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**Dentofacial Orthopedics: The Herbst Appliance**

One of the most common problems in orthodontics is correction of Class II malocclusion.. In most cases, the improper bite is caused by a lower jaw that is too far back in relationship to the rest of the face due to skeletal mandibular retrusion. Correction of this growth imbalance between the upper and lower jaws requires the orthodontist to limit the forward and vertical development of the maxilla and maxillary dentition while promoting forward development of the mandible and mandibular dentition.

Removable functional appliances and headgears are capable of producing highly successful orthopedic results when worn properly. However, they are completely dependent upon patient cooperation to achieve the desired result. (Fig 4) In many instances, a lack of cooperation leads to frustration for patient, parents, and doctors. Despite considerable research, there is no correlation between any demographic or socio-economic variable and patient non-compliance.

The research literature has demonstrated that the most important variable in patient attitudes towards orthodontic treatment in general was their own perception of the severity of the problem.) With this in mind, many orthodontists have started taking advantage of fixed functional appliance concepts with the herbst appliance.



**Fig 1 : Clinical Photographs: Before and after herbst appliance application.**

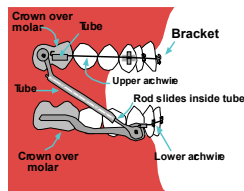
## Appliance Design

The bite-jumping appliance was first described by Dr. Emil Herbst in 1905. In 1934, he published a series of papers describing his experiences with this treatment method. However, it was not until 1979 that Dr Hans Pancherez published a valid, controlled study that brought attention to this treatment.

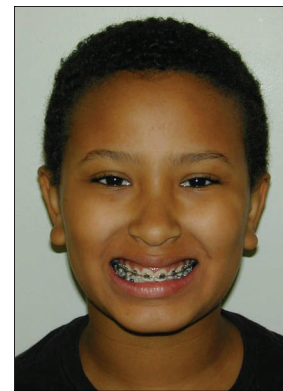
The herbst appliance works by positioning the mandible in a forward position like a functional appliance but with one exception: it is fixed in place, this negating any noncompliance problems that may be encountered. The appliance consists of bilateral telescopic tubes that are attached to bands or crowns. It allows for normal vertical opening and limited lateral movement while maintaining forward mandibular position. The appliance is fixed (cemented) and is worn 24 hours a day for approximately 9-12 months.

There are several advantages to the Herbst appliance

1. No removable parts, thus cooperation is therefore not an issue.
2. Breakage is minimal and hygiene is not a problem
3. Stainless steel crowns provide excellent strength and retention
4. Correction of Class II malocclusions are treated more efficiently.



**Fig 2 : Intra-oral photo and illustration of a Herbst appliance.**



**Fig 3: Patient in treatment with Herbst appliance.**



**Fig 4: Photos of other functional appliances that may be used. Above: Bionator. Below: High pull headgear. Both appliances require patient compliance.**

### Mechanism of Action

In a separate study Pancherz delineated the components of change responsible for class II correction in patients treated with the herbst appliance:

1. Maxillary growth inhibition 6%
2. increased mandibular growth 37%
3. distal movement of maxillary molar 42 %
4. mesial movement of mandibular molar 15%

Pancherz and Hagg in another study of consecutively treated cases compared the somatic maturation level to the mechanism of Class II correction. They found that mandibular growth accounted for 61% of the overjet reduction when treatment occurred during the pre-peak period this percentage dropped 49% and if it occurred during the post-peak period, it fell to 34%. However, Class II correction was still obtained through increased dentoalveolar changes.



**Fig 5: Left: side profile photo of patient prior to treatment. Right: buccal views of before treatment and model of Herbst appliance.**

### Conclusion

The need for patient compliance in achieving a Class II correction is often the most limiting factor in determining the duration of treatment and the quality of result achieved. Non compliance therapy aims to remove some of these patient determined variable factors. While this type of treatment may be useful in the non compliant patient, reducing the need for compliance in all of our patients may be advantageous. The herbst appliance is another orthopedic tool that many orthodontist have utilized in order to alleviate patient non-compliance problems.



**Fig 6: Above: Before and after treatment with Herbst appliance. Below: Intraoral view of patient in retention.**

### References

1. Pancherz, H. Treatment of Class II malocclusion by jumping the bite with a Herbst Appliance, Am. J. Orthod. 76:423-442, 1979
2. Pancherz, H. The Herbst Appliance: It's biological effects and clinical use. Am J. Orthod. 87:1-20,1985.



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| 1. | T F | The bite-jumping appliance was first described by Hans Pancherez in 1905.  |
| 2. | T F | In most cases the improper bite is caused by a lower jaw that is too far back in relation to the rest of the face. |
| 3. | T F | Removable functional appliances are highly successful because they do not depend on patient compliance.            |
| 4. | T F | The Herbst appliance works by posturing the mandible forward. It is fixed in place.                                |
| 5. | T F | The mechanism of action of the Herbst appliance is a) Inhibit maxillary growth, and b) Increase mandibular growth. |