven bone pattern, dramatically illustrated under polarized light…”
- “…forces applied to the palatal alveolus might stimulate “compensatory periosteal apposition” on the labial alveolus, thus developing a new alveolar phenotype through bony developmental “drift.”

“Changes Concurrent with Orthodontic Treatment When Maxillary Expansion is a Primary Goal”
- Ladner, PT and Muhl, ZF
AJODO August 1995 p 184-193

Surgically Assisted RME

Indications

- Unusually large expansions (>10 mm)
- Significant pre-treatment gingival recession
- Prominent roots on buccal surfaces
- Buccal inclination of posterior teeth
- Many class III patients
- Sleep apnea treatment
Surgically Assisted RME

- Cost
- Patient reluctance
- Morbidity 100% (pain, facial swelling, work loss, sinus infection)
- Unsightly midline diastema
- Osseous defects, gingival recession, external root resorption at midline (Cureton and Cuenin, AJODO 1999; 116: 46-59)

D.A., ♂

Surgical Expansion

Pre-Rx  32y 5m

Post Expansion 33y 1m

Unilateral Maxillary Expansion


3/95
12/95
11/95
4/99

LBJ Surgically Assisted RME 30y

Surgically Assisted RME-
unfavorable split

RE ♂ SURGICALLY ASSISTED RME 37y

LBJ ♂ SURGICALLY ASSISTED RME 30y

7/5/94
12/12/95
7/9/99
Choices in Clinical Procedures

- Evidence Based
- Least Invasive
- Least Costly
- Least Iatrogenic
- Most Efficient
- Informed Consent
CONCURRENT MAXILLARY AND MANDIBULAR EXPANSION
FOR THE TREATMENT OF
BIDENTAL ARCH CONSTRUCTION

DIAGNOSTIC MEASUREMENTS FOR TRANSARCH CONstriction

Maxillary rule

4-4  27mm  
6-6  34mm

Mandibular rule

4-4  25mm  
6-6  32mm

Measurements below the rule indicate arch constriction and are candidates for expansion
MAXILLA

Fabrication of Modified Haas Expander for maxillary transverse deficiency

First molar and first premolar bands are fitted and transferred to the working model. The acrylic bodies of the Haas expander must be about 3-4mm away from the palatal gingiva of the posterior teeth with the underside smooth and rounded and relieved at all sides. They must not extend into the 2nd molar region. Wire extensions posteriorly to the second molars or anteriorly to the cuspids are an option.

Activation of the Modified Haas Expander

Activation depends on the age of the patient and the tendency for gingival recession. For patients up to the mid 20’s, activate the screw once initially and then every other day. For patients over 30, activate every third to fifth day. Patients with a tendency for gingival recession activate the expander every fifth to seventh day. Continue expansion until the palatal cusps of the maxillary molars or premolars are slightly in occlusion with the buccal surfaces of the mandibular teeth.

Retention following expansion

After expansion, maintain the appliance for a minimum of 3 months. However, bonded appliances can be placed as soon as expansion is completed, as the expander provides excellent anchorage. On the day the expander is removed, deliver an acrylic palatal retainer. In adults, the tooth undercuts are usually sufficient to stabilize the retainer without the need for clasps. The retainer can be trimmed when rectangular arch wires are placed for palatal crown torque to minimize buccal tipping of the crown that may have occurred.

* Fabricated by Summit Laboratory; [www.summitortho.com](http://www.summitortho.com)