

FRANKEL III FUNCTIONAL REGULATOR:

A Simplified Treatment of Skeletal Type III Malposition

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Dental Class III malocclusions are easy to correct, whereas skeletal Type III malpositions are more complicated. In orthodontics, they are considered the most difficult facial-skeletal abnormality to correct.

Most orthodontic practitioners assume that skeletal Type III malpositions are caused by prognathic mandibles. That may be true in

some cases, but most skeletal Type III malpositions are caused by underdeveloped maxillae. Successful treatment of this abnormality is based on accurate diagnosis. The Jefferson Cephalometric Analysis is one of the best ways to determine whether the skeletal Type III abnormality is caused by prognathic mandibles, a retrognathic maxillae, or a combination of both. This type

of ceph analysis is also helpful in determining whether an abnormality is dental Class III or skeletal Type III.

Treating skeletal Type III abnormalities in compliant children and teenagers using the Frankel III appliance is fast, easy, and efficient. The treatment results are stable, and there is no need for retainers.

Accurate Diagnosis With the Jefferson Ceph Analysis

Some researchers favor the term "Type" to describe facial-skeletal disharmony,¹ as it helps to emphasize and differentiate dental from skeletal issues. The term "malocclusion" strictly refers to dental misalignment. This author prefers to use the term "malposition" in discussing the anterior-posterior position of the maxillary and mandibular and vertical position of the mandible when they are not in their correct and ideal position. The terms retrusive and protrusive refer to a dental position. This author prefers to use the term prognathic and retrognathic in describing A-P positioning of the maxilla and mandible.

If a patient has a Class III issue, is it a dental Class III or skeletal Type III? Treating practitioners must know the difference to treat the

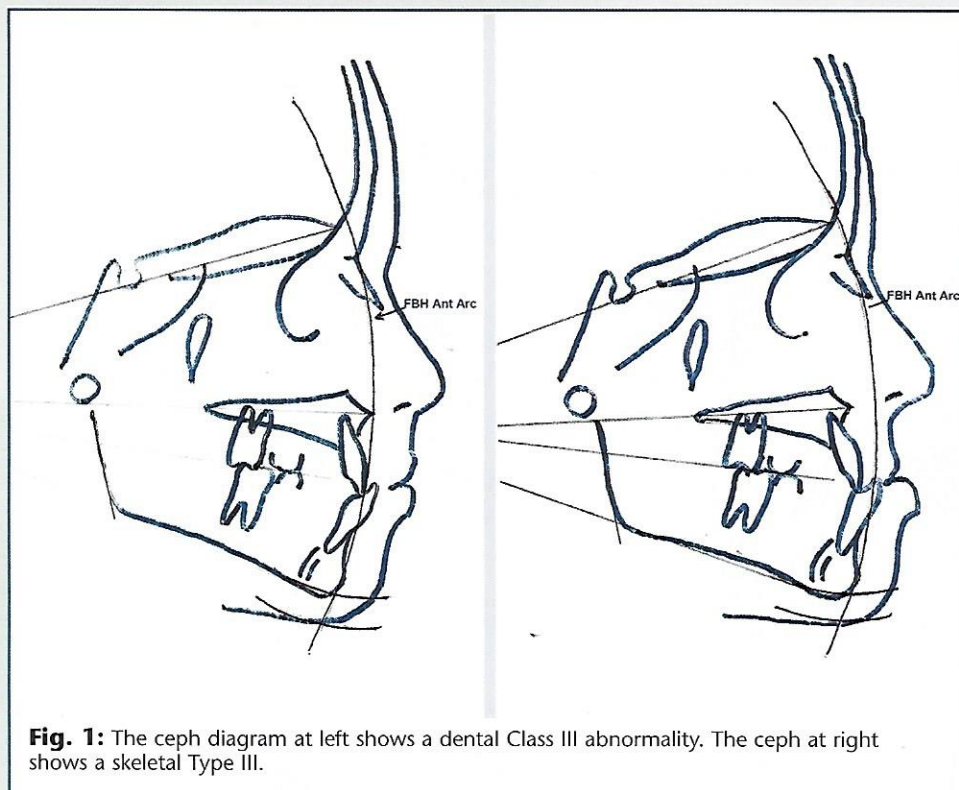


Fig. 1: The ceph diagram at left shows a dental Class III abnormality. The ceph at right shows a skeletal Type III.

