Innovative Techniques For Today’s Ortho Practitioner
Insufficient maxillary width continues to be one of the most constant problems facing the orthodontic clinician. The high vaulted and v-shaped palate creates problems of arch form, crowding, occlusion, tongue function, breathing and esthetics. If opposed by a more rounded horseshoe shaped mandibular arch it can create a posterior trapping effect on the mandible. In this compromised jaw relationship the patient is often relegated to a Class II or pseudo-Class III effect (Fig. 1), caused by a poorly developed mid-face. The result may be a trapped or blocked mandible and the attendant joint dysfunction and and/or dental breakdown. Palatal expansion has long been advocated as the first step toward resolving not only the maxillary width, but also the mandibular dysfunction. This can be treated in adults in a predictable non-surgical manner free of the trauma and morbidity of a surgically assisted expansion. It is not only possible, but very safe and predictable with the fixed Haas appliance. We have accomplished this on hundreds of adults over the past thirty years.

DIAGNOSING THE INSUFFICIENT PALATE

One very noticeable clue to a narrow maxillary vault is apparent in the full frontal smile. We note a black triangle of space between the buccal mucosa and the molars and premolars, often with little or no visualization of the first molar (Fig. 1), caused by a poorly developed mid-face. The result may be a trapped or blocked mandible and the attendant joint dysfunction and and/or dental breakdown. Palatal expansion has long been advocated as the first step toward resolving not only the maxillary width, but also the mandibular dysfunction. This can be treated in adults in a predictable non-surgical manner free of the
alveolar ridge (Fig. 4). This boney extension down the alveolus occurs between the 1st and 2nd molars, and acts as a flying buttress which holds the posterior width, but does not maintain the width forward to it. So the 1st molar and anterior arch form is much more greatly influenced by aberrant tongue and muscular function. In adult patients with normal twelve year molar eruption we have this important diagnostic key. In adolescents or late blooming young adults with as yet unerupted 12 year molars we do not have it. This may be another strong argument for delaying dental treatment (not skeletal development) and always finishing the cases to the 12 year molars.

FORCE APPLICATION AND STRESS DISTRIBUTION

Bonding or cementation of a fixed jackscrew appliance across the palate allows predictable and controlled force to be applied for the intermaxillary dysjunction. Evaluation of the biomechanical effect of RME (rapid) on a 20 year old dry skull with sequential 3-D tomography defines clearly the significant transverse orthopedic forces placed on the intermaxillary suture. It further describes a distribution of force to the other maxillary sutures; nasal, zygomatic and pterygoid. The study concurred with previous research that the pattern of displacement revealed the “greatest widening was observed in the dental alveolar structures, with the expansion effect gradually decreasing toward the superior structures.” The three buttresses of the skull that resist these forces and prevent dorsal displacement of the maxilla are the zygomatic process of the temporal bone, the pterygoid process of the sphenoid bone, and the very sturdy nasal part of the frontal bone.

Although the study cited was of a dry skull, the appliance was not specifically a Haas appliance, and it was opened rapidly, unlike our preferred method for adults; it very clearly defines the force distribution of a fixed jackscrew appliance during palatal expansion. The resultant displacement of the maxillary and dentoalveolar complex was down and forward, and were most evident when the lateral expansion was three mm. or more on each side. The fact that the greatest change was seen at “A” point and “ANS” is borne out by the positive changes we see clinically.

“There is an increasing body of evidence that supports nonsurgical RPE in young adults...It is time for a paradigm shift.” The further shift should include the understanding that developing the palate can go well into the middle age years if the clinician is willing to give up the “rapid” part of the acronym.
as meaning two weeks. For the beautiful palatal form and facial harmony that we are achieving routinely in 50 year olds, I do not believe 12 to 15 weeks of active turning of a jackscrew is slow (schedule of turning to follow). Especially if it eliminates the morbidity of the surgical alternative.

