The Fixed Sagittal Appliance

by Dr. Philip J. Pistolas

This idea is not a new one. If we do orthodontics we are faced with the need to augment the anterior growth of the premaxilla. Whether we have concluded this by using the McNamara facial index (tip of nose to incisal edge of maxillary central incisor — simplified as ~40 mm) in our cephalometric analysis or if we are faced with the continuing growth of the mandible in a Class III case. We all need something simple to use that is both efficient and patient compliant.

We have removable sagittal appliances at our disposal but these appliances can be monsters due to their size and cumbersome nature. They must be worn 24/7 and only the very best of patients comply.

We have the reverse pull headgear. I don’t know if I would wear this once let alone on a regular basis. We have to sleep with this on our heads and hook up elastics.

I know that it is a great appliance with a compliant patient however all of my patients are not so compliant.

I deal with children of all ages. Orthodontically, I can start growth development as early as age seven. Although the patient wants to be compliant, unless the appliance is comfortable, the exuberance and novelty wears away quickly. The patient begins to stop expanding the screws or just stops wearing the appliance. Now if I was told to wear and adjust an appliance when I was younger, I would not have had a choice. However we are no longer in the sixties, kids and parents are different now. Now we have to have something that is comfortable and not dependant on patience compliance.

If you are familiar at all with my writings, you will undoubtedly remember that not only do I like to work with my hands but I also like to do this in my lab. I turn the music up loud, with no one else around and design or fabricate things that I need. I have been waiting for Dr. William Clark to release his patented design of a similar appliance but grew impatient with the delays and modifications. So I found myself with my pliers in hand attempting to make a similar appliance. I did and it works well.

Like a lot of my appliances, I start with molar bands. I like molar bands for their stability and durability. I use them on a standard basis in all of my orthodontic cases. It is not uncommon for me to have a rickanator or crozat being utilized during a fully bracketed case. I always have straight lengths of wire and solder around.

A few years back, I was very impressed with some of the Williams expansion appliances and experimented with them. I was able to get the tubes from an orthodontic supply and found that .036 stainless steel wire fit into the sleeve. I had open coil springs so I was in business.
Theses are the same materials that I used to fabricate my fixed sagittal appliance (FSA).

The patient’s maxillary impression is poured in stone. I have manually fit my molar bands in the patient’s mouth. I usually do this when I place my separators, a week before I band the case. I bring out my trusty handpiece and cut a trough around the molar in the stone model. I place the bands on these teeth and proceed with the fabrication.

I use arch forming pliers to arch the straight .036 wire. I want to have this in contact with the lingual aspect of the maxillary incisors in the cingulum region. I want the arch to be wide enough to affect the four incisors but I want it to end so that the wire has a straight run into the lingual tube. The lingual tube should be long enough to reach the medial aspect of the first premolar. I have found that the longer the tube the more stable the force. Here length is important.

The tube has to be long enough to hold the extra length of wire without
the ability of escape of either end of the wire arch. The coil is cut according to the amount of growth desired. You obviously do not do all of the desired growth at once but in steps. The appliance can easily be removed and recemented and more open coil spring added.

On the wire, I place a small amount of solder to control the compression of the spring. I have found that the space between the solder and tube should be ~ 10-15mm. The length of coiled spring can then be ~5mm longer than the space. I have thought about the use of a screw lock to replace the solder on the wire. I could then adjust the appliance in the mouth without removal. I could simply loosen the lock and slide it distally to recompress the spring. The disadvantage would be if it slipped.

On the lingual aspect of the incisors I can bond composite. This prevents the appliance from slipping out over the incisal edge. The different stages of fabrication are displayed in the photos. The appliance is easy to make. It takes me all of twenty minutes start to finish. Final polish-
ing can be done by me or my staff. The appliance is easy to insert.
I have also shown the dramatic changes of a class III high angle growth patient.
Insert of the FSA, one and two month intervals are demonstrated. This same patient was treated with a removable sagittal appliance without as much success.
If you have the desire to make one of these yourself or if the lab you use is willing to fabricate it for you, here are some helpful hints. The tube is cut with a simple cutting disc on a slow speed handpiece. Once the wire is cut and shaped to length, round off any sharp shards that could cause a frictional problem in the tube. Polish the cut end of the tube as well. Make sure that the wire slips easily in and out of the tube. Now you are ready for soldering. First make sure that the end of the tube is indeed closed. You do not want to solder the wire and tube together. I solder the tubes to the molar bands with the wire in the tube. I use sticky wax to hold the parts together. Once the tube is soldered to the bands and I have made sure that the wire still slides in and out easily, I then place a small bead of solder onto the wire.

Lab setup for rickanator after fixed sag treatment.
Control of distalization = length of spring

Maxillary molar distalization bilateral

Nance type retention stabilization-Palatal bone

Notice that each side can be affected differently

Brackets upper anterior

Fixed sag removed and rickantor insert

Insert
anterior to the tube. The appliance is complete after polishing and the addition of the length of spring.

I place these in the mouth, I do not delegate this to a staff member. I want to make an educated judgment as to the force I am employing.

Some modifications are available. This works extremely well when second molars have already erupted. If they have not, you can ligate the posterior segment together to create more anchorage. If there is not a need for lingual composite to anchor the anterior aspect of the appliance, care should be employed when using forces such as elastics to prevent distalization of the molars.

On the other hand, if molar distalization is preferred, the anterior segment can be ligated together to provide the anchorage and the molar can be distalized such as in the case of second molar extraction. In the case of a midline shift, different lengths of coils can be used to provide the desired correction.

This is a simple design whose limitations are only a function of the imagination, knowledge and experience of the practitioner. Good luck with its design and use. I hope you find it as useful as I have.