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# How Functional Appliances Work When

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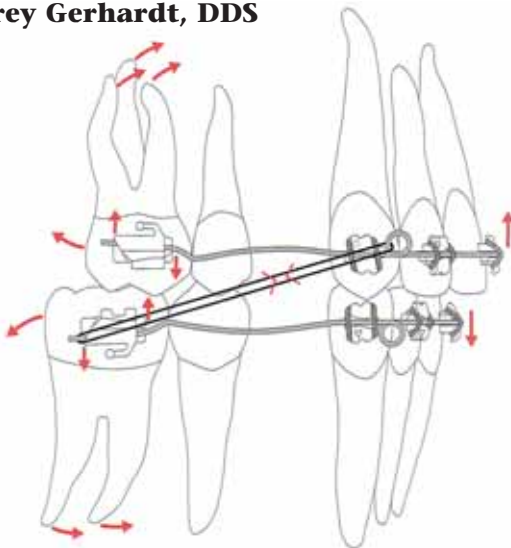


Fig. 1

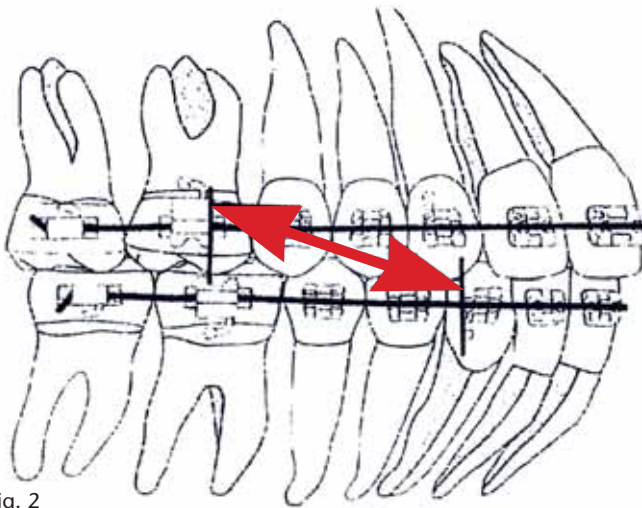


Fig. 2

Numerous articles have been written on functional appliances. I have not read any articles that addressed if functional appliances can be used with the Tip-Edge bracket system. The answer is, yes. This article will focus on using functional appliances in conjunction with comprehensive orthodontic treatment. Functional appliances can be used with straight wire or the tip-edge bracket system.

The definition of a functional appliance is an appliance that changes the posture of the mandible, holding it open or open and forward. This posture stretches the soft tissue and muscles, and the resulting forces are transmitted to the teeth and skeletal structures.<sup>1</sup> Functional appliances can be used in treatment of Class II patients.

### Tip-edge Bite Opening:

Figure 1 illustrates the basic mechanism of bite opening and Class II correction with the Tip-Edge bracket system.<sup>4</sup> The first molars are banded and the anterior teeth are bracketed in Stage I of treatment. Bicuspid are not bracketed at this stage, so they will not interfere with bite opening. A .016 stainless steel wire is used with about 30 degree bite opening bends 2 mm anterior to the molar tube. This wire exerts an intrusive force to the anterior teeth. A slight extrusive force is also exerted on the first molars. Two ounce, Class II elastics are worn by the patient to retrude the upper anterior teeth.

### Fixed Functional Appliance:

Figure 2 illustrates that functional appliances push instead of pull. Dental changes are such that an appliance pushes the upper teeth distally while pushing and torquing the lower teeth mesially. Skeletal changes force patient to hold the lower jaw forward. This action is supposed to cause condylar remodeling over time.

