

## THE JASPER JUMPER APPLIANCE; USAGE, EFFECTS AND RECENT MODIFICATIONS

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### ABSTRACT

*The Jasper Jumper is a fixed functional appliance producing dento-alveolar forces to correct mild to moderate skeletally class 2 malocclusions.*

*Various methods have been described to apply the Jumper utilizing its maximum potential. The mechanism of Class II correction with the Jasper Jumper includes: basal restraint of the maxilla, dento-alveolar retraction of the maxillary dentition, dento-alveolar protraction of the mandibular dentition, increased growth at the mandibular condyle, downward & forward glenoid fossa remodeling, and lateral expansion of the maxillary molars.*

**Key words:** Jasper Jumper, Fixed Functional Appliance, Condylar growth, Growth Modification.

### INTRODUCTION

Patient cooperation is a never-ending concern for orthodontists. Removable appliances leave the orthodontist totally dependent on the patient, and bonded functional appliances present hygiene and cleanup problems. The need is for a fixed appliance that takes responsibility from the patient and places control of the case in the orthodontist's hands<sup>1</sup>.

The Jasper Jumper is a relatively new auxiliary capable of producing rapid change in occlusal relationships. It is a flexible fixed appliance that delivers light, continuous force. It can be used to move single teeth, units of teeth or an entire arch. It can deliver functional, bite jumping forces, headgear-like forces, elastic-like forces, or a combination of these.

The element of control is the most important advantage of the Jasper Jumper. The appliance certainly offers more directional control than elastics or fixed coil springs, with their extrusive and constrictive forces on the lower molars and extrusive forces on the upper anterior teeth.

The Jumper can be easily placed, activated, and removed. It does not interfere with space consolidation, extraction treatment, or non-extraction treat-

ment, and it enhances mandibular leveling. It can be used with bite planes, J-hook headgear, and various elastic combinations<sup>2</sup>.

Patient acceptance is excellent because the patient's only responsibility is to keep the appliance clean and avoid breakage. The Jumper's flexibility makes oral hygiene easy, and because the appliance curves away from the occlusal table on closing, it does not interfere with chewing.

### BIO-MECHANICS OF THE JASPER JUMPER

When the Jumper is first installed, it bows toward the cheek. Over time, the mandible moves forward to a neutral position. Mastication then helps deliver intrusive and distalizing forces on the upper molars, much as a high-pull facebow would, along with intrusive forces that work to level the lower anterior teeth.

Furthermore, the forward and downward positioning of the mandible is along the y-axis, allowing the jaws freedom for normal growth.

**The usual results of using the Jasper Jumper area:**

- 1 Intrusion and distalization of the upper molars, with occasional opening of the posterior bite similar to that seen with a Herbst appliance.

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- 2 Some indication of condylar growth<sup>4</sup>.
- 3 Anterior migration of the mandibular teeth through alveolar bone.
- 4 Intrusion of the lower incisors.
- 5 Expansion of the upper molars if heavy, constricted maxillary archwires and/or transpalatal bars are not used.

Good results have been obtained in mixed dentition, adolescent dentition, and adult cases. Treatment time is usually shortened because of 24-hour-per-day, uninterrupted force application. Dr. James Jasper, originator of the appliance, allows six months for leveling and anchorage preparation, six to nine months for Jasper Jumper use, and 12 months for finishing. Leaving the Jumper passively in place for three to four months enhances the stability of the results.

The following modifications to Dr. Jasper's original technique<sup>1</sup> have been developed to make the appliance easier to incorporate into a busy practice schedule. They allow almost complete delegation of insertion, where permitted by state law, and give the clinician more control over several potentially adverse side effects.

#### RECENT APPLIANCE MODIFICATIONS<sup>2</sup>

Use a transpalatal bar or a full-slot, heavily constricted maxillary archwire unless a slow palatal expansion is desired. The palatal bar allows space closure, leveling, and rotation correction to proceed while the Jumper is in place.

Even in fully bonded cases, add a looped lower lingual arch to enhance anchorage. The only exception would be an extraction case in which mandibular molar advancement is needed for space closure.

Always use the largest possible rectangular wire (fill the slot) in the lower arch.

If possible, use -5° lower anterior brackets, or add anterior lingual crown torque to the lower archwire to enhance anchorage.

If anterior vertical elastics are required, back them up with high-pull J-hook headgear to prevent extrusion of the upper anterior teeth<sup>5</sup>

#### INTRA-ORAL FITTING OF THE APPLIANCE

Have the patient bite in centric relation, and measure from the mesial of the first-molar headgear tube to the distal of the Teflon friction ball. Add 12mm to the measurement to obtain the correct Jasper Jumper size. If there is no appliance of that size, select

the next larger size and allow the ball pin to protrude more distally from the upper molar tube (Fig 1).