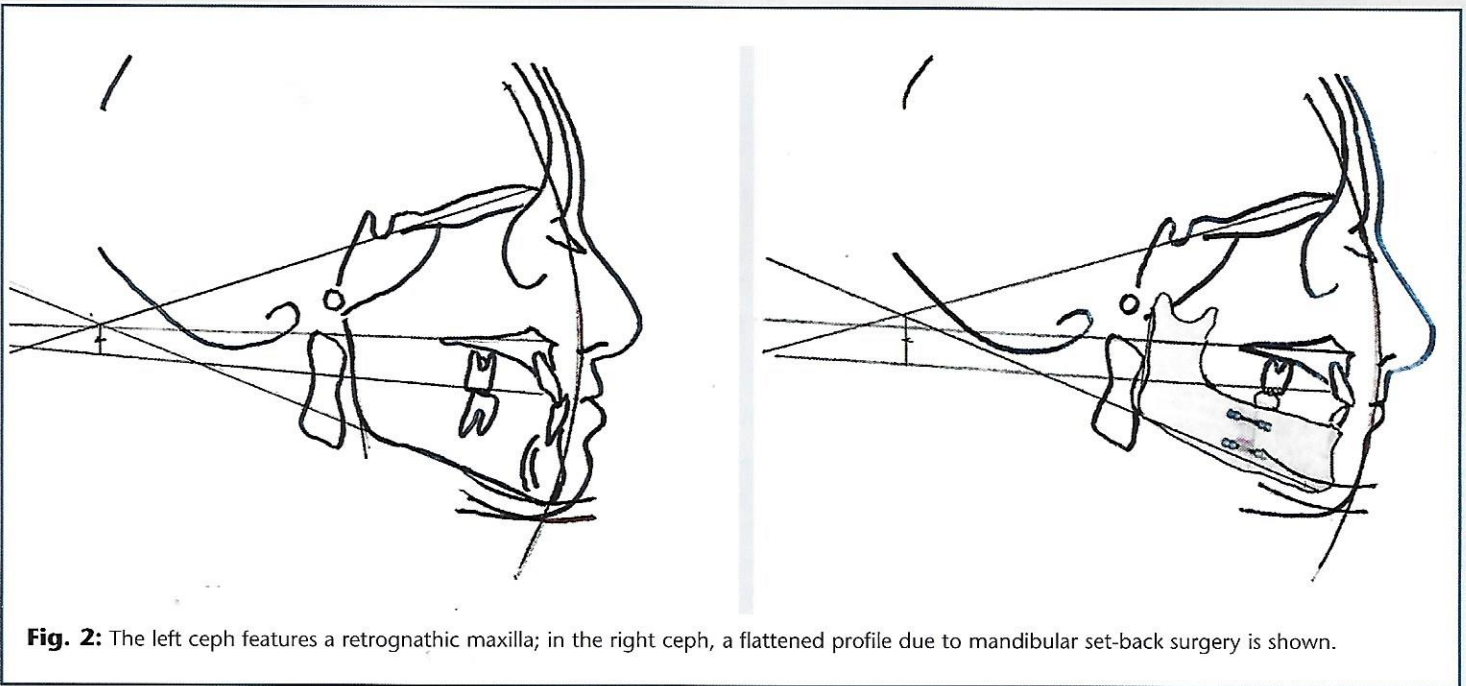


Fig. 2: The left ceph features a retrognathic maxilla; in the right ceph, a flattened profile due to mandibular set-back surgery is shown.

issue properly. Using the Jefferson Ceph Analysis aids in making this determination.² In Fig. 1, the lefthand ceph analysis shows the ANS and pogonion within 3 mm of the FBH Anterior Arc, indicating that they are in proper A-P position, while the anterior teeth are in Class III position. This is clearly a dental Class III. The righthand ceph shows the ANS retrognathic to the FBH Anterior Arc, but the pogonion is within 3 mm of the FBH Anterior Arc. Clearly, this is a skeletal Type III caused by an underdeveloped maxilla. The pogonion is within normal A-P position. Therefore, the mandible is in an ideal A-P position, and the skeletal problem is due to an underdeveloped maxilla.