**APPLIANCE FABRICATION FOR ADULT EXPANSION**

Fabrication of the Haas appliance as it is designed is critical (Fig. 5). Fitting of orthodontic bands to the 6 year molars, is preceded by two days of elastic separation mesial and distal. This allows for easy and comfortable fitting of the molar bands and the impression. We use a band that has our Roth prescription bracket, so we can move into the straight wire treatment without removing the appliance. The bands are reseated in the alginate impression, which is poured in dental stone after the bracket slot/tube is carefully sealed with wax. This is sent to any good orthodontic lab and the Haas appliance is prescribed with a 28 or 36 mm. jackscrew. A scalloped 036 wire emerges from the solder joints forward to the cuspid and is reimbedded in the palatal resin. The wire also exits the molar band solder joint distally and is locked into the resin As in the photograph (Fig 6a), care is taken to cover the alveolar segments of the palate with resin without impinging on the free gingival margin. These resin pads are critical to the stability, efficiency, and force distribution of this appliance and must be constructed as pictured. Another key feature of the appliance is the 2mm of relief of the resin on the palatal side for a width of 3mm on either

**DIFFERENT TURNING SCHEDULES: SAME APPLIANCE**

<table>
<thead>
<tr>
<th>Over 20</th>
<th>Under 20</th>
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<tbody>
<tr>
<td>2 turns/week</td>
<td>2 turns /day</td>
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<tr>
<td>24-36 turns</td>
<td>24-36 turns</td>
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<tr>
<td>Maxilla rotates at the sutures</td>
<td>Maxilla separates at mid-palatal suture</td>
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<tr>
<td>Opening completed 14-18 weeks</td>
<td>Opening completed 14-18 days</td>
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<tr>
<td>Palate flattens and widens</td>
<td>Palate flattens and widens</td>
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**Fig. 6a**

**Fig. 6b**

**Fig. 7**

**Fig. 8**
side of the jackscrew. This relief is to allow the palate to flatten as the expansion is effected (Fig. 6b). Check the appliance on the cast as it is returned from the lab, and if the relief has not been created it should be ground and polished prior to insertion.

**DELIVERY AND CEMENTATION**

Two days before delivery the separators are again placed. Trial seating is done and the molars are pumiced. After checking the turnstile of the jackscrew for rotation, the appliance is cemented to place. Presently we are micro-etching the inside of the bands and sealing and bonding the appliance to place with a fluoride releasing resin cement. After cleaning up the band cement, considerable time is spent with the patient and sometimes a second person to explain the turning of the jackscrew with the ‘key’ included from the laboratory (Fig. 7). We shorten the key and for safety place a rubber band through the loop to secure it to the fingers. With a hand-held mirror and facing a large mirror it can be turned without assistance by the patient. A rotating ‘key’ on a plastic wand is also made to allow either the patient or helper to perform the turning.

**SCHEDULE OF OPENING (Fig. 8)**

The turning of the jackscrew is in a very different manner in the adults. Separation of the palatal suture in adults is not predictable and we do not turn on a schedule to achieve it. We have very gentle and predictable results by turning the jackscrew one full turn (bar to bar), twice a week. Twice a week in the adults works very well and achieves the desired result with only fleeting awareness by the patient of very slight palatal pressure. This is in contrast to the 2 turns a day in our under 20 year old patients. In adults we do not usually get a midline diastema. Otherwise the results are clinically identical. Rounding of the arch form, transpalatal width (cusp to 1st molar), flattening of the palatal vault, and strengthening and fullness at A-point are very much like the results with the RPE in children and teens. We instruct our adults that there is no value in accelerating the two turns/week schedule of opening. Because of the manner in which the appliance works, the body must be given time to accommodate to the turning. If any discomfort is noted the schedule must be slowed and rarely a back-turn or two taken with two to three days rest, before resuming the turning schedule. The appliance is opened 7 to 9 millimeters to achieve over correction relative to the opposing mandibular dental arch form. The palatal cusp of the maxillary 6-year molars is carried up the inner aspect of the buccal cusps of the opposing dentition to an edge to edge position, but not into buccal version (Fig. 9). This achieves measurable compensating width increase in the lower arch. At the completion of turning, we press some light–cured resin into the jackscrew to present a smoother surface to the tongue.

For the 36-turn jack screw, the completion of opening typically takes 18 to 20 weeks. We hold the appliance in place another two to three months, while the skeletal change is stabilizing.

Then we bracket the upper arch, and will sometimes cut the appliance down into a smaller ‘cut down’ transpalatal arch (Fig. 10), and leave this in for longer.
periods. Either the full appliance or reduced one is left in place until the arch is shaped and controlled by an 020 stainless arch wire. Once the 020 wire is placed, we cut the wires on either side of the solder joint and “drop” the appliance out without disturbing the molar band and bracket. By following this protocol, we see no relapse of the arch width we have gained.

**THE CLINICAL CHANGE**

In the ten percent of adults whose palatal suture never fully knits, we do occasionally see a well-documented opening of the palatal suture. But in the great majority of adult patients the maxilla appears to rotate in varying amounts at its seven sutures; the palatal and three paired sutures; the zygomatic, pterygoid, and nasal- maxillary. On occasion, the nasal-maxillary and zygomatico-maxillary sutures may be found tender to palpation, but unless identified by the clinician remain sub clinical.

