



HOW FUNCTIONAL APPLIANCES CAN IMPROVE TMJ HEALTH

Seventy percent of all malocclusions are Class II and approximately 80% are Class II skeletal with normally positioned maxillas and retrognathic mandibles. These patients traditionally have narrow maxillary arches, moderate to large overjets and deep overbites. Routinely, these patients have internal derangements of the TMJ, evidenced by posteriorly displaced condyles and anteriorly displaced discs. Posteriorly displaced condyles compress the nerves and blood vessels in the bilaminar zone distal to the condyle. Functional appliances reposition the condyle downward and forward away from the nerves and blood vessels. There are basically three ways to treat these Class II skeletal malocclusions.

1. Retractive technique, which involves the extraction of the maxillary first bicuspids and the retraction of the six anterior teeth to correct the overjet.
2. Surgical technique, which involves surgically repositioning the lower jaw forward to correct the overjet. Two prominent orthodontists, Dr. Sabine Ruf and Dr. Hans Pancherz, reported that patients with pre-existing TM Dysfunction (articular disc displacements) did not improve with orthognathic surgery to advance the mandible. They reported a high degree of success in improving the health of the TMJ when functional appliances such as the Herbst appliance were utilized.
3. Functional technique, which expands the constricted maxillary arch, solves the airway problem, repositions the lower jaw forward to correct the overjet, and erupts the lower posterior teeth to correct the deep overbite.

My experience and that of many other orthodontic clinicians who evaluate the health of the TMJ prior to, during and after orthodontic treatment, confirms that if there is an existing TM dysfunction prior to orthodontic treatment, then the retractive and surgical technique do not solve the problem. Conversely, when the lower jaw is repositioned anteriorly with either a Twin Block Appliance (for patients under age 11) or a MARA Appliance for teenagers and adults, there definitely is a reduction in the signs and symptoms of TM dysfunc-

tion. This can be confirmed by employing a TMJ Health Questionnaire, range of motion measurements, muscle palpations, JVA (Joint Vibration Analysis), TMJ x-rays (tomograms) prior to, during and after orthodontic treatment.

The functional technique basically involves relating the mandible to the maxilla ideally in three dimensions: transversely, anteroposteriorly and vertically. The most effective way to accomplish this is to use functional orthopedic appliances.

The six keys to TMJ health are:

1. Maxilla Must Be the Proper Width

The key to TMJ health is to develop the maxilla to its correct width and length using functional appliances. If the maxilla is too narrow and the mandible needs to be advanced, the case will not be stable as the maxillary teeth will be in a posterior crossbite. Therefore, the first step in the functional treatment of Class II skeletal patients with retrognathic mandibles is to expand the maxillary arch. The advantages include expanding the nasal cavity, which encourages nasal breathing, making more room for the eruption of the permanent teeth, and allowing more room for the tongue, which helps ensure proper speech and gives the patient a broad smile.



Constricted Upper Arch - No room for Laterals



Upper Schwarz Open 5mm. - Room for Laterals



Narrow Arch - No room for Laterals



Broad Arch - Left Lateral Erupted

2. Proper Inclination of the Maxillary Incisors

If the maxillary incisors are too vertical or, in fact, lingually inclined (e.g. Class II Div 2), this frequently results in trapping the mandible, which prevents it from coming forward to its correct position. These lingually inclined incisors can be moved to their correct inclination by utilizing an appliance called an Anterior Sagittal. The first step to correcting a Class II Div 2 malocclusion is to move the incisors forward to create a Class II Div 1 malocclusion (overjet increased). A functional appliance such as a Rick-A-Nator (fixed) or a Twin Block II (removable) can then be utilized to move the lower jaw forward, which allows the condyles to assume their proper position, downward and forward in the glenoid fossa.

3. Proper Relationship Between the Maxilla and the Mandible

As mentioned previously, Class II skeletal patients with retrognathic mandibles routinely have moderate to large overjets with the condyles posteriorly displaced and the discs anteriorly displaced. When these patients open to talk or to chew, their jaws click. The treatment of choice would be to use a functional appliance such as a Twin Block (removable appliance) or a MARA Appliance (fixed functional appliance) to advance the mandible, which moves the condyle down and forward to recapture the

disc. The literature is clear: if the disc can be recaptured, most patients have a significant reduction in the signs and symptoms of TM dysfunction.



