Space age pedodontics:
The use of the utility archwire appliance

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The utility archwire appliance is a fixed appliance with great versatility for treating to a state of normalcy in the developing dentition. The dental practitioner should be able to understand early arch alignment by getting the proper overbite, overjet, molar relationship, jaw relationship, lip seal and serial guidance. With these procedures, the dentition is placed compatible with the face. It eliminates most headgear, elastics and functionals for Class II corrections, and reduces the extraction of bicuspids and molars.

Introduction

One of the most important objectives of pedodontic practice is the guidance of the dentition of the child to a state of normalcy for that particular stage of oral growth and development. This requires the practitioner to supervise the development and exchange of the dentitions, recognize deviations from normal growth patterns, recognize interferences with the normal unfolding of the dentition and determine, when and how the interferences should be removed.

In the framework of this objective, the trained pedodontist has traditionally used a combination of several therapeutic appliances taught in the pedodontic specialty program, i.e. space maintainers, habit appliances, the lingual arch, maxillary hawley, functionals and headgear therapy, to name a few. Clinically this has been a frustrating experience for these procedures have resulted in questionable quality and sufficiency of treatment with an obvious lack of total orthodontic control.

The premise presented is that the use of the utility archwire appliance (UAA, Figs. 1a, 1b) will give the clinician the freedom of total orthodontic control to accomplish important early treatment objectives. It is termed utility arch because it performs a number of roles and functions, due to the uniqueness of its basic design and the many modifications that it will allow it to achieve the following treatment objectives:

1. proper overbite,
2. proper overjet,
3. proper molar relationship,
4. proper jaw relationship and
5. proper lip seal.

The main focus of these early treatment objectives is to correct clinical problems of the following nature: habits, airway, orthodontic, orthopedic and functional. The correction of these problems early in the growth and developmental process will create a better environment for arch development and allow nature to fulfill the unique genetic potential of each child that the clinician has under care.

The utility archwire appliance

The utility archwire appliance (UAA), as used in the Brehm Straight Wire System, consists of banding the molars, bracketing the incisors, and bending the straight wire arch form into the utility arch shape to bypass the posterior primary teeth of the maxillary or mandibular arch, Figs. 1a and 1b.
PASSIVE MAXILLARY UTILITY ARCH

Fig. 1b The maxillary utility arch is an inverted form of the mandibular utility arch.

Basic utility archwire appliance fabrication

Step 1. Take 0.016 round wire or 0.016 x 0.016 Straight Wire arch form and make a helical loop with a Jarabak plier (Fig. 2) at the distal end of both sides of the archwire. This prevents irritation to the patient when placing the archwire into the mouth during fabrication.

**STEP 1**

MAKE HELICAL END OF PREFORMED ARCHWIRE

Fig. 2 The Jarabak plier is seen in this figure.

Step 2. Place wire into incisor brackets. Take Brehm utility plier (Fig. 3) and place it distal to lateral bracket if no crowding exists. If there is crowding, measure width of lower incisors, then add 3 mm width on each side of this measurement for proper positioning of the plier and enough space for alignment of the teeth. Make sure midline of wire coincides with midline of incisors and remove the wire with the plier in its position distal to lateral bracket.

**STEP 2**

Place Wire Into Anterior Brackets
Check Midline
Place Plier Distal to Lateral Bracket

Fig. 3 This figure shows the Brehm utility plier.
Step 3. Remove the wire from the mouth with the plier holding distal to the lateral bracket. Bend the wire distal gingivally.

**STEP 3**

![Diagram](image1)

**MAKE 90° GINGIVAL BEND DISTAL TO PLIER**

Step 4. Flair the wire buccally 25 degrees. This will prevent soft tissue irritation in that area of the mouth.

**STEP 4**

![Diagram](image2)

**FLAIR BUCCALLY 25° CHECK WITH PLIER**

Step 5. Reposition the plier on the anterior vertical step and place a 90 degree bend to the distal. Then step 2 through 5 should be repeated on the opposite side of the archwire.

