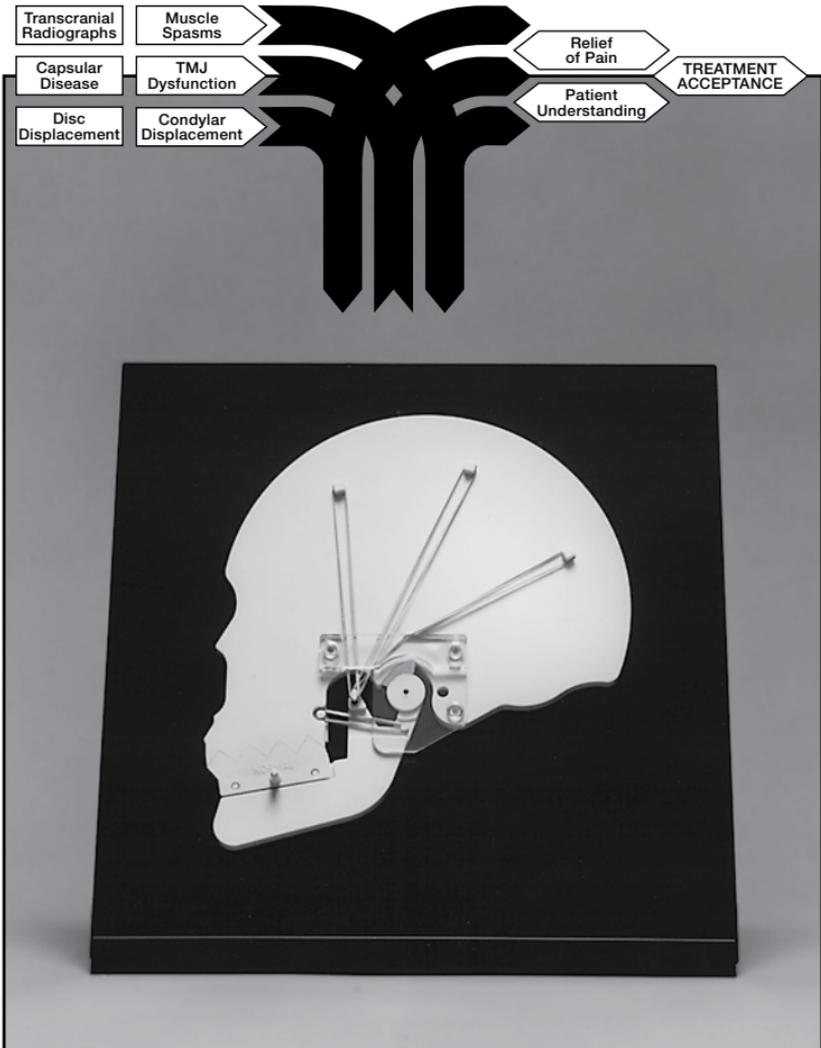

Simplifying the Complex



***The DENAR[®] TMJ Tutor
Instruction Manual***

Acknowledgements

Whip Mix Corporation is pleased to offer the TMJ Tutor, an effective patient communication device which visually demonstrates the patient's TMJ problem and encourages patient understanding and acceptance of the recommended treatment program.

We are particularly grateful to Dr. Donald A. Rolfs of Wenatchee, Washington, for his original design concept of the TMJ Tutor. His far-reaching insight for the need for this type of patient communication aid is becoming more and more apparent as the practice of TMJ continues to expand and the need for patient education increases. Special appreciation goes to Dr. Bernard Williams whose input for the manual added to the practical implications for use.

Drs. Harold Gelb, Jack Haden and Gerald Murphy's enthusiastic support of the TMJ Tutor confirmed the value and need for simple, yet comprehensive tools to aid in patient communication.

Appreciation is acknowledged to Dr. Clifford Fox who pointed out the advantages of such a device in the dental office and recommended that the product be pursued.

Thanks should also be given to Dr. William Farrar whose concern with jaw repositioning appliances demonstrated the need for a device which could explain appliance use to patients.

And finally, we are grateful to Dr. Peter Dawson whose input contributed towards making the TMJ Tutor a more valuable tool in patient education.