Most orthodontic practitioners assume that the skeletal Type III issues they encounter are caused by prognathic mandibles. Currently, the standard of care in treating skeletal Type III abnormalities is to wait until patients are fully grown to around 18 years old and treat them via orthognathic surgery, followed by orthodontic therapy. This treatment may take two or more years to complete. The cost of the treatment can be prohibitive, and there are medical risks. The problem with assuming that skeletal Type III cases are due to prognathic mandibles when they are in

fact due to underdeveloped maxillae is that the surgical procedure will permanently produce an unattractive, flattened facial profile. In Fig. 2, the lefthand ceph shows that the skeletal Type III abnormality is not due to a prognathic mandible, but rather a retrognathic maxilla. Proper treatment involves leaving the mandible in its current A-P position but developing the maxilla forward. In assuming that the abnormality is due to a prognathic mandible and undergoing a mandibular set-back surgery, the resulting facial profile would be flattened.

In the past, most orthodontic practitioners and orthognathic surgeons assumed that skeletal Type III abnormalities were caused by overdeveloped, prognathic mandibles. Increasingly, research has shown that the majority of skeletal Type III abnormalities are caused by underdeveloped, retrognathic maxillae. The eminent orthodontist Dr. James McNamara stated that approximately 80% of skeletal Type III malposition cases are caused by underdeveloped maxillae, with the remaining 20% being attributed to mandibular prognathism.³ This author has also experienced that the vast majority of skeletal Type III cases are caused by underdeveloped maxillae; additionally, while not mentioned by

McNamara, there appear to be many cases where there is a combination of underdeveloped maxillae and prognathic mandibles. However, when the combination occurs, the underdeveloped maxillae often predominate over the prognathic mandibles.

Waiting until patients are 18 years old to treat their skeletal Type III abnormalities involves major issues, including cost, length of treatment, and medical risks. For children, skeletal Type III deformities may be minor. As they mature, the condition can worsen, making the unattractive mandibular appearance due to underdeveloped maxillae more noticeable. Furthermore, older children may become difficult to treat. Beyond that, children with skeletal Type III facial deformities may be ridiculed by their peers, affecting their self-confidence and self-worth. Treating children as young as 5 years old with a Frankel III appliance can alleviate the issues. Over nearly 30 years of using the appliance, the treatment results have proven nearly miraculous.

Understanding the Frankel Appliance

Frankel appliances, also known as functional regulators (FR), were developed by Rolf Frankel.⁴ The FR I

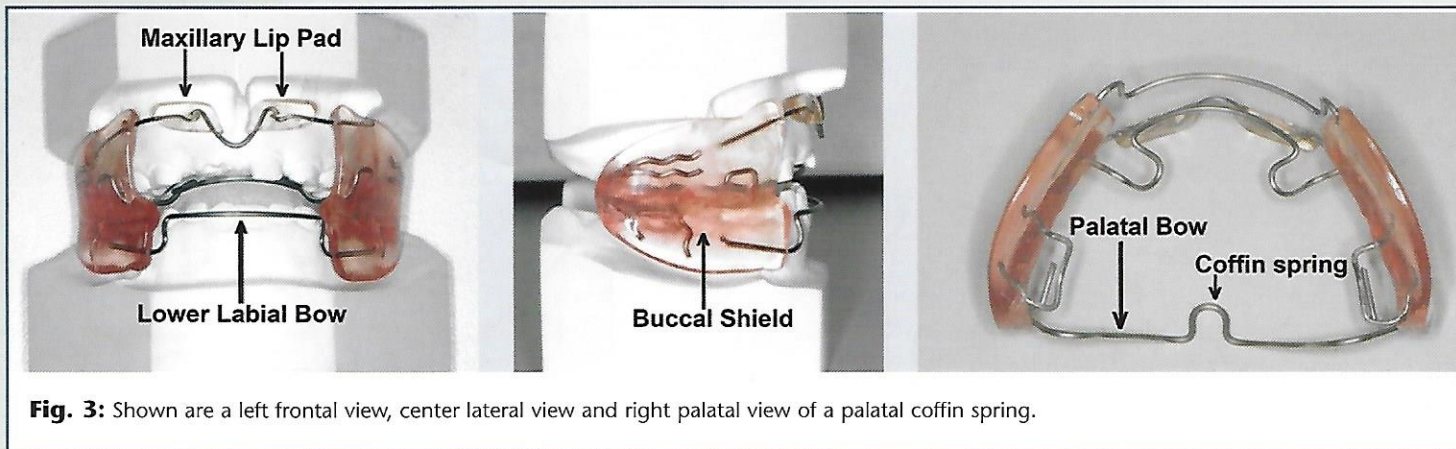


Fig. 3: Shown are a left frontal view, center lateral view and right palatal view of a palatal coffin spring.