Because of the engagement of the resin pads against the lateral wall of the palatal vault, after just a few turns, the appliance is not just engaging the teeth and supporting sockets. Therefore dental tipping does not occur without concomitant change in the maxillary alveolar basal bone. This alteration is noted in the flattening and squaring of the palate. The palatal expansion creates a measurable and noticeable filling at A-point as well as the cuspid eminences which allows for greater dental proclination and lip support.

Upon removal of the appliance there is some redness of the tissues engaged by the pads. It looks much like the tissues under a constantly worn denture. In 5-7 days with no treatment the tissues appear normal.

**CASE STUDIES**

The following case is a 26-year-old female patient treated to develop her insufficient palatal width. In this pretreatment photo, we see the obvious eye fatigue shown here (Fig. 11), the result of an eight year history of daily headaches and chronic facial pain. She has the classic v-shaped palate and resultant ‘trapped’ mandible. The same patient is shown (Fig. 12) after treatment. Her palate was widened and shaped and in 24 months she was in balance. Her lower jaw now forward and facial musculature balanced and comfortable. Her facial profile is shown (Figs. 13 & 14) before and after treatment. Note the characteristic development and fullness under her nose, and movement of her lower jaw forward.
The next patient is a 46-year-old female (Fig. 15) with no acute symptoms who makes a very common chief complaint of “not knowing where to hold my jaw,” and the chronic facial muscle fatigue which accompanies it. Frequently, these patients (usually women) rest on their tongue which they hold between their posterior teeth; thereby filling the vertical freeway space and creating a rest position for the mandible. (Fig. 16) shows her after treatment with a Haas appliance, actively opening over 12 weeks, and then treatment immediately with fixed straight wire over a two year period.

Similarly, the maxillary arch was widened and advanced to allow a forward posturing of the lower jaw and balance of the TM joint and facial musculature. Development of the mid-face like these cases is expected when the palate is sufficiently widened prior to dental correction. No forward-pull head gear was used here, although we do occasionally use it in conjunction with the palatal expansion. The pre- and post-treatment models of this patient (Figs. 17 & 18) show a typical change in size and form of the palate.

This case is a 31-year-old male patient with a Class II, Division 2 malocclusion, with a very narrow palate, deep bite, rabitted (reclined) central incisors and vertical range
of motion (between incisors) of 31 mm. a “closed-lock” position (Fig. 19). Panoramic and transcranial radiographs reveal loss of TM joint space, with posteriorly displaced and degenerative condyles. By history, he and his twin brother were diagnosed as maxillofacial surgical cases at 16 years of age, which the family declined. Our initial orthotic/splint therapy failed to unlock or recapture the bilaterally displaced menisci.

The treatment pictures (Figs. 20a, 20b) are taken at just eight weeks after palatal expansion was initiated and three weeks into the 1st archwire (016 NiTi). Both the skeletal and dental changes are very dramatic for such a short treatment period. All this facial change is after only 11 weeks of treatment. After a 22-month orthodontic treatment and resultant palatal width, the advancement and vertical support of his lower jaw was now completed (Fig. 21). After brief splint therapy we were able to recapture the discs and establish stable condylar and jaw position. He regained full function and range of motion (53 mm.). The case was completed without any surgical intervention. It was clear in this case and many like it, that the lower jaw could not be advanced and thereby unlocked, until the upper arch was reshaped.

The marriage of orthopedic alteration of the palate to orthodontic treatment in our adult patients continues to produce some rewarding results and insights. One observation is that after palatal expansion there are fewer and fewer ‘true’ Class II skeletal patients, and more and more trapped mandibles. As in the children, given the chance, many of these adult lower jaws advance to a muscle and joint defined posture without much treatment.

Another insight is that once forward under a developed maxillary arch, these lower jaw postures no longer create the trauma and anterior dental breakdown so prevalent in our adult population. The catch-all of “bruxing” ceases to be much of a factor in these balanced faces.

**CONCLUSION**

Following the tenant of gaining palatal development and facial balance prior to dental treatment, has been invaluable in its application to both simple and complex orthodontic cases. With modification it has proven useful in treating an ever expanding age range of patients.
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REFERENCES


5. Stuart DA, Wiltshire WA, Rapid palatal expansion in the young adult: time for a paradigm shift, J. Canadian Dental Association, June 2003 Vol69, 6; 374-7


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