Contemporary Multiloop Edgewise Archwire (MEAW) Technique: Old-fashioned but useful

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Introduction
1) Young Ho Kim & MEAW (Open bite, Class II, Class III, Finishing)
2) Mechanics & Wire bending

Diagnosis and indications
1) Differential diagnosis
2) MEAW or Mini implant

Successful Cases
1) 77/77, 77/88, 88/88

Unsuccessful Cases
1) DJD

Retention and stability
1) Four major etiologic factors – Mouth breathing, Tongue trusting, TMD, Weak muscle

MEAW technique

E-handouts of Open bite lectures are available at
1) 2013 A Combination of Mini-Implant and MEAW to Correct a Skeletal Class II Open Bite https://www.aaoinfo.org/node/625
2) 2014 Open bite treated by intruding posterior teeth; Methods, outcomes, stability and guidelines https://www.aaoinfo.org/node/7382
3) 2015 Orthodontic Treatment of Skeletal Class II Open Bite; 1) Closing the open bite and 2) Solving the A-P discrepancy https://www.aaoinfo.org/node/4792
4) 2016 Ankylosis of Anterior Teeth https://www.aaoinfo.org/meeting-archive/2016-annual-session#topbar
5) 2017 Second molar extraction for open bite treatment https://annual-session.aaoinfo.org/meetings/2018-annual-session/
6) 2018 Molar intrusion with skeletal anchorage, from single tooth intrusion to canting correction and skeletal open bite https://annual-session.aaoinfo.org/meetings/2018-annual-session/
Multiloop Edgewise Arch Wire (MEAW)

- 018x022 stainless steel

MEAWs are made of 018x022 ss wire.

Class II correction
- U: MEAW
- L: Ideal arch wire

Class III correction
- U: Ideal arch wire
- L: MEAW

Closing anterior open bite
- U: MEAW
- L: MEAW

MEAWs can be used to correct Class II relation, Class III relation and open bite. To close the anterior open bite, MEAWs are used both in upper and lower arches.

To correct Class II relationship, MEAW is applied in the maxillary arch and Ideal arch(019x025ss) is used in the mandibular arch. Class II 5/16" 6oz elastics are applied.

To correct Class III relationship, MEAW is applied in the mandibular arch and Ideal arch(019x025ss) is used in the maxillary arch. Class III 5/16" 6oz elastics are applied.

To close the anterior open bite, MEAWs are used both in maxillary and mandibular arches. 3/16" 6oz elastics are applied from the first upper loop to the first lower loop.
To make MEAWs, 4 to 5 L-shaped loops are made between teeth.

An 043 CK plier is used to make a MEAW.

Tips have three cylindrical sections; front cylinder being of .045" diameter, middle cylinder being of .060" diameter and the rear cylinder being of .075" diameter.

Cutter can be used for both round and rectangular wire up to .025" saving time and motion.

Arch turret without torque
Between #2 and #3, the first L loop is made.
Sequentially, upper L loops are made.

Upper MEAW shows L loops in perpendicular to the arch. The arch doesn't have torques.
To avoid gingival impingement or cheek mucosa irritation, L loops have a buccal tipping. The angle increases progressively distally.

The arch is made flat.

- Upper
  - The upper MEAW

- Lower
  - The lower MEAW

Average size of L loops

The final upper and lower MEAWs were made.
Upper and lower MEAWs shows a good coordination.

Tip back bends are applied to each loops. How many degrees do you bend?
Tip back bends are applied to each loops. 3° to 5°. Finally, the upper arch has a compensating curve and the lower arch has a reverse curve of Spee.

“Rocking Chair”
1. Extrusion of anterior teeth is the main effect.
2. Very slight intrusion of posterior teeth is also secondary effect, “Rocking chair effect”.
3. Distal tipping contributes to the correction of molar relationship.

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2. Very slight intrusion of posterior teeth is also secondary effect, "rocking chair effect".
3. Distal tipping contributes to the correction of molar relationship. This effect is increased by Class II elastics (in Class III, by Class III elastics).
4. Distal tipping or intrusion of a molar can be controlled very accurately and effectively with a stiff stainless wire. And also the load-deflection rate is decreased well with the L loops.

Reasons why I use MEAWs instead of curved TMA or NiTi wires?

1. If the handle is made of a flexible material, it would not be easy to control well (tip-back and intrusion) and
2. it would be hard to adjust the wires (vertical or in-and-out steps) for compensating the minute errors of bracket positioning.

Regional Load Deflection Rate of MEAW

<table>
<thead>
<tr>
<th>Region (Post-Nr)</th>
<th>L Loop</th>
<th>N/T</th>
<th>TMA</th>
<th>Steel</th>
<th>Brass</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>1.09</td>
<td>0.21</td>
<td>0.38</td>
<td>1.00</td>
<td></td>
<td>1.56</td>
</tr>
<tr>
<td>3-5</td>
<td>1.08</td>
<td>0.94</td>
<td>1.04</td>
<td>2.77</td>
<td></td>
<td>1.06</td>
</tr>
<tr>
<td>6-7</td>
<td>1.08</td>
<td>2.10</td>
<td>3.06</td>
<td>3.89</td>
<td></td>
<td>2.33</td>
</tr>
<tr>
<td>8-10</td>
<td>1.08</td>
<td>1.95</td>
<td>2.12</td>
<td>2.87</td>
<td></td>
<td>1.85</td>
</tr>
<tr>
<td>Average</td>
<td>1.08</td>
<td>1.74</td>
<td>2.14</td>
<td>2.74</td>
<td></td>
<td>1.85</td>
</tr>
</tbody>
</table>


Indications

The first factor was 'The initial amount of Incisal Display'. Compare the height of incisal edge with the level of stomion.