and FR II are used to treat skeletal Type II problems; the FR III is used to treat skeletal Type III problems; and the FR IV is used to treat long facial patterns and anterior open bites. Frankel appliances are not orthodontic appliances, which mainly correct dental problems. Rather, they are orthopedic appliances, which can be used to correct skeletal problems.⁵

Frankel states that the improper function of the orofacial muscles, such as the lips, cheeks, and tongue, can cause dental and facial abnormalities. The most destructive and damaging abnormal muscle function is mouth breathing. It is the most significant cause of dental malocclusion, as well as skeletal Type II and Type III issues, long face syndrome, and other facial-skeletal abnormalities. More importantly, facial-skeletal abnormalities not only cause unattractive facial features, but they are also associated with a multitude of major medical problems.⁶ It must be emphasized that prior to starting Frankel III treatment, any patients with chronically swollen tonsils and/or adenoids must have them surgically removed. Patients with underdeveloped maxillae often have difficulty breathing nasally. They are often winded when running, with their mouths gaped open, attempting to intake oxygen. Often, parents assume that they suffer from asthma and need nebulizers. Developing the maxilla with Frankel III therapy often improves nasal respiration.

Amazingly, Frankel appliances have

no active springs, screws, or elastics to exert any pressure on the teeth or soft tissues. It has buccal shields and maxillary lip pads outside of the dental arches to prevent excessive inward pressure from the cheek and lip muscles in mouth breathers. In Fig. 3, the front, side, and palatal views of the Frankel III appliance are shown. The palatal view shows a small coffin spring that trains the tongue to press into the palate when the patient swallows. This tongue action applies forward pressure of the tongue to the pre-maxillary area, forcing the maxilla to develop forward, thus correcting the skeletal Type III abnormality.

Without the appliance's shields and pads, the cheek and lip muscles would exert inward pressure that would collapse the maxillary and mandibular dental arches during mouth breathing—a major cause of dental crowding. The upper lip would create inward pressure, pushing the maxilla back and causing it to be underdeveloped. To re-emphasize, the Frankel III has an upper coffin spring to train the tongue to press up into the palate whenever patients swallow. The inward pressure of the lips and cheeks in mouth breathers is negated by the shields and pads, allowing the tongue muscle to exert greater pressure outward and causing the maxillary and mandibular arch to expand.

Tongue muscle pressure during swallowing is the most effective and fastest way to push the maxilla forward in skeletal Type III patients with underdeveloped maxillae.

More importantly, having properly developed maxillae enhances nasal respiration, thus alleviating mouth breathing. Once treatment is completed and the Frankel appliance is forever removed, the orofacial muscles are trained to maintain normal myofunction. The result is essentially a “biologic,” permanent retainer.

For orthodontic practitioners believing that a skeletal Type III abnormality is the most complicated facial-skeletal problem to treat, the Frankel III appliance makes treatment remarkably simple in children and adolescents. While use of the device with adult patients has not been studied extensively, there is reason to believe it could be successful. However, total compliance in wearing the appliance is critical, and treatment time may be significantly longer for adults than it is for children.

One of the disadvantages cited for Frankel therapy is the size of the appliance. Its large appearance can frighten patients, and some orthodontic practitioners fear offering it to them. But consider the two other options to treat this condition: orthognathic surgery followed by orthodontic therapy and reverse face-mask therapy. Both treatments take at least two years to complete. The Frankel appliance, once inserted in the mouth, is hardly noticeable, and patients become accustomed to them. In young children, the treatment may take several months to a year. In adolescents, it may take a little over one year. For the treating doctor, almost no adjustments are necessary.

The appliance does all the work. The only adjustment to be made is when the maxilla is developed forward and contacts the maxillary lip pads. The simple solution is to have the lab fabricate side screws on both sides of the buccal shields. The treating doctor can then turn the screws and move the lip shields forward.

Patient Management

Written, informed consent is essential when using the Frankel III appliance. Providers must never guarantee treatment will be successful, unless patients cooperate with 100% compliance. They must wear the appliance 24 hours a day, except when they are eating, brushing their teeth, and participating in high-contact sports. At all other times, they must have the appliance in their mouth. They must sleep with the appliance every night until the treatment is complete.

