Fixed functional appliances (Class II correctors) are an integral part of an orthodontist’s armamentarium, owing to their ability to correct Class II malocclusions without relying on patient compliance. Although their use has traditionally been restricted only to growing individuals, recent studies have documented successful use of compliance-free Class II correctors in young adults as well. Data from various research groups in Europe indicates that appliances such as Herbst® and Functional mandibular advancers are also successful in Class II correction in adult Class II patients¹,²,³. Pancherz has rightly termed this as a shifting paradigm in Class II treatment options. MRI data of adult patients undergoing fixed functional treatment have demonstrated the possibility of condylar remodeling in adults too⁴. This fact has surely opened new doors of exciting possibilities for Orthodontists.

For the past seven years, the Forsus™ Fatigue Resistant Device has been used in my practice and by our residents in over a hundred Class II patients. In young adults also, we have had predictable results, and in this paper I will also enlist suitable situations in which Forsus corrector can be used effectively in adults. Modifications in usage and their rationale will also be described.

Need for Class II Correctors in Young Adults
There are, in my opinion, four main indications of Class II correctors in young adults, namely:

- **Skeletal Correction** in patients with mild skeletal Class II malocclusion. Borderline Class II cases with deficient mandible (LANB 4-6 degrees) are suitable for this approach. However, obvious surgical cases are a contra-indication to such treatments. It is also important to consider that these individuals should not be seeking drastic changes in their facial appearance.

- **Dental Class II malocclusion** correction only. Obviously, the amount of skeletal correction achievable in adults is much less than in adolescents (only 30-40% skeletal changes may be expected). Therefore, the best results in young adults are those cases which have mainly a dental component of Class II without an underlying skeletal discrepancy.

- **Correction of Class II subdivision malocclusion** patients having a mandibular midline shift. In these cases, by selective differential force selection on either side, subdivision correction becomes more predictable, while addressing the lower midline.

- **Class II dental malocclusion requiring maxillary molar distalization.** Again, in these cases, selective molar distalization, on one side or bilaterally, is easily effected by minor variations during appliance installation.

**Forsus™ Fatigue Resistant Device as an Efficient Class II Corrector**
The Forsus fatigue resistant device satisfies all requisites of an ideal Class II corrector, namely, is very simple to use, comfortable to the patient, corrects Class II malocclusions effectively and the fact that all this is achieved without problems of breakage is an added bonus.
Among five brands of Class II correctors I have used on patients, the Forsus™ Class II Corrector has proven to be most comfortable to a patient, right from installation itself. The Forsus corrector, not being as forceful as Herbst, allows gradual overpowering of the patient’s oral musculature. On the day of insertion, the patient does not experience any pain. Within a month, at the time of recall, it is generally observed that a part of Class II correction would be initiated. This, by itself, is a big motivational feature for me. Whenever a patient is apprehensive about having a Forsus corrector in the mouth, I introduce him to another who already has it in place. The latter’s positive experience helps in encouraging the new patient too.

Clinical Protocol
There are a few changes that I make before placement of Forsus corrector in a patient. These are essential to get an improved biomechanical vector as well as to minimize unwanted dental effects, especially lower incisor proclination and buccal flaring of upper molars.

The fixed appliance prescription of choice is the MBT™ Versatile+ Appliance System with 0.022” slot brackets. As is expected with fixed Class II correctors, due to applied force vectors, upper incisor torque loss and labial flaring of lower incisors is bound to happen. MBT system brackets, with relatively high lingual root torque in upper incisors and -6 degrees of labial root torque in lower incisors, have better capabilities in resisting both these untoward effects.

In the upper arch, necessarily, second molars are banded. This prevents a step from being created between the first and second molars during the Forsus corrector phase. It is important that the wire sizes at the time of inserting the Forsus device should be 19×25 SS. In my use of the appliance, the upper archform is constricted by 2 mm on either side and additionally supported by a Zachrisson type TPA to prevent buccal rolling of the molars. As per the need of the case, additional lingual root torque in the upper archwire and extra labial root torque in lower wire is added to further prevent the above mentioned side effects.

The lower wire is always cinched back. Upper wire may or may not be cinched back based on the need for molar distalization. When one needs distalization, 2-3 mm of wire is left projecting from the tube intentionally to allow molars to freely slide under the influence of the Forsus correctors (refer to Case 3).