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I. Introduction/Rationale for Development

Because of the relative newness of TMJ diagnosis and treatment there has been only a limited amount of consumer information published and disseminated. As a result, many patients find it difficult to understand that ear, head, neck, back, facial and other pains could be a result of jaw joint disharmonies and related problems. Consequently, it may be difficult to obtain treatment acceptance. It is thus up to you, the dentist, and your staff, to begin the process of educating the patient about the jaw joint and how it can affect the individual's total health. This can be difficult at times. To aid you in this task, Denar has developed the TMJ Tutor, an innovative and highly effective communication device which helps simplify complex terms and conditions to the patient.

The TMJ Tutor illustrates the anatomical relationship of the human anatomy to provide the patient with a clear understanding of TMJ dysfunction. The various interrelationships between head and neck, seemingly unrelated to the TMJ area, become rather obvious once visually portrayed on the Tutor. Through this visual presentation of the various interrelationships, the patient is immediately clued to recognize that "headaches" can be caused by the muscles that are attached to the jaw. By visually demonstrating the patient's specific TMJ condition, the device encourages patient understanding and treatment acceptance.

II. Features and Benefits

- The TMJ Tutor closely simulates the human skull and tooth/muscle/condyle/disc/fossa interrelationships to provide easy understanding of TMJ dysfunction.
- Movable mandible, disc, muscles, and inserts illustrate cause/effect relationships.
- Five teeth and four splint/jaw repositioner inserts are provided. This allows you to customize the presentation to the specific condition of each patient thereby enhancing patient understanding.
- Shows how necessary adjustments will correct TMJ dysfunction.
- Aids in radiograph explanation.
- Patient understanding encourages recommended treatment program.

- Comes with 100 patient booklets. Patients can therefore leave the office with a permanent visual presentation of their problem to share with their family and gain support for the recommended treatment.
- Three reference points are depicted. They are the auditory meatus, the eye and the nose. These will help the patient to relate to the anatomy and understand the dysfunction.
- The TMJ Tutor can be easily operated from the rear. The patient can clearly see the demonstration without obstruction and thereby better understand the recommended treatment.