Patients and parents should be informed of alternative treatments, such as orthognathic surgery followed by fixed orthodontic therapy or reverse facemask therapy. In over 30 years of using the appliance, failures have only been observed when the patient did not wear the appliance as instructed. If patients show no improvement over several months, ask them if they have been wearing the appliance as instructed, then probe deeper, asking: "Were there any times when you did not wear this appliance?" Over the years, several children have confessed that they did not wear their appliance in school because their parents told them they did not have to.

Children who snack frequently can also see inhibited treatment results. Informed consent should specify that when treatment is discontinued due to patient noncompliance, there will be no refund due to the cost of the appliance and the treating doctor's time; however, all future contracted payments may be waived.

Frankel III treatment typically aligns the teeth nicely, negating the need for Phase II fixed appliance

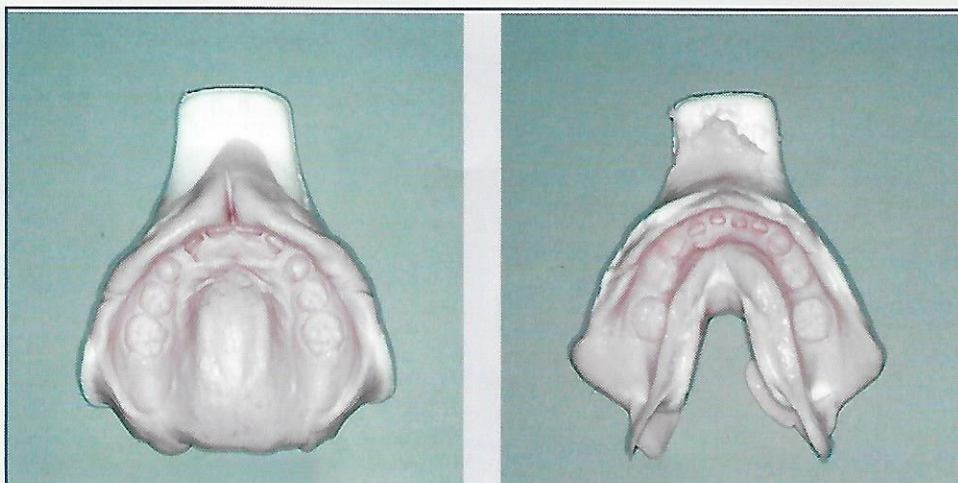


Fig. 4: Shown is a proper alginate impression for fabrication of a Frankel III appliance.

therapy. However, there may be times when such therapy is necessary. For example, one 11-year-old patient had an upper left, second premolar that was lingually displaced after Frankel III therapy due to lack of space. Fixed appliance therapy was necessary to correct it. Dental alignments may not always be perfect post-therapy, but typically they are close enough that patients' parents elect not to go forward with Phase II treatment. Your informed consent must disclose that perfection is never guaranteed, and further correction will carry an additional charge.

Clinical Management: Impressions

After an accurate diagnosis has been made, maxillary and mandibular alginate impressions are taken for fabrication of a Frankel III appliance. A standard metal stock tray is adequate. However, it is crucial that the tray is sized correctly to the patient's mouth so that it is not too small or too large. Perfect sizing is critical for the success of fabricating the appliance. In addition, bead wax must be placed along the edge of the trays; soften the bead wax with warm water prior to taking an impression. Insert the trays inside the mouth and muscle mold by pulling the lips down to capture both the anterior and posterior frenum. Continue the muscle mold by massaging and pressing the cheeks and lips over the soft

tissues to capture the anatomic vestibular area accurately.

The mixture of alginate should not be runny or too thick; it should have a creamy, bubble-free consistency. Make sure there is enough alginate to flow into the vestibular areas. Add alginate to the vestibular areas with your finger if necessary. Once the tray is seated, pull the lips and cheeks away, then pull down to capture the frenums. Once the frenums are captured, continue to muscle mold the cheeks and lip areas. Once the impression is set, the border of the vestibular areas should have a teardrop-shaped margin. The margins should not be rounded or knife edged. Check the impressions for proper reproduction of the teeth, frenums, and associated soft tissue. There should be no air bubbles or abnormal artifacts.

For some young children, metal stock trays may be bulky and uncomfortable. A disposable foam impression tray may be used in such cases. See Fig. 4 for a proper impression taken using a disposable foam tray on a young child. Note the tear-drop vestibular margin and the frenum areas. Impressions made with metal stock trays with bead wax border-molded at the edge of the tray should produce a similar impression to that shown in Fig. 4.