**STEP 5**

![Diagram](image3)

**REPOSITION PLIER 90° BEND TO THE DISTAL STEPS 2-5 SHOULD BE REPEATED ON THE OPPOSITE SIDE**

Step 6. Place the wire again into the anterior brackets. Position the Brehm utility plier mesial to the lower right buccal tube. Hold tightly and bend the wire distal to the plier. Cut off the helical wire.

**STEP 6**

![Diagram](image4)

**PLACE WIRE INTO ANTERIOR BRACKETS CHECK MIDLINE PLACE PLIER MESIAL TO RIGHT BUCCAL TUBE MAKE BEND DISTAL TO PLIER**

Step 7. Place protective tubing over the buccal bridge section to prevent sores during the adjustment period.

**STEP 7**

![Diagram](image5)

**PLACE PROTECTIVE TUBING BEFORE FINAL 90° BEND**

Step 8. Position the tubing forward so that the plier will be on the wire for a final 90 degree vertical bend.

**STEP 8**

![Diagram](image6)

**PLACE TUBING FORWARD SO PLIER WILL BE ON WIRE FOR FINAL 90° VERTICAL BEND**

Step 9. Bend the distal of the wire 25 degrees to the lingual to prevent gingival irritation in the area of the posterior vertical step.

**STEP 9**

![Diagram](image7)

**BEND DISTAL OF WIRE 25° TO LINGUAL**

Step 10. Make the final horizontal 90 degree distal bend on the posterior vertical step. The posterior vertical step of wire should be flush to the mesial of the molar bracket when placed.

**STEP 10**

![Diagram](image8)

**MAKE FINAL 90° DISTAL BEND**
**Step 11.** Complete the same procedure on the opposite side of the archwire.

**Step 12.** Check the placement of the utility archwire appliance. Note the proper 3 mm clearance distal to the right and left lateral brackets in the area of the anterior steps. Also, the posterior right and left vertical steps should be flush to the mesial of the molar bracket. Examine the wire for normal symmetrical arch form, which should be the same as the original preformed archwire.

The above procedures should be duplicated in a gingival direction for the formation of the maxillary utility archwire appliance.

**TUBING PLACED ON INITIAL UTILITY WIRES**

(.016 or .016 x .016)

**Materials and methods**

The following instruments and materials, and how to use them are presented in tabular form so that the clinician can use the information easier.

**INSTRUMENT**

1. Brehm utility plier
2. Jarabak plier
3. Occulist plier
4. Distal-end cutter
5. Brehm angulated preformed arch locking plier
6. Crimpable hook plier
7. Weingardt plier
8. Ligature director
9. Mathieu needle holder
10. Mosquito forceps
11. Gram gauge
12. Schure band sealer

**USE**

- **Forming uniform UAA, toe-in bend - distal rotation, arch wire advancement torque adjustment**
- **Forming helical loop tip back bend - intrude, extrude, retract**
- **Incisal torque adjustment**
- **Intra-oral wire cutting**
- **Lock in preformed utility arch to its designated length**
- **Crimp post for Class II or III elastics**
- **Placement and removal UAA**
- **Aids in deflecting archwire into bracket**
- **Ligature wire placement and ligation**
- **Hand-ee-last, rotating wedge placement**
- **Force measurement**
- **Molar band placement, scaler tuck in ligature wires**

*Ortho Organizers, Inc., 1619 S. Rancho Santa Fe Road San Marcos, CA 92069*
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Straight arch appliance*</td>
<td>Tip-torque-in-out</td>
</tr>
<tr>
<td>2. 0.014 UAA</td>
<td>Very early mixed dentition, roots not completely formed, leveling-aligning-rotation correction of anterior cross-bites</td>
</tr>
<tr>
<td>3. 0.016 UAA</td>
<td>Beginning of treatment leveling-aligning-rotation advancement-retraction</td>
</tr>
<tr>
<td>4. 0.016 X 0.016 UAA</td>
<td>After anterior teeth aligned, distal rotation, expansion, tip back, torque control, space maintenance</td>
</tr>
<tr>
<td>5. Place tubing</td>
<td>Soft tissue protection, maintain space</td>
</tr>
<tr>
<td>6. Hand-ee-lasts</td>
<td>Ligation tie-backs, anterior retraction, placed on lingual buttons for tissue protection</td>
</tr>
<tr>
<td>7. 0.010 ligature wire</td>
<td>ligation</td>
</tr>
<tr>
<td>8. Power chain</td>
<td>Space closure, open bite cases to close bite, hid in rotation</td>
</tr>
<tr>
<td>9. Open coil spring</td>
<td>Space regainer, space retainer, shifting midlines, class II corrections, consideration of space expansion</td>
</tr>
<tr>
<td>10. Crimpable hooks</td>
<td>Class II/III elastics, tie backs retract anterior teeth with torque control</td>
</tr>
</tbody>
</table>