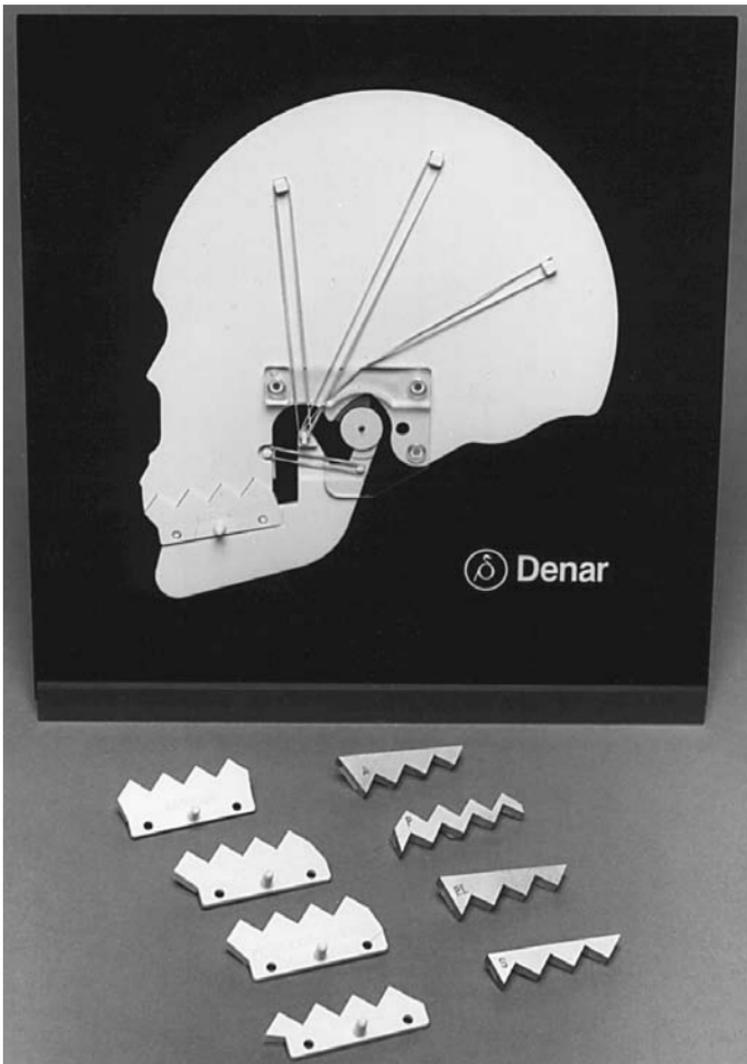


Fig. 1

III. Diagram of Terms and Mechanical Operation

Study the diagrams below to visually correlate the TMJ Tutor's anatomy and reference points with the actual human anatomy. Operation of the Tutor is easily accomplished by placing the desired insert onto the peg of the mandible (Fig. 2). The disc can be easily manipulated by rotating the large knob located on the back of the Tutor. Opening of the mandible is accomplished by movement of the smaller lever, also located on the back of the panel.

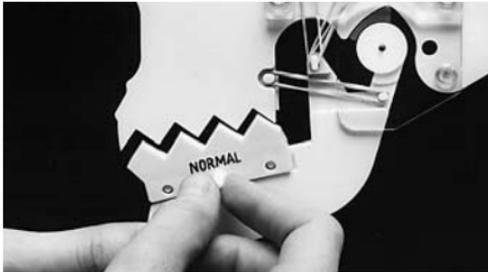


Fig. 2

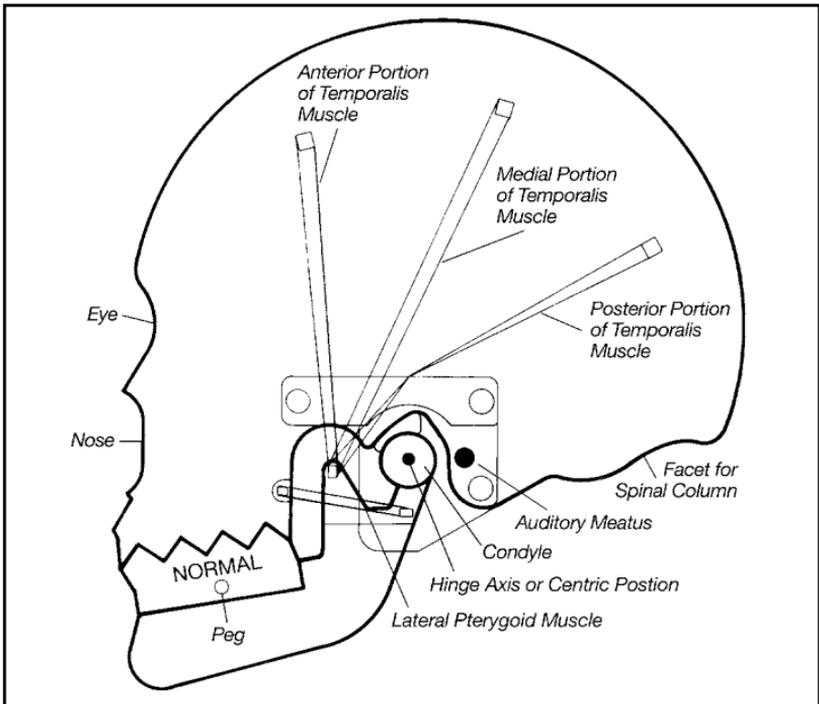
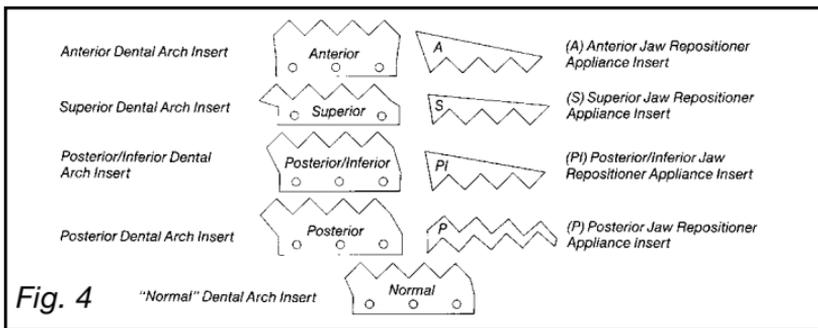


