

Crossbow's Competition and Dealing With Side Effects

Crossbow's Competition

- Headgear: Advantages: easy to install, low cost, no lower incisor proclination, opens space for upper canines, no emergencies

Disadvantages: compliance, U7 impaction, upper lip retraction, not great for subdiv cases

Crossbow's Competition

- Class II elastics: Advantages: low cost, best for lower molar eruption in deep overbite and short lower facial height, no emergencies, good for subdiv cases, less upper lip retraction

Disadvantages: compliance, upper incisor eruption, lower incisor proclination/root prominence



Bite opening in phase two with eruption mechanics (bite turbo and Class II elastics) while the patient is growing and mandibular growth can compensate for the downward and backward rotation of the mandible.

Crossbow's Competition

- Twin Block: Advantages: two impressions, no emergencies, 1-2 mm extra mandibular length
Disadvantages: compliance, speech, breakage, no banded RME, not great in subdiv cases, lower incisor proclination/prominence, especially with overcorrection, needs overjet, not great with crowded upper canines

Crossbow's Competition

- Herbst: Advantages: compliance, 1-2mm extra mandibular length, RME can be built in
Disadvantages: lab bill, crowns hard to remove, needs overjet, not great with crowded upper canines, sores, lower incisor proclination/prominence, especially if over-correction, not great in subdiv cases

Crossbow's Competition

- Crossbow: Advantages: compliance, unilateral control similar to Class II elastics, RME built in, LLA built in, RME X 6 compatible, opens space for U3's, side effects settle before phase 2
Disadvantages: cost, 6 bands, proclines lower incisors, sores, pushrod adjustment



Initial unilateral Class II



Left spring only



Over-correction after 5 months, incisors edge to edge, note side effect of posterior openbite but no anterior occlusal canting



After 1 month settling



After 2 months settling



After 5 months settling



May Cause Temporary Posterior Openbite
Supports Upper Incisor Intrusion
Segment Archwire Before Attaching Springs



RME X 6/Xbow

This is an example of why we segment the arch wire distal to the canine before placing springs.



Isolate the anterior teeth from the side effects of the Class II springs...
...to avoid extrusion of the anterior segment, and...
...to avoid anterior canting when the spring is used on one side only, and...

We have just removed the springs after over-correcting the first bicuspid to a half cusp Class III

The lower incisors are overly proclined. They have been tipped forward, leaving the roots in bone.



The bicuspid crown relapses forward by tipping, leaving the root apex Class I. The lower incisor relapses back by tipping, leaving it proclined 3 degrees on average.

Crossbow's Competition

- Phase One Class II Elastics: Advantages: No lab bill but still pricey, shortens phase 2, no emergencies, less upper lip retraction
Disadvantages: compliance, possible over-eruption of upper canines leading to over-eruption of upper incisors in phase 2, possible over rotation of upper molars, RME not part of appliance, unilateral use can cause canting, lower incisor proclination/prominence

The greater the Class II, the greater the side effects from Class II elastics and Class II springs.

Class II elastics cause tooth eruption which does not tend to relapse. Class II springs cause tooth intrusion and posterior openbite which does tend to relapse. Over-eruption of upper incisors (and upper canines with phase one Class II elastics) can lead to a gummy smile.

A unilateral Class II elastic on a full edgewise appliance (FEA) is no problem.

A unilateral phase one Class II elastic is likely to cause an occlusal cant that might be unrecoverable.

A unilateral Class II spring on a FEA can also cause an occlusal cant and an openbite that requires good anterior vertical elastic cooperation to resolve. A unilateral spring on a Xbow does not cause a cant because there are no brackets on the lower incisors. Any unilateral intrusion will relapse.

Class II springs with a FEA cause buccal flaring of upper molars which may require posterior crossbite elastics to recover from. Class II springs on a Xbow do not cause the same flaring because of cross arch stabilization by the RME.

Both Class II elastics and Class II springs cause proclination of the lower incisors. Dr. Anthony Mair has warned about the use of Class II elastics with lower aligners which cause bodily root movement, root prominence, and gingival recession of the lower incisors.

Xbow causes a temporary over-proclination of the lower incisors followed by partial but incomplete uprighting.

This is necessary in order to over-correct the Class II buccal relationship and to achieve the "bite-catching effect" and a socked in Class I bicuspid relationship **BILATERALLY!**

The fact that the Xbow is a phase one appliance allows the clinician to achieve **RAPID** over-correction of the sagittal and transverse problems soon after the eruption of the first bicuspids to take advantage of the "bite-catching effect" of the steep cusps of the first bicuspids. The side effects such as posterior openbite and over-proclination of the lower incisors tend to relapse before phase two full edgewise.

The clinician has a better idea of where the incisors will end up after phase two and can modify the treatment plan at the beginning of phase two.

If there is still a deep overbite to treat in phase two then a combination of a bite-turbo and Class II elastics may be used for rapid bite-opening. The patient only has to cooperate with elastics for a short time so burn out is not as big a problem compared to depending on Class II elastic use in phase one and phase two to correct the entire malocclusion. There is also less chance of over-erupting the upper incisors with short term use of the Class II elastics.