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Brehm adjustable utility archwire appliance

An adjustable preformed utility archwire with a 3 mm step down to fit all situations is seen in Fig. 4. Both legs maybe adjusted to desired length and then crimped intraorally. This appliance is available for both upper and lower arches.

BREHM ADJUSTABLE
UTILITY ARCH
Manipulation: Adjustable preformed utility archwire appliance

**Step 1.** Use the utility plier to hold the preformed archwire and slightly flair the bridge in a buccal direction.

**STEP 1**

![Flaring Buccal Bridge](image1)

**Step 2.** Adjust the buccal segment wire to the approximate size by pulling the anterior segment out of the tube of the performed arch.

**STEP 2**

![Lengthen Wire to Approximate Size](image2)

**Step 3.** Place the archwire into the anterior brackets and buccal tubes. Check the midline. The 3 mm step should lie toward the gingiva.

**STEP 3**

![Place into Anterior Brackets and Buccal Tubes](image3)

**Step 4.** If necessary, lengthen the archwire, by pulling the square outer tubes of the utility archwire distally. The posterior step should be flush with the mesial part of the buccal tube.

**STEP 4**

![Slide Wire Against Mesial of Buccal Tube](image4)

**Step 5.** Make any necessary utility archwire adjustments at this time. Cut off any excess archwire distal to the buccal tubes.

**STEP 5**

![Advance Anterior Bridge 1mm for Incisor Advancement if Needed](image5)

**Step 6.** Use the Brehm angulated crimping plier (Fig. 5) to crimp the mesial portion of the outer tube of the buccal so that the wire is locked into position.

**STEP 6**

![Intra Oral Utility Locking Plier](image6)
Basic uses of utility archwire appliance

Level, align and rotate:
Early developing problems of the leveling, aligning and rotational nature are very amenable to UAA treatment. The 0.014 UAA is used in very early mixed dentition, when roots are not completely formed and anterior crossbite is present. The 0.016 UAA is commonly used for leveling, aligning and rotating at the beginning of mixed dentition treatment, Fig. 6a. Most rotations can be completely corrected with this wire within a few months with the aid of rotational wedges, which are placed on the tie wing of the bracket closest to the archwire, Fig. 6b.

![Diagram](image)

**Fig. 6a** The 0.016 round wire is used to advance, level, align and rotate the teeth.

**Fig. 6b** This figure demonstrates the use of the rotating wedge.

Manipulation of the anterior incisal segment: Advancement, retraction and torque control:
The amount of incisor torque needed can vary from child to child depending on the predicted skeletal development and treatment mechanics. Treatment planning includes a prediction of post treatment skeletal relationship and desired incisor inclination. With the Straight Wire System, individual incisor brackets of various torque are available and depending upon the problem, maybe pre-programmed into treatment through bracket selection and wire adjustment, Fig. 7a,b,c.

**LABIAL CROWN TORQUE**

![Diagram](image)

**Fig. 7a** The shape of the wire for labial crown torque.

**LINGUAL CROWN TORQUE**

![Diagram](image)

**Fig. 7b** The shape of the wire for lingual crown torque.
If a change of angulation is desired in the movement of the incisors, then a round 0.016 UAA would be used. All other movements with torque control would be accomplished with a square 0.016 x 0.016 wire. By forming the UAA 1 mm anterior to the brackets and making monthly adjustments on the anterior and posterior vertical steps of the UAA, it is possible to get up to 4 mm of advancement with the use of the UAA, if indicated.

Depending on the arch length analysis and cephalometric correction, it is possible to open or close arch length by advancing or contracting incisors, Fig. 8 a,b,c,d.