MARA Appliance



MARA Appliance Advance Mandible 5mm



Class II Skeletal Retrognathic Mandible



Class I Skeletal Straight Profile

4. Correct Unilateral Crossbite

Some patients with narrow maxillary arches have unilateral posterior crossbites due to the shifting of the mandible to one side in centric occlusion. This causes a facial asymmetry and the condyle appears posteriorly displaced, on the side to which the mandible is shifted. This can cause a breakdown of the head of the condyle over time if not corrected and the condyle can actually shorten on the affected side. This problem must be corrected as soon as possible (any time after age four).

The treatment of choice is to expand the maxilla using a Schwarz Appliance (removable) or a Hyrax Appliance (fixed). Both of these appliances have midline screws to expand maxillary arches. The bilateral expansion allows the mandible to center itself within a properly developed maxilla and the unilateral crossbite, TM dysfunction and facial asymmetry are corrected.

5. Lower Posterior Teeth Must Be Uprighted Over the Basal Bone

Lower posterior teeth that are lingually inclined must be uprighted with functional appliances to assure a proper occlusion and TMJ health. This uprighting makes more room for the tongue, which helps ensure proper speech and establishes proper vertical dimension. This can be accomplished with a lower Schwarz Appliance (removable) or a Memrex Appliance (fixed).

6. Establish Proper Vertical Dimension

When a patient presents with a deep overbite, this frequently is due to a deep curve of Spee caused by a mouth breather whose lower tongue position depressed the posterior teeth. Patients with deep overbites usually have their condyles posteriorly displaced, which compresses the nerves and blood vessels distal to the condyle. This can cause many symptoms such as headaches, ear aches, dizziness, neck pain, ringing in the ears, ear congestion, pain behind the eyes, tingling of the hands and arms, and even shoulder and back pain. This depression of the lower posterior teeth can cause the muscles to become shortened, which can lead to excessive muscle contractions of the muscles of mastication and other surrounding muscles. This results in increased soreness and, in many cases, the formation of trigger points. A trigger point is a knotted muscle and is extremely painful.

The solution to this problem is to utilize a functional appliance such as a Rick-A-Nator to stabilize the lower jaw with an incisal ramp, prevent the eruption of the anterior teeth, and to encourage the eruption of the posterior teeth. The establishment of proper vertical dimension is an extremely important factor in achieving TMJ health.

Orthodontic clinicians, general dentists and orthodontists must evaluate their treatment plan carefully and must employ a functional philosophy if the patient presents with existing TM dysfunction. In the future, the treatment goal must be to not only achieve straight teeth but also broad smiles, straight profiles and healthy temporomandibular joints. The overall, long term health of the patient depends on which treatment philosophy is utilized.

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1. Patients with internal derangements of the TMJ routinely have:

- A. Posteriorly displaced condyles and normal disc position
- B. Posteriorly displaced condyles and anteriorly displaced discs
- C. Posteriorly displaced condyles and posteriorly displaced discs

2. The treatment of choice for a Class II skeletal patient with TM dysfunction:

- A. Extraction of maxillary first bicuspid
- B. Surgically advance the mandible at age 17
- C. Twin block or MARA Appliance

3. One advantage for expanding the maxilla:

- A. Encourages mouth breathing
- B. Prevents extraction of permanent teeth
- C. Increases referrals to speech therapists

4. Proper inclination of the maxillary incisors:

- A. Helps to prevent Class II malocclusion
- B. Traps the mandible
- C. Causes TM dysfunction

5. The advantages of having a proper relationship between the maxilla and mandible:

- A. Helps keep the condyle in the rearmost, uppermost position
- B. Helps recapture anteriorly displaced discs
- C. Guarantees that patients will never suffer from TM dysfunction

6. What is the cause of the unilateral crossbite?

- A. Occlusal interferences
- B. Narrow maxillary arch
- C. Nasal breathing

7. When treating Class II skeletal malocclusions with narrow maxillas and retrognathic mandibles, the sequence of treatment is as follows:

- A. Advance mandible, then expand maxilla
- B. Expand maxilla, then advance the mandible
- C. Just advance the mandible

8. Trigger points can be caused by the following:

- A. Dental open bite
- B. Deep overbite
- C. Class III molar relationship

9. The function of the Rick-A-Nator is to:

- A. Correct the deep overbite
- B. Correct the anterior open bite
- C. Achieve Class II molar relationship

10. Which of the following functional appliances will not move the mandible forward?

- A. Twin Block Appliance
- B. Schwarz Appliance
- C. MARA Appliance