Fig. 3



IV. Patient/Doctor Opening

Explain to the patient by opening with an explanation of occlusion and malocclusion, e.g., "Mr. Jones, the way your teeth fit together is called occlusion. Malocclusion is a condition in which your teeth do not fit together properly. What may look like a good bite could be at the expense of putting pressure on other jaw joint areas. The teeth will fit together regardless of the resulting discomfort to the musculature. The individual automatically compensates to avoid excessive pain on individual teeth. In other words, to achieve maximum closure (intercuspatation) and avoid pressure on individual teeth, the jaw will accommodate the way the teeth fit together resulting in any number of symptoms—clenching, grinding, premature tooth wear, stress on the muscles and tendons resulting in headaches and muscular aches and pains, dizziness, and many other symptoms."

V. Use of Dental Arch Inserts

Five mandibular dental arch inserts are provided with the TMJ Tutor demonstrating various occlusal bites. The insert, "Normal"* illustrates an ideal occlusal/condyle/disc/fossa interrelationship. The four maloccluded inserts illustrate anterior, posterior, posterior/inferior, and superior condylar displacements.

On the TMJ Tutor, there are two black dots in the condyle area. When the black dot of the condyle is lined up directly under the black dot of the plastic covering (hinge axis point or centric), the condyle is centered in the fossa and the disc is in the proper position—this represents good occlusion and may be demonstrated via the "Normal" insert (Fig. 5).

*The term "normal" is used to represent an "ideal" or "therapeutic" occlusion. However, occlusal therapy is needed *not* because people have normal occlusal disharmonies, but because some people cannot tolerate symptoms caused by occlusal disharmonies as a result of their "normal" bite.



(Normal Dental Arch Insert)

Fig. 5

If the patient has malocclusion, the disc and condyle will be displaced causing the black dot on the condyle to be out of alignment with the black dot of the plastic covering and the condyle will not be centered in the fossa. This is demonstrated using the malocclusion inserts, see example of Posterior insert (Fig. 6).



(Posterior Dental Arch Insert)

Fig. 6

When demonstrating the maloccluded inserts, point out how both muscle groups are strained to varying degrees as the individual automatically moves the jaw in order to keep the teeth fitting together and avoid pain on individual teeth during closure. As the particular malocclusion is the only position in which the individual can close tightly and not have pain from the teeth, it is the position that the muscles learn to place the jaw whenever it closes.

Normal Insert

At this point, with the “Normal” dental arch insert positioned in the TMJ Tutor, visually show the patient the proper alignment of the jaw joint components when there is good occlusion. Manipulate the mandible via the lever located at the back of the Tutor to illustrate the hinge movement of the mandible (Fig. 7). Note how in the protrusive excursion the disc

and condyle maintain their proper relation to each other as they move smoothly forward in the fossa (Fig. 8). Then explain how in this position the muscles which support the head and move the jaw and disc all work in smooth coordinated function with optimum muscular tension.

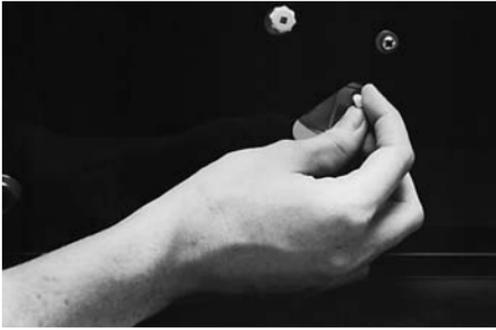
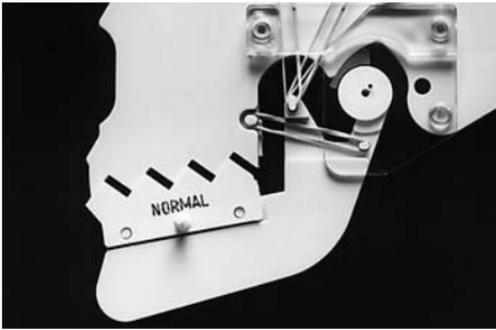