Improved Biomechanical Vector
Instead of hooking the push rod directly on a plain archwire next to a bracket, I make an omega loop in the 19×25 SS wire (Figure 1) and then insert the push rod onto this hook. Before placement, the pushrod is also given an inward bend to follow the curvature of the lower arch and vestibule. This displaces the force vector closer to the Cres of the mandibular dentition (Figure 2). In turn, what is expected is more of a bodily movement of the lower dentoalveolar segment than mere steepening of the occlusal plane. Additionally, this modification helps prevent canine bracket breakage and makes it less visible.

Also, while doing such a modification, we have observed a phenomenon of alveolar bone bending. This phenomenon was documented by Schwindling5 in his book and we verified it in an earlier research project6.

On a personal basis, I feel this phenomenon of alveolar bone bending, if seen in many cases and remains stable over an extended time period, may be of prime importance in achieving a good dento-alveolar camouflage in skeletal Class II young adults. What it would essentially mean is that instead of simply proclining lower anteriors (which jeopardizes their periodontal integrity) while using a Class II corrector, the entire alveolus gets bent and aids the overall correction since active bone growth is complete in young adults.

Figure 1: Omega Loop bent into mandibular archwire for push rod placement.

Figure 2: Slight bending of push rod after inward bend is made.

Duration of Forsus™ Class II Corrector Usage
Most clinicians prefer to keep Forsus device only for 4-5 months in majority of patients. However, data of Rabie and co-workers has defined the appropriate duration of fixed functional appliances as being close to one year. This was derived by extrapolation from their animal experiments7.

Based on these lines, I prefer leaving the Forsus device for an average time period of 7-8 months. Activation of the appliance is done either at the L-pin end by pulling it mesially, or adding the split crimps provided with the kit. After the appliance is in place for 4-5 months, one might see the overjet reducing rapidly and the patient achieving an edge-to-edge relation. From this point onward, I deactivate the appliance by loosening at the L-pin and leave the Forsus device in place for at least a couple of months. This way, we obviate the need for an additional retention appliance while stabilizing the achieved result.

Case Reports
In this section, three cases are shown which correspond to the earlier discussion. Treatment of two female patients SP (Case 1; Figures 3-7) and RM (Case 2; Figures 8-10) of ages 16 and 17 with Class II div 1 and div 2 malocclusions respectively is depicted to illustrate benefits of the Forsus™ Fatigue Resistant Device in bilateral Class II correction. In both cases, initial leveling and aligning was done with NiTi wires. The Forsus corrector was placed after placing 19×25 SS wires. Activation...
of the push rod was needed only in SP since she had a large overjet of 10 mm to begin with. Very little finishing is required after Forsus™ Class II Corrector phase, and one can witness excellent overjet reduction and good Class I buccal segment relationship. Cephalometric superimpositions show minimal proclination of lower incisors.

Case 1

The third case, SK (Figures 11-13), a 24 year old male reported with a large overjet, overbite and a unilateral half unit Class II relation on the left side. He also had a compromised periodontal status. Unilateral molar distalization was achieved on the left side during the Forsus corrector phase by leaving the end of the upper wire uncinched on the left side.
Case 2

Figure 8: Case 2 pre-treatment.

Figure 9: Case 2 post-treatment.

Figure 10: Case 2 post-cephalometric superimposition.
Conclusion

Most Orthodontists are skeptical about using a fixed functional appliance after the end of pubertal growth spurt in their patients. Instead of compromising on facial appearance by extracting only upper first premolars (which leads to unaesthetic appearance in some cases) or resorting to an invasive procedure such as an orthognathic surgery for borderline skeletal malocclusions. The clinician now has the ability to use the Forsus™ Fatigue Resistant Device to correct Class II malocclusions in young adults in a predictable manner.

One has to be careful though, in ensuring limited side effects of the Class II corrector by taking adequate precautions as mentioned earlier. I see this application as a potentially practice-transforming technique and recommend it to practitioners who haven’t used Forsus correctors in young adults.

So, what are you waiting for? Go ahead and give the Forsus Fatigue Resistant Device a try. I bet you will enjoy the experience. The satisfaction on the patient’s face after treatment will surely be a driving force for your future patients too.

References

1. Ruf S, Pancherz H 1999a Dentoskeletal effects and facial profile changes in young adults treated with the Herbst appliance. Angle Orthodontist 69:239-246

Case photos provided by Dr. Chetan V. Jayade