Crossbow's Competition

- Class II Springs to the Archwire: Advantages: compliance, no lab bill but still pricey, less upper lip retraction
Disadvantages: RME has to be done as a separate stage, sores, lower incisor proclination/prominence, leaving Class II correction until mid treatment then dealing with side effects like posterior openbite, anterior canting in subdiv cases, buccal flaring of upper molars

Longer treatment time with Forsus to the archwire is due to dealing with the spring side effects late in treatment such as posterior openbite and buccal flaring of the upper molars. The greater the correction the greater the side effects and the longer it takes to deal with them.

There is no buccal flaring of the upper molars with Xbow.

Much of the posterior openbite and proclination of the lower incisors rebound before full braces are placed.

[Drs. Miller, Tieu, and Flores-Mir's](#) article titled "Incisor inclination changes produced by two compliance-free Class II correction protocols for the treatment of mild to moderate Class II malocclusions" is in the online version of the Angle Orthodontist.

It is based on Dr. Bob Miller's clinical study.

He compared 36 Class II patients treated in one phase with Forsus to the archwire in a full edgewise appliance to 38 similar Class II patients treated in two phases with Xbow

followed by a full edgewise appliance. The Forsus to the archwire group was finished in an average of 30.2 months (between records). The Xbow group was finished in an average of 24.2 months (between records), which included a 4 to 6 month rest period to allow for relapse. The two phase Xbow patients were completed 6 months faster on average than the one phase Forsus to the archwire patients (time between records).

The Forsus to the archwire group had full braces for an average of 26.75 months. The Xbow group had full braces for an average of 16.68 months, or 10 fewer months.

There was no significant difference in the lower incisor to mandibular plane angle between the two groups. The Xbow patients ended up with lower incisors at an average of 100 degrees to mandibular plane which is considered a reasonable compromise for non-extraction Class II compensation.

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The side-effects of Forsus on the archwire are especially problematic when the spring is used unilaterally late in treatment.

The unilateral posterior openbite and anterior canting requires prolonged treatment with good elastic cooperation to recover.

We do not see the anterior canting when the spring is used unilaterally on a Xbow because there are no lower brackets.

The fact that the first bicuspid are already Class I after Xbow therapy reduces the time in phase two braces and the need for side-effect correction with elastics.

I use the same principles when using the Forsus device with a full edgewise appliance as I do with Xbow.

Use the 22mm Direct Pushrod distal to the lower first bicuspid instead of the canine, if possible.

This keeps the Forsus device more compact and moves it distal to the anterior curvature of the arch, preventing the need for rod adjustments. It also keeps the spring distal to the Obicularis Oris muscle, preventing sores.

The only difference is you cannot fully compress the spring with an edgewise appliance if you use a bracket as the anterior stop.

If you do be prepared to rebond the bracket. Don't forget to steel tie the first bicuspid.

Reactivate the springs with crimpable stops on the rods or use longer rods.

Dr. Bob Miller taught us to hook up the pushrod using an Alastic KX module to activate the spring but at the same time remove the force from the canine or first bicuspid bracket. This also negates the need to cinch the distal end of the arch wire.

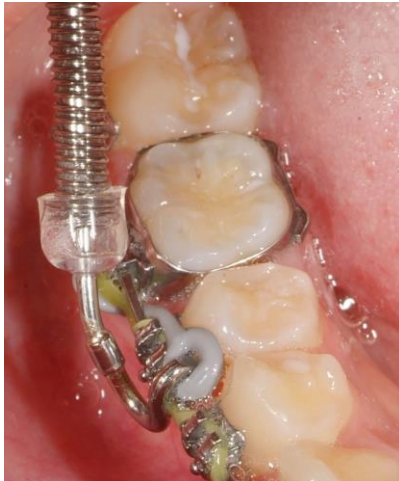
Place the springs and pushrods as you would normally but don't close the loop yet. Make the pushrod adjustments leaving 1mm of play in the spring, remove the pushrod, pre-stretch a KX-1 module, place the KX module on the pushrod, place the pushrod on the archwire, close the pushrod loop, hook the KX module to the first molar hook using floss and a floss threader over the second bicuspid bracket and down between the second bicuspid and first molar, then place the pushrod in the spring. This completely activates the spring without debonding the canine or first bicuspid bracket.

If we place the 22 mm or 25 mm pushrod distal to the first bicuspid we use a KX-1 module.

We also use a KX-1 module distal to the canine in a bicuspid extraction case.



Elastic KX-1 module placed with floss threader



Elastic KX-1 module and lingual tuck-in pushrod adjustment on 25mm rod



Alastic KX-1 module hook-up distal to canine (severe Class II, patient decided against mandibular advancement surgery after preparation)



Alastic KX-1 Module hook-up distal to first bicuspid



Alastic KX-1 Module hook-up distal to canine (bicuspid extraction) with a 22 mm pushrod.



Spring Sleeve available from Comfort Solutions