Fig. 7



(Normal Dental Arch Insert)

Fig. 8

Anterior Condylar Displacement

With the Anterior insert in position you can demonstrate normal hinge closure with the condyle centered in the fossa, then tooth contact and subsequently a forward shift of the mandible to maximum intercuspation. With the mandible at maximum intercuspation, the condyle and disc are both *down* and *forward* in the fossa (Fig. 9). (It may be necessary to use the adjustment knob to exactly position the disc and jaw to achieve maximum intercuspation—Fig. 10). In this case, the patient's muscles are being forced to reposition the mandible to accommodate to the maloccluded teeth. This can result in increased tension and symptoms in the muscles of the head, neck and shoulders.



(Anterior Dental Arch Insert)

Fig. 9



Fig. 10

Posterior Condylar Displacement

The Posterior dental arch insert is used to illustrate what can happen when posterior teeth are too high. This can occur when lost mandibular molars are not replaced and the second molars tip forward causing the disto-buccal cusps to rise. Tongue habits can also cause slight extrusions of posterior teeth.

With the Posterior insert in position, use the adjustment knob, if necessary, to position the teeth in maximum intercuspation. The condyle is now positioned *nearly straight back* (and *only slightly down*) in the fossa in relation to the black dot on the plastic covering (Fig. 11).



(Posterior Dental Arch Insert)

Fig. 11

Explain and point out how because the back teeth are too high and do not fit properly, the muscle which moves the disc will chronically tension to move the condyle and jaw back and down in an attempt to improve the fit of the teeth and prevent overloading of the back teeth. Chronic tensioning of these muscles can cause bruxism, pain about the ear and jaw joint. The back teeth can also show signs of excessive wear and/or bone breakdown.

Posterior/Inferior Condylar Displacement (Anterior Disc Displacement)

The Posterior/Inferior dental arch insert displaces the condyle *down* and *back* and the disc extremely *forward* of the condyle in an almost vertical position (Fig. 12). In this condition, the condyle is hitting the petro tympanic fissure (groove between ear structure and jaw bone).



(Posterior/Inferior Dental Arch Insert)

Fig. 12

As the condyle hits against the fissure it crushes related soft tissue which goes up into the inner ear. When this tissue is crushed, it becomes inflamed and may cause sound and balance problems related to the inner ear.

At this stage, it can be explained to the patient how displacements can progress to extreme degrees, as illustrated by the posterior/inferior insert. The importance of early treatment should be emphasized to prevent the condition from advancing in stages.

Superior Condylar Displacement (Anterior Disc Displacement) (Reciprocal Click)

The Superior dental arch insert is used to explain clicking and popping in the temporomandibular joint.

When posterior condylar displacement with concurrent forward position of the disc has occurred over a long term the small ligament (posterior condylar ligament), which connects the posterior margin of the disc to the capsule, can become stretched. When this occurs the condyle can slip off the posterior margin of the disc and onto the posterior ligament as the disc is pulled forward. When the jaw is moved forward, the posterior ligament becomes taut and braces the disc and the characteristic “pop” or “click” is heard as the forward moving condyle “jumps” back onto the disc. As the mandible is retracted from the protruded position, the click can be heard again as the condyle again slips off the disc and the disc is pulled forward.

These “reciprocal click” actions of the condyle and disc and concurrent noises in the TMJ can be easily illustrated with the TMJ Tutor. With the Superior insert in position, use the adjustment knob to move the disc to its *forward* position at maximum intercuspation (Fig. 13). With the teeth



*(Superior Dental
Arch Insert)*

Fig. 13

now in maximum intercuspation the condyle is positioned superiorly *above* and *back* of its normal position. As the mandible is moved forward, simultaneously turn the adjustment knob to reposition the disc on the condyle and a “click” is heard as the condyle and disc “jump” or move into normal position (Fig. 14). As the condyle is retruded from the protrusive position, use the adjustment knob to move the disc forward and the “click” is again heard as the condyle moves off the disc (Fig. 13).