### What Results Can You Expect?

Studies will vary on this topic. Current studies indicate that the correction of a Class II patient is the result of about 40 percent skeletal changes and about 60 percent dental changes. The skeletal changes are a result of the remodeling processes in the articular fossa area. A dentist can achieve up to about 5 mm of overjet correction.<sup>2</sup> (Figure 3)

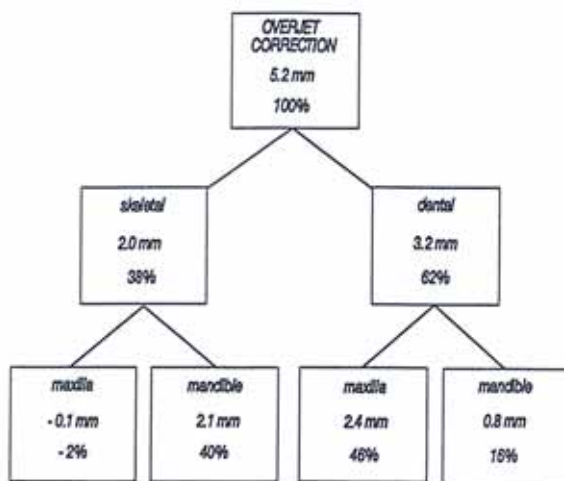


Fig. 3

# Applied to Orthodontic Cases

## Expect Some Relapse

Bone formation does take place in the glenoid fossa after the use of a functional appliance. There is an increase in fibrous tissue in the disk posterior to the condyle that appears to stabilize the anterior condylar displacement caused by the functional appliance. The fibrous tissue holds the condyle forward. Within a month of removing the functional appliance, the fibrous tissue resorbs and the mandible partially retrudes to its original position.<sup>1</sup> Because of this relapse, cases must be overtreated.

## Fixed Functional Appliances

### Herbst Appliance

These appliances have been around for a long time. Herbst appliances are used in two phase treatment in Class II patients. The Herbst appliance is normally used by itself for about 6 to 9 months before comprehensive orthodontics is started. The idea behind this two-phase treatment is to see how much of the Class II can be corrected before the braces are started. This will help the treating dentist decide how to proceed with comprehensive orthodontics. (Figure 4)



Fig. 4 Herbst Appliance

### Jasper Jumper

Made by American Orthodontics, this appliance can be used in conjunction with comprehensive orthodontics. It is a coil spring which attaches to the upper molar tube and distal to the lower canine bracket. When the patient bites down, the coil spring bows out pushing distally on the upper molar and mesially on the lower teeth. The patient is capable of lateral movement. (Figure 5)



Fig. 5 Jasper Jumper

Photo Courtesy of American Orthodontics, Sheboygan WI.

### Twin Force Bite Corrector

This appliance is a fixed, push-type appliance with ball and socket joint fasteners that allow lateral jaw movement that can be used in conjunction with comprehensive orthodontic treatment.

The tow plunger/tube telescopic assemblies on each side contain nickel titanium coil springs that deliver the force.<sup>3</sup> With Tip-Edge, we use this appliance in stage III. The patient is placed in upper and lower .021 x .025 rectangular wires. The appliance is screwed onto the wire on the mesial of the upper first molar and distal of the lower canine. This appliance is made by Orthodontic Organizers. (Figures 6A & 6B)



Fig. 6A

Twin Force® Bite Corrector  
Photo courtesy of  
Ortho Organizers, Carlsbad CA.



Fig. 6B

## How I Prefer to Use Functional Appliances:

First of all, I only use functional appliances in about 1 to 2 percent of my cases. In my opinion, functional appliances are a good tool for dentists who want to provide their patients with comprehensive orthodontic care.

Treatment of Class II non-extraction cases in patients with full step molar Class II and an overjet of 5+ mm.