Clinical Management: Wax Bite Registration

Use only high-quality wax for



Fig. 5: A proper wax bite registration for fabrication of a Frankel III appliance is shown.

wax bite registrations. Poor quality wax flakes when heated in warm water and easily distorts after bite registrations. The preferred method uses one sheet of rectangular wax or two sheets for older children and adolescent patients. Heat the wax in warm water and trifold and press it together. When using two wax sheets for older children, place the two sheets together so that they are aligned. Heat the two sheets together, and while they are still warm, trifold them and press together. While a buffalo knife might be used, large scissors are effective for cutting the wax while it is still warm to the approximate size and shape of the patient's mouth. Insert the wax inside the mouth and have the patient gently bite into the wax, leaving small occlusal indentation. Take it out and, using the small occlusal indentation as guide, cut the wax just outside the occlusal indentation. The wax size and shape will be custom fit to the patient's mouth.

Warm the custom-fit wax in warm water, place the wax inside the patient's mouth, and have the patient bite into the warm wax with normal mandibular closure. The mandible should not be forward or backward of a patient's natural closure, nor should the lower bite be shifted to either side. In other words, both the upper and lower skeletal midline must be centered. Have the patient stop

biting when the maxillary and mandibular incisors are 2 to 3 mm apart. If the patient has a deep underbite, ensure that the wax bite is thick enough to allow the anterior teeth to cross over each other during treatment. In young children with missing anterior teeth or teeth not fully erupted, visually approximate their height when fully erupted. Do not allow the wax bite registration to be too thick. Observe the patient's facial profile to ensure that the bite registration does not give him or her an unattractive, long-face appearance, which often deters compliance.

Trim the anterior portion of the wax so that the maxillary and mandibular incisor distance can be seen and measured and to ensure adequate clearance for the maxillary incisors to cross over the mandibular incisors during treatment. Trim the posterior portions to the buccal of the maxillary posterior teeth. The wax bite may become distorted during trimming. In that case, run the wax bite under slightly cold water and have the patient bite into it to reestablish the correct bite registration.

Fig. 5 shows correct wax bite registration for fabrication of the Frankel III appliance. With proper wax bite registration, the upper and lower incisors should be approximately 3 mm apart, and both the upper and lower skeletal midline must be centered.

Clinical Management: Laboratory Prescription

Not all orthodontic laboratories fabricate Frankel appliances. An internet search for orthodontic laboratories fabricating Frankel III appliances in the United States will generate a list of approximately eight labs. For your first case, it is advisable to call the laboratory and ask to speak to the lab technician who will personally make the appliance. Because this is a specialized appliance, ask the technician about his or her qualifications and certifications. How long has the individual been making this appliance? Ask for the names, phone numbers, and email addresses of orthodontic practitioners who have used their lab for Frankel III appliance fabrication. Contact the practitioners for their recommendations.

As a practitioner, you can do everything perfectly but fail in the eyes of your patient because the Frankel appliance has been made incorrectly. Once you have selected a lab, ask the administrators to contact you if the impression or bite registration is incorrect before the appliance is made so you can send new impressions and/or bite registrations.

Before sending maxillary and mandibular models to a lab, package them carefully. Protect the models with bubble or foam wrap so that they will not be damaged. This includes the wax bite registration. Mail the models to the laboratory with the following instructions:

"Rx: Please fabricate a Frankel III appliance to correct a skeletal Type III abnormality. The appliance should be fabricated to develop the maxilla forward. Therefore, the maxillary lip pads should not touch the maxillary soft tissue. Please add side screws to advance the maxillary lip pads if necessary. If there are any problems with the models and/or wax bite registration, please contact me before you fabricate the appliance."

Clinical Management: Appliance Insertion

To insert the appliance, pull the left cheek out with your fingers and place the left buccal shield in the mouth first. Then, pull the right cheek out and roll the right buccal shield inside the right cheek. Once inserted, run a plastic tipped periodontal probe underneath both the left and right lip pads. There should be enough room for you to run the plastic probe from side to side. If not, turn the side screws to create more space. Ask the patient if there are any areas of irritation and relieve them. If the appliance is uncomfortable, the patient will not wear it.