**Fig. 8a** This figure shows the placement of the plier to advance the wire anteriorly.

**Fig. 8b** The wire is lengthened 1 to 2 mm per side.

**Fig. 8c** This figure shows the placement of the plier to advance the wire posteriorly.

**Fig. 8d** The wire has lengthened another 1 to 2 mm per side.

**SAME WIRE LENGTHENED ANOTHER 1 - 2mm**

Manipulation of the posterior molar area:
The most common early orthodontic problem is the developing Class II molar relationship. This is expressed clinically as a division 1 or 2 type of occlusion with usually a 1/2 class II mesio-lingual upper molar rotation in the early mixed dentition. It is usually seen with muscle imbalance.
Class II, division 1 correction

Activate the molar section of the upper utility archwire appliance (0.016 X 0.016) for distal rotation by placing a toe-in bend of 45 degrees to 65 degrees and expand the arch by flattening the anterior section of UAA giving it a 5 to 10 mm expansion buccally to mesial of the upper molar buccal tubes.

After inserting the activated UAA, cinch back the molar section. This activation will produce a distal rotation and expansion of the upper first molars, which aids in class II correction; plus the secondary effects of posterior bite opening and retraction, intrusion and lingual root torque of the incisors. It also enhances an orthopedic effect of the lower jaw advancement of 0 to 3 mm. The average advancement is usually 2 mm.

**CLASS II DIV. I**

**STEP 1**
- .016 ADVANCE
- LEVEL
- ALIGN
- ROTATE

**STEP 2**
- OVERCORRECT ANTERIOR INCISORS IF NEEDED .016 X .016

**STEP 3**
- WIRE ACTIVATED FOR DISTAL ROTATION AND EXPANSION

**STEP 4**
- DISTAL ROTATE AND EXPAND FOR CLASS II CORRECTION
- TIE BACKS

**STEP 5**
- OVER CORRECTION OF MOLARS

Class II, division 2 correction

In class II, division 2 cases, engage the molars and the two upper centrals only, to initially advance the teeth to a class II, division 1 position. This takes approximately 3 to 5 months. Then engage all four incisors into the wire and activate the UAA in the same manner as the class II, division 1 correction, except that the wire will be advanced 1 to 2 mm anterior to the upper incisor brackets at each visit.

**CLASS II DIV. II**

**STEP 1**
- ADVANCE CENTRALS ONLY
- ALIGN

**STEP 2**
- .016 X .016
- OVER CORRECT ANTERIOR INCISORS 2mm

**STEP 3**
- PREFORMED UTILITY WIRE .016 X .016
- AFTER ACTIVATION
Fig. 9
Summary of maxillary utility archwire appliance adjustments.

Fig. 10.
Summary of mandibular utility archwire appliance adjustments.

After distal rotation and expansion has been completed, remove the toe-in from the archwire. Make UAA passive to maintain arch length, or if bite opening is required, place a 45 degree tip-back bend in the wire, Fig. 11. This will open the bite by extruding the molars and intruding the incisors. It is usually done with 150 grams of force on the upper incisors. This type of mechanics will also distalize the upper molars. The archwire should have at least 5 mm expansion on each side when the tip-backs are present. If proper bracket placement is done, i.e. the brackets are more incisally, it is usually not necessary to place the tip-back in the upper arch wire. The use of the tip-back is more commonly used with the lower utility arch, Fig 12.

Fig. 11
A 45 degree tip-back is placed in the maxillary utility archwire appliance.
Fig. 12
Activation of the mandibular utility archwire appliance.

Fig. 13
The effect of tip-back on anterior tooth movement with the use of a round or square wire.

If indicated, the maxillary utility arch may be placed with hooks for class II elastics, Fig. 14. The posterior step should be 3 to 5 mm or more forward of the buccal tube to allow the distal movement of the maxillary anterior teeth. The posterior step of the lower utility arch should be away from the mesial of the lower buccal tube to allow the mesial movement of the molars as indicated. Frequently, this type of mechanics requires anchorage preparation of the lower arch, Fig. 15.

MAXILLARY UTILITIY ARCH

Fig. 14
The form of a maxillary utility archwire appliance when class II elastics to lower anchorage are used.