- ① Always starts with the treatment analysis First the dentist must decide it is an orthognathic case, an extraction case, a camouflage case (by extracting upper bicuspids) or can the Class II be treated with orthodontics only. A lot of the cases I treat with functional appliances are on the borderline of taking two upper bicuspids out to camouflage a Class II or using a functional appliance.
- ② If options are available to treat a Class II, I will present them to the patient during the consultation. On borderline extraction cases, I will normally treatment plan them for non-extraction but with the potential of extraction if we cannot correct the Class II to satisfaction with the functional appliance.
- ③ I will start the orthodontic case with conventional tip-edge bite opening mechanics. I will open the bite as much as possible in stage I of treatment then re-evaluate the case. If I can get the patient to at least a end-to-end molar Class II relationship and the overjet corrected to within 5 mm or less, I am fairly confident that a functional appliance will work. If I cannot achieve these goals, I will consider extracting upper bicuspids to camouflage the Class II.
- ④ If I have achieved my goals in Stage I, but still have an overjet to correct I will proceed to Stage III. I will bracket the patients bicuspids, place them in rectangular wires and then place the functional appliance.
- ⑤ The functional appliance is left until patient bites end to end on their anterior teeth (normally about 6 mo.)
- ⑥ After removal of the functional appliance the patient resumes Class II elastics and is monitored for relapse.
- ⑦ When teeth are in a stable overbite/overjet relationship, braces are removed and retainers made.

Functional appliances can also be used for those patients who are skeletal Class I, but dental Class II. If I cannot correct the overbite/overjet to satisfaction using elastics alone, I will often use a functional appliance.

The use of functional appliances can be a great asset (in my opinion) for dentist providing comprehensive orthodontic care to their patients when used correctly.

## References

1. William Proffit, Contemporary Orthodontics, St. Louis, Missouri, Mosby, 1986, p. 358.
2. Weiland F., Bantleon H., Treatment of Class II malocclusions with the Jasper Jumper appliance—a preliminary report, AJO and DF, October 1995, Volume 108 number 4.
3. Rotheberg J., Campbell E., Nanda R., Class II Correction with the Twin Force Bite Corrector, JCO, April 2004, Volume 38 number 4.
4. The Tip-edge bracket system is a product of TP Orthodontics.

## Treatment Example

This patient was treated by student dentists in a two-year, hands-on orthodontic class sponsored by the Academy of Gp orthodontic in Austin, Texas.

The patient presents with a dental Class II, but a skeletal Class I. Because of this, the functional appliance was used for only three months instead of the normal six months required for a patient with more skeletal issues.

The patient also still has their primary canines. I would normally not treat this patient until they lost these teeth, but we started the case early due to the schedule of the orthodontic class. (Figures 4A & 4B)



Fig. 4A



Fig. 4B



Fig. 5A



Fig. 5B



Fig. 6A



Fig. 6B



Fig. 7A



Fig. 7B



Fig. 8A



Fig. 8B



Fig. 9A



Fig. 9B



Fig. 10A



Fig. 10B

### Patient Exam & Progress (Figures 4A & B)

- 12-year-old patient
- Class II molars, Class I skeletal
- Wits +1
- Lower 1 to A.PO is -4
- Model discrepancy is +1.5
- Total discrepancy is +13.5
- 100% overbite
- Adult canine not erupted yet.

### Diagnosis

- Total discrepancy indicates a non-extraction case.
- 100% overbite, often very difficult to correct to a perfect 20% overbite.
- Possible use of functional appliance.

### Start Case (Figures 5A & B)

- Started case by bracketing the upper anteriors only. The idea here is to move the upper teeth out of the way to make room for the lower brackets.
- Patient about to loose upper deciduous canines.

### Recall Appointment (Figures 6A & B)

- Once the upper anteriors are moved out of the way, bracketed lower teeth.
- Placed patient in upper & lower .016 stainless steel wires.
- Placed normal bite opening bends in wire and had patient wear 2 once, Class II elastics.

### Stage III (Figures 8A & B)

- Opened bite as much as we could, but still had an overjet to contend with.
- Molars are end-to-end Class II.
- About a 4 mm overjet.
- Bicuspid were bracketed in pre-stage III.
- Rectangular wires placed in stage III. (Figures 7A & B)
- Patient is placed in twin force functional appliance.

### Treatment (Figures 9A & B)

- Patient in functional for three months
- Anterior teeth are now end-to-end. They were over corrected on purpose due to potential relapse.

### End of Treatment

- Patient is now Class I molar relationship with 20% overbite. Figure 10A & B were taken about six months after treatment.



BEFORE



AFTER