(Superior Dental Arch Insert)

Fig. 14

VI. Jaw Repositioning Appliance Rationale

Use of the jaw repositioner inserts (appropriate to each maloccluded dental arch insert) illustrate the rationale of appliance therapy treatment. To select the appropriate appliance/splint insert, refer to the labeling on each insert, e.g., “A” stands for “Anterior,” “P” stands for “Posterior,” “PI” for “Posterior/Inferior,” and “S” for “Superior.” (Each to be used with the corresponding maloccluded dental arch insert.)

By inserting the appropriate splint insert with the dental arch insert, the patient can visually see how the condyle and disc are repositioned to create a correct anatomical relationship within the fossa once the discrepancies between teeth, joints and muscles have been corrected. Example: With the “Anterior” dental insert in place, point out the *down* and *forward* position of condyle and disc within the fossa (Fig. 15). Then, by inserting the Anterior jaw repositioner insert, the condyle and disc are repositioned to a healthy relationship within the fossa (Fig. 16).



(Anterior Dental Arch Insert)

Fig. 15



(Anterior Jaw Repositioner Appliance Insert)

Fig. 16

At this point, it is necessary to explain to the patient how jaw repositioners are used in diagnosis. With an anterior condylar displacement, a relatively early stage of TMJ dysfunction, the splint is used as basically a standard dental device with repair directed at the teeth. The patient will wear the repositioning device for a given period of time. If the symptoms subside after wearing the appliance, the dentist can recommend treatment—it may be equilibration or crowns to build the bite to a therapeutic physiologic relationship. Orthodontia may also be recommended in place of restorative procedures. Possibly a combination of all these would be recommended.

Explain to the patient the necessity of using the appliance for successful treatment. By using the appliance, you can refine and adjust it, successfully eliminating the problem of the bite, joint and muscles. In this way, the patient's bite need not be permanently altered until the diagnosis is accurately refined via the splint.

However, in more advanced stages of TMJ dysfunction where symptoms have progressed to clicking and popping, the repositioning appliance is used as an orthopedic device (See Figures 17, 18, and 19) with repair directed towards realignment of joint parts. In such cases, using the appliance as a standard dental device (as in the anterior condition) may delay receiving appropriate therapy and could possibly cause irreversible damage. Thus, careful diagnosis is crucial. These more advanced problems may require help from a variety of specialists including orthopedists, orthodontists and/or oral surgeons. Again, proper diagnosis is the key to successful treatment and cannot be overstated.



*(Posterior Jaw
Repositioner
Appliance Insert)*

Fig. 17



*(Posterior/Inferior
Jaw Repositioner
Appliance Insert)*

Fig. 18



*(Superior Jaw
Repositioner
Appliance Insert)*

Fig. 19

VII. Patient Radiograph Rationale

Since transcranial radiographs are an important tool in the diagnosis and treatment of condylar position and TMJ dysfunction, it is important that the patient also realizes its significance in the treatment process. The TMJ Tutor can quickly clarify and explain the need for radiographs. Use the Tutor's condyle, fossa and earhole as reference points. Then point these reference points out on the radiograph (Fig. 20). This visually explains and illustrates the need for obtaining a radiograph of the patient's TMJ anatomy and disc, condyle, fossa interrelationships.

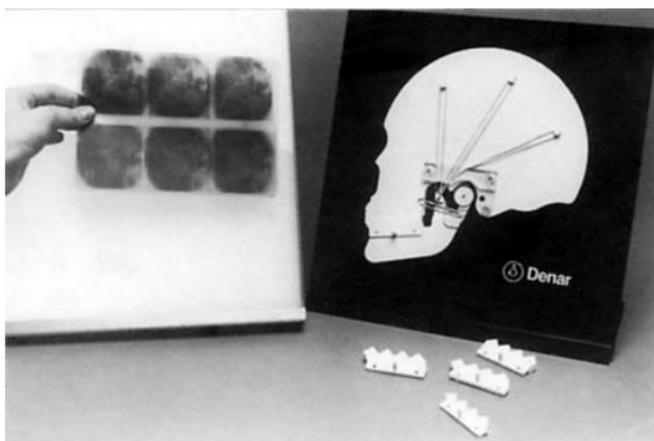


Fig. 20

VIII. Demonstrates Need for Bite Registration and Articulators

The TMJ Tutor illustrates how the *teeth guide the jaw* as it actually occurs in the human anatomy. The teeth will adapt to fit regardless of the guidance from the joint to ensure the most comfort to the teeth themselves.