Each Jumper is marked "UR" (upper right) or "UL" (upper left) with one of seven sizes. Do not attach a Jumper upside down or on the wrong side; this will cause binding and subsequent archwire, bracket, or appliance breakage.

Attach the Jumper to the upper headgear tube using the supplied ball-pin attachment. Feed the pin through the upper hole in the Jumper, then through the distal end of the headgear tube. Leave 2-3mm protruding distally to prevent binding. Free movement is essential.

For patient comfort and acceptance, it is advantageous in initial placement to let the ball slide out far enough that the appliance is passive. At the next visit, the maxillary attachment can be advanced to activate the Jumper<sup>1</sup>.

There will be a bow in the appliance at first, but the patient will soon position forward as with other functional appliances (Fig 2 & 3).

#### CONNECTION AND ACTIVATION

There are several ways to connect the Jumper to the lower arch. Each method has advantages and disadvantages.

**Method One:** As the appliance was originally designed by Dr. Jasper, offsets are placed in the lower .018"x.025" or .021"x.028" archwire, distal to the cuspid bracket, and the first bicuspid bracket is removed. The Teflon friction bar is slid onto the archwire, followed by the lower end of the Jumper. The arch is then ligated in place, and the upper portion is attached to the headgear tube. The archwire must be bent down distal to the terminal molar to prevent slippage.

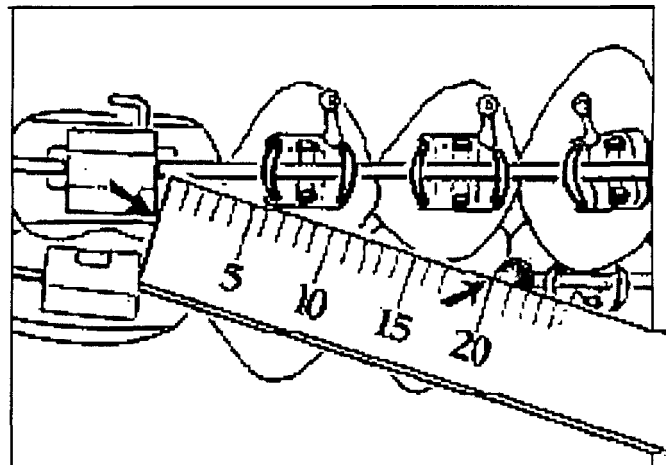


Fig 1. Measurement of the Jumper

**Method Two:** Make an attachment out of an .017"x.025" stainless steel wire, soldered to a Rocky

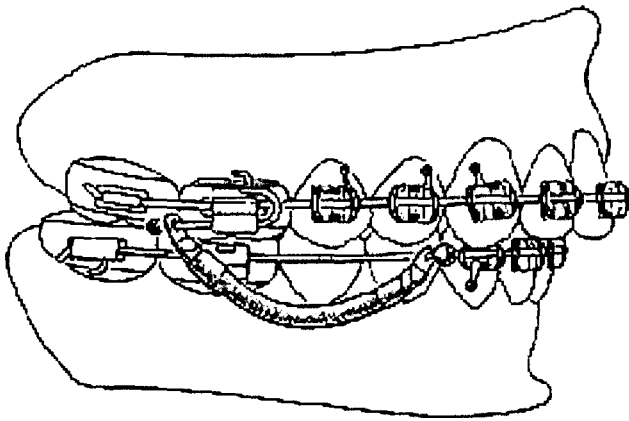


Fig 2. Intra-oral Side View

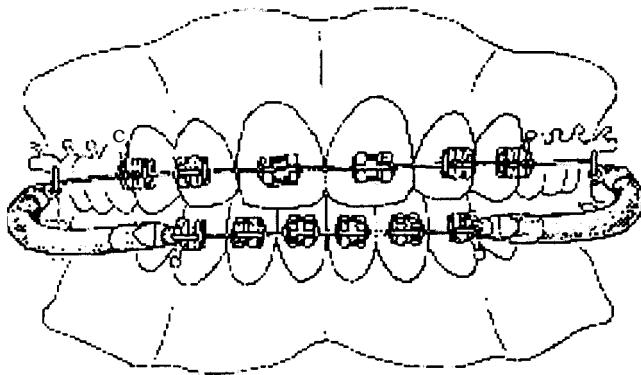


Fig 3. Intra-oral Front View

**Advantage:** No additional parts required.

**Disadvantages**

- 1 Unattached bicuspid tend to erupt above the occlusal plane as the anterior teeth are intruded.
- 2 Jaw opening is limited because the lower portion of the Jumper tends to bind at the second bicuspid. Limited opening is a major disadvantage of some similar flexible fixed appliances.
- 3 Replacement of a broken Jumper requires removal of the entire archwire.
- 4 If an arch breaks or comes untied at the distal tieback, all the force is transferred to the anterior teeth, which tends to tip them forward, depress them, and open space.
- 5 Removing the Jumper for an occlusal check is time-consuming.
- 6 In an extraction case, it is difficult to close spaces because the Jumper must be attached to the arch before closing loops are bent.