In the left case, the extrusion of the upper incisor is desirable. However, the right case allows a minimal extrusion of the upper incisor.

What factors were considered to select the mechanics?

The left case was treated with the MEAW technique, extrusive mechanics. However, the right case was treated with the mini-implant mechanics, intrusive mechanics.

What factors were considered to select the mechanics?

MEAW case
Incorporation

Mini-implant case
Molar intrusion

What factors were considered to select the mechanics?
The second factor was the 'Lip Incompetency'. The right case presented of lip incompetency. However, the left case did not feel hard to close his lip (No ‘strains’ around lips).

The third factor was the ‘Skeletal Class II pattern’. Both cases showed a very similar skeletal-dentoalveolar pattern. However, the right case showed a little severer Class II pattern.

Considering three factors, in the left case, the extrusion of incisors was proper. However, the right case needed the intrusion of upper posterior teeth and the autorotation of mandible.

ANBs were 5.3 and 6.1. APDIs were 84.5 and 78.1.


Please, compare real treatment results. We can select the adequate techniques differentially, considering three factors.
Graphically, the treatment procedures will be demonstrated. First, the left case treated with the extrusive mechanics, MEAW, will be shown. After leveling and decrowding, upper second and lower third molars were extracted. Second, MEAWs were applied to close the open bite by extruding the incisors.

Graphically, the right case treated with the mini-implant mechanics will be shown. He was treated with ‘intrusion’. During leveling, upper incisors were extruded a little, and some portion of the open bite was resolved.

After leveling, a mini-implant was placed in the mid-palatal area. Next, upper molars were intruded in ‘en masse’ mode, and the open bite was closed by autorotation of mandible.
In summary,

**What factors are considered to select the mechanics?**

1. Incisal display
2. Lip incompetency
3. Skeletal pattern

**Successful Case**

<table>
<thead>
<tr>
<th>Date</th>
<th>Female</th>
<th>Other Info</th>
<th>Before Orthodontic Treatment</th>
<th>After Orthodontic Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004.3.27</td>
<td></td>
<td></td>
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</table>
Unsuccessful Case

DJD with CO-CR discrepancy
Unstable condylar position

DJD and Class II elastic bands
As the door isn’t closed well, it is hard to make a good occlusion in TMD patients, esp. with CO-CR discrepancy.

Some patients show the forward mandibular shift by Class II elastic bands, instead of movements of teeth.

When it is useless to use Class II elastic bands, total retraction of maxillary teeth by using skeletal anchorage may be considered.

Report on the literature
MEAW technique


Diagnosis – ODI, APDI, Combination factor, Extraction index

https://doi.org/10.1016/0002-9416(82)90255-3

Skeletodental changes with MEAW


Stability

- Young H Him, Unae Kim Han, Diana D Lim, Ma Laarni P Serrano, Stability of anterior openbite correction with multiloop edgewise archwire therapy, A cephalometric follow-up study, Am J Orthod Dentofacial Orthop 2000;118:43-54

Case reports

https://doi.org/10.2319/042817-287.1


Case reports
Research


Retention and stability

Strategies for retention in open bite cases
1. After correction of open bite, at the detailing stage, distally tipped molars were corrected.

2. During the detailing stage, 018x 022"ws with shoe hooks were used with up & down elastics. Elastic-wearing time was decreased gradually from 24 hours to 0 hour, monitoring the overbite & any bad habits.

Conceptually, the detailing stage was regarded as a retention period and it was extended as long as possible.

3. Patients were educated during active treatment and/or post-treatment period to masticate more than thirty times for each spoon of food, if TMJs had no discomfort.

Strategies for retention

Start of detailing
Debonding

Initial
3-year post-treatment
Strategies for retention in open bite cases

4. At the stage of debonding, it is recommended that the occlusal contact areas be as wide as possible. This may provide more stable mandibular position and maximum bite force.

5. Mouth breathing, tongue posture & habits are monitored every year after debonding. Frequent rhinitis and mouth breathing may make the tongue posture lower and protruded. It may be a relapse factor.

Fixed retainer + Labial buttons + U/D elastics

How to retain the result after debonding?
1. Monitor the causes: TMJ pains, tongue thrust & mouth breathing.
2. Use Fixed retainers (4-4).
3. When a relapse tendency found, apply labial buttons (22/33) with u/d elastics 3/16” 6 oz.
4. Instruct patients to chew many times during eating meals (to increase muscle tonicity).
5. Train swallowing without thrusting tongue.

How to make labial button?
1) Etching
2) Wash and dry
3) Primer application
4) Curing
5) Place a Separator ring on cervical area
6) Inject Flowable resin in the ring.

7) Curing
8) Remove a Separator

9) Polish and check the undercut.

Fixed retainer(4-to-4)
3M Unitek 0.8mm twisted wire, REF 260-032

2014.1.15
1 year after debonding

3M Unitek twisted wire 0.8mm REF 260-032
Strategies for retention in open bite treatment with MEAW are as follows;

1) After correction of an open bite, at the detailing stage, upright the distally tipped molars.
2) Check the etiologic factors.
   - mouth breathing
   - tongue thrusting
   - weak masticatory muscle force
   - tongue thrusting, and
   - TMD.

In Summary

• MEAW technique can be used after leveling to correct Class II, Class III, and open bite malocclusion efficiently. The occlusal plane also can be changed. Third molars (or second molars) are extracted to remove the wedge or the posterior crowding.
• MEAW's indication, successful cases, unsuccessful cases, pieces of literature, retention, and stability were presented.
• If wire bending ability is equipped, it will be one of the powerful and useful tools for open bite treatment.