MANDIBULAR UTILITIY ARCH

Fig. 15
The form of the mandibular utility archwire appliance when it is used for anchorage.
Orthopedic correction:

The distal rotation and expansion of the upper utility archwire in class II correction, changes the occlusal table relationship of the upper and lower molars and allows for the occlusion to be unlocked. If the child is being treated during active growth, the mandible has the potential of coming forward from 1 to 3 mm. Therefore, the dental correction of the upper first molars and the orthopedic effect of the lower jaw coming forward, allows the correction of most early class II problems, without the use of headgear, elastics or functional appliances.

Arch development:

The mechanical manipulation of the anterior and posterior segment of the UAA achieves proper overbite, proper overjet and proper molar relationship, which enhances proper lip seal. It is after these effects are achieved that the concept of serial guidance in the arch development may begin.

Serial guidance is known as the selective and timely removal of the posterior primary teeth, when the developing roots of the succedaneous teeth are one-half to two-thirds formed. If this procedure is done under UAA control with adequate lip seal, the tongue will act like a lingual functional appliance and give predictable arch development. This concept has been clinically proven to reduce the pedodontic-orthodontic case load to less than a 10% need for permanent tooth extractions in resolving the final occlusion.

Space maintenance:

Once the oral environment has been brought to state of normalcy for that particular stage of growth and development, the UAA may remain on the dentition as a passive space maintainer until the definitive phase of straight arch orthodontic treatment has started.

Clinicians have found this to be more hygienic and acceptable to the patient in the rest period, than the traditional maxillary hawley and lower lingual appliances. The major benefit is the maintenance of physiological arch form and/or molar width.

Errors in fabrication and potential problems

1. Failure to coordinate archwire symmetry when fabricating the wire.
2. Failure to make the labial bend after making 90 degree anterior step bend. Also, failure to make the lingual bend after the 90 degree posterior step bend, thus causing gingival impingement especially mesial to the first molars.
3. The bend mesial to the molar is too short or too long.
4. The bend distal to the lateral brackets is too close and prevents proper alignment.
5. Failure to place plastic tubing on the initially placed archwire, thus causing some patient discomfort.
6. When advancement of the anterior teeth is indicated, placing either tip-back or toe-in bends, which appears to be counterproductive.
7. Failure to use ligature ties on anterior teeth when advancing these teeth.
8. Cutting the wires too short distal to the buccal tubes. This causes archwires to become dislodged. Archwire should be 3 to 4 mm longer, then place a slight toe-in bend at the very distal portion of the wire.
9. Cutting the wire too short before activation can cause frequent breakage, when making toe-in or tip-back bends.
10. Improper expansion of the archwire, when activating for the toe-in or tip-back can cause molars to roll-in lingually, especially on the lower fast molars.
11. Tip-back bend on the upper arch should be avoided if possible, it is better to rebracket anteriors more incisally and molars more gingivally, when additional bite opening is required.

12. Starting the lower arch too soon can cause constriction of the lower molars, especially when you are expanding and rotating the upper molars. The upper molar expansion will cause the lower molars to expand without the use of lower appliances.

13. Inadequate force applied to the archwires. There should be 80 gm on the lower arch and 150 gm on the upper arch.

14. After over-correction of upper molars and anteriors, failure to place a passive arch with lateral expansion only. If over-correction remains, the second molars must be bracketed later to correct the first and second molar rotation.

15. Failure in class II, division 1 cases with flared anteriors to tire back the archwire, which could cause additional flaring.

16. Failure to advance the archwire 1 to 2 mm anteriorly to anterior brackets in class II, division cases, when distal-rotating and expanding.

Summary

In practice, the pediatric dentist is called upon to apply knowledge of growth and development in the supervision of the developing occlusion; in space maintenance and management of arch length problems; in intercepting pernicious oral habits, which are damaging the occlusion and the correction of irregularities resulting from these habits; in the correction of anterior and posterior crossoverbite; in the treatment of deep impinging overbites causing tissue destruction; and in other orthodontically or orthopedically related clinical entities. In order to render such services with simplicity and efficiency the utility archwire appliance is proposed as another means for the armamentarium of the pediatric dentist.

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