Mountain Lock, then bent so as to pass distal to the lower first molar. The lock is attached between the bicuspid and cuspid.

An alternative is to place the lock distal to the molar bracket with the wire bent distal to the cuspid. This approach uses a free-sliding quick connect. The wire runs parallel to the main archwire, allowing the Jumper to clear the bicuspid brackets.

### **Advantages**

- 1 The attachment can be made in the office laboratory, and placement can be delegated to an assistant— simply screw on the attachment, measure, and place the Jumper.
- 2 The jaws can open fully.
- 3 Force is directed distal to the molar; if the archwire breaks, there is no effect on the anterior teeth.
- 4 The Jumper does not interfere with space closure or leveling procedures.
- 5 A broken Jumper is easy to replace.
- 6 No auxiliary tubes are needed on the mandibular molars.

### **Disadvantages**

- 1 Laboratory time is required to solder and bend the attachment.
- 2 The Rocky Mountain Lock assembly is an additional expense.

**Method Three:** The most time-effective setup uses an auxiliary tube on the lower first molar and pre-formed .017"x.025" sectional arches. The sectional arch is looped over the main archwire, with enough separation for the Jumper to clear the bicuspid brackets and avoid occlusal interference.

### **Advantages**

- 1 The sectional arches can be bent by assistants during free moments. After measurement by the clinician, the Jumper can be attached by an assistant.
- 2 If breakage occurs, there is no adverse effect on the dentition.
- 3 The material is inexpensive.
- 4 It is easy to change or remove Jumpers.
- 5 The appliance delivers force distal to the mandibular molar tube, rather than to the archwire.
- 6 Full jaw opening is possible.
- 7 A longer Jumper can be used, allowing more freedom of movement and reducing the chances

of breakage. A longer Jumper is less likely to take a set and lose efficiency, and therefore delivers a more constant, controllable force.

- 8 The mandibular first bicuspid brackets do not need to be removed to prevent overeruption.
- 9 A fatigued Jumper can be reactivated by placing a Rocky Mountain Lock mesial to the Teflon friction ball, positioning the ball more distally.

**Disadvantages:** None.

## DISCUSSION

The Jasper Jumper is an excellent appliance for class two cases requiring dento-alveolar sagittal correction<sup>6-7</sup>. The 24 hour constant force generates a round-the-clock forward mandibular pressure, which corrects class two deficiencies earlier as compared to inter-maxillary elastics<sup>8</sup>.

However, The force magnitude of the jumper is regulated by the extent of distortion of the open coil. The longer the spring in relation to a certain distance, the more it will bend and the higher its resulting initial force magnitude will be. The set expansion force does not remain constant but falls in course of time.

The initial spring force of about 4N (400 grams) will be reduced by half after a week. The embedding polymer, which is first of all rigid and then denaturates due to the patients oral functions and or the patients thermal and chemical influences of the oral cavity., plays an essential part in this initial force decline. The remaining force magnitude is attained essentially by distortion of the open coil. This amount of force also falls in time due to metal fatigue and plastic deformation due to chewing biting sucking between the teeth etc. tow or three months later the force magnitude will have declined to about 1 N<sup>9-10</sup>.

The Jumper has a flexible bite jumping effect that pushes against the maxillary and mandibular dentitions. This module is a modification of the bite jumping mechanism of Herbst that was developed nearly 100 years ago<sup>11</sup>. The Jasper Jumper and the related Herbst appliance produces a relatively rapid correction of a Class II malocclusion by both sagittal and intrusive forces. Both skeletal and dentoalveolar adaptations have been observed with the jumper mechanism<sup>12</sup>.

The appliance system has been improved over the last 10 years, so that now the modules are more resistant to fracture during appliance wear. Patients should be instructed not to chew on the appliance and

also not to perform wide open movements. Strict dietary controls are mandatory. In addition, the patient should be cautioned repeatedly not to "pop" the modules after yawning or excessive wide opening<sup>1-2</sup>.

As mentioned earlier, it is critical that the clinician must prepare anchorage before the force module is placed against the lower arch. If the arch wire is full sized (or nearly so) and is properly anchored posteriorly, forward movement of the lower dentition is minimized. The placement of lingual crown torque anteriorly and tip-back bends posteriorly will further enhance anchorage. If the clinician is concerned about the mesial movement of the lower dentition, use of lighter forces with the module is advocated.

## CONCLUSION

Dento-alveolar and skeletal results with the Jasper Jumper have been promising. Insertion and activation is easy as various methods can be applied according to the amount of force required and chair-side time available. Care should be taken towards proper insertion and activation. Patient acceptance of the appliance is excellent, and appliance breakage is nowadays rare.

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