In order to study the relationship of the patient's teeth and joints, it is necessary to see how the joints would guide the jaw if there were no interference from reflexes and muscles. To do this, a facebow record can be obtained of the relationship of the teeth to the jaw. By means of Cadiax recordings, the movements of the condyles can be transferred to an articulator to accurately duplicate the joint movements. Models of the teeth can then be mounted on the articulator to study the disharmonies without interferences from reflexes and muscles (Fig. 21).

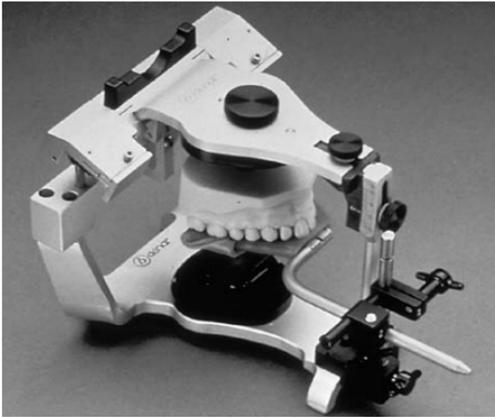


Fig. 21

IX. Demonstration of Occlusal Equilibration Effects

The TMJ Tutor can be used to demonstrate how occlusal equilibration can treat the TMJ problem. With any of the maloccluded dental arch inserts in place (Fig. 22 illustrates the anterior dental arch insert) and the mandible in an open position, point out that the closure at the back of the teeth is half the distance of the closure of the front teeth. This is due to the fact that the back teeth are only half the way from the axis of rotation as the front teeth. Thus when adjusting the bite, small interferences at the back of the teeth can be removed by reshaping the tops of the teeth and result in large closure differences in the front teeth.



(Anterior Dental Arch Insert)

Fig. 22

X. Summary of Patient Explanation

The TMJ Tutor was designed to aid you in reducing complex terms to simple easy-to-understand language that the patient can understand and visualize. It may be best to keep your terminology simple and follow this brief outline to make sure the major points are covered during the consultation (your assistants can be easily trained in this task). Following the consultation, give the patient the booklet entitled “TMJ Pain: Understanding the Cause and the Cure.” This booklet will help clarify and reinforce the points discussed during the consultation and will help patients explain to their families the need for treatment.

1. Explain and demonstrate a healthy occlusion via the “normal” dental arch insert and jaw manipulations.
2. Illustrate effects of malocclusion on jaw joint and muscles using the maloccluded dental arch inserts.
3. Illustrate the effects of appliances with jaw repositioner inserts.
4. Show the relationship of Accurad radiographs to the TMJ Tutor and explain the importance of radiographs in diagnosis.
5. Explain the need for bite registration and articulator mounted casts for accurate diagnosis.
6. Demonstrate the effects of occlusal equilibration.

XI. Storage and Care

The TMJ Tutor skull and inserts are manufactured from high-quality, durable injection molded polycarbonate plastic for long-lasting dependable service. The board is manufactured from durable black acrylic while the stand is constructed of extruded black anodized aluminum. The TMJ Tutor was designed as an attractive display piece and may be used conveniently stored behind the board in the stand holder.

Cleaning of the unit is easily accomplished with a clean, lint-free cloth dampened in gentle, soapy water. Wipe with a lint-free cloth.



RESTORATIVE ORAL HEALTH

Whip Mix Corporation - West
1730 East Prospect Road, Suite 101
Fort Collins, CO 80525
Toll-Free: 1-800-201-7286
Fax: 1-970-472-1793
www.whipmix.com

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