Check placement of the anterior teeth to ensure they are positioned correctly. Both the upper and lower skeletal midlines must be centered. Additionally, the lower labial bow that crosses over the lower anterior teeth must be in front of the anterior teeth. The labial bow must not be behind the lower anterior teeth. An exception is when a deciduous tooth is ready to exfoliate and is in front of the wire; however, the rest of the anterior teeth must be behind the wire. See Fig. 6 for proper placement of a Frankel III inside the mouth.

Prior to discharge, the patient should demonstrate an ability to insert and remove the appliance. Have the patient practice in the office until he or she can do it comfortably. Again, the patient must pull the left cheek out with his/her fingers and then insert the left buccal shield first. Once in, he/she pulls the right cheek out and rolls in the right buccal shield. Have



Fig. 6: Proper placement of a Frankel III appliance is shown.

the patient practice the operation multiple times in the office until he/she becomes proficient. Teach the patient which side of the appliance is up. Attempting to insert the appliance upside down will be difficult and frustrating.

Initially, until patients are accustomed to the appliance in their mouth, their cheeks and lips may look tense and puffed. Once they are used to wearing the appliance, their cheek and lip muscles will relax, and their face will look normal. The appliance is almost imperceptible and typically preferable to a reverse facemask.

Clinical Management: Instructions to Parents

Advise parents and patients that the Frankel III appliance is fragile and expensive. Care should be taken not to abuse it. If it is inadvertently broken or distorted and unrepairable, a new appliance should be made. Informed consent should state that if a new appliance is needed due to damage, the patient will be responsible for the cost to remake it. Whenever the appliance is not worn (e.g., during contact sports), it should be placed in an ortho container to protect it. A label with the patient's name and phone number must be placed on the container in case it is lost.

The appliance should never be wrapped in paper towels or tissues and placed inside a pocket. The

wires holding the buccal shields can easily be distorted or damaged. A more likely possibility is that it will be wrapped, placed on a table, mistaken for garbage, and thrown out. Never leave the appliance out for pets to chew, and never leave it in the sun.

The appliance must be worn constantly, with exceptions only for eating, brushing, and contact sports. Children must not eat snacks frequently while wearing the appliance, which should be cleaned thoroughly several times a day with a toothbrush, especially before the patient goes to bed. Emphasize that the treatment will fail unless the appliance is worn as instructed. If the patient is non-compliant, treatment should be discontinued. Instruct parents to call the office should any problems occur.

Clinical Management: Appointments & Treatment Length

The patient should be seen two weeks after initial appliance insertion. At this visit, check for sore spots and adjust the appliance if necessary. Also, check to make sure that the anterior teeth are positioned correctly with the appliance in place. More importantly, determine whether the patient has been compliant. If not, note the non-compliance in the record. Emphasize again to parents and children that the treatment will fail unless the



Fig. 7: The figure shows a pre-treatment skeletal Type III patient and Jefferson ceph tracing.

appliance is worn as instructed. Thereafter, the patient should be scheduled every two months to check for sore spots and cooperation.

If the patient wears the appliance as instructed, skeletal and dental improvements should be evident by the second month. After the fourth month, maxillary soft tissue may contact the maxillary labial pads. Test this by running a plastic-tipped periodontal probe sideways under the labial pads. If there is no room, turn the left and right screws and advance the labial pads 2 to 3 mm away from the maxillary tissue. Reinsert the appliance in the child's mouth and make sure it is comfortable. Check that the upper and lower skeletal midline is centered.

Length of treatment varies with each patient, depending on age, cooperation, lifestyle, and physiology. In one case, a 4-year-old patient who was excited to wear the appliance and did so even while eating, the treatment time was approximately one

month. Typically, however, treatment takes between 4 and 18 months.

Case Study

In treating skeletal Type III patients with the Frankel III appliance, a long-held rule has been that patients must be no more than 8 years old. A popular saying is: "In by 8 or it's too late." After many years of following the advice, the author decided to test the rule and began treating older patients.

A father brought in his 12.5-year-old son, who had a skeletal Type III facial profile. The father wanted the abnormality treated, Frankel III therapy was offered, and he accepted. Orthodontic records were taken on Nov. 15, 2011. Fig. 7 shows the patient's facial photographs and Jefferson Ceph tracing. The patient had a combination problem, where the maxilla was retrognathic, the mandible was slightly prognathic, and the vertical was slightly short. The Jefferson Skeletal Classification is skeletal Type IIIIC; short tendency.

Fig. 8 shows the patient's intraoral photographs. To almost every orthodontic practitioner, this is a complex case. But, with Frankel III therapy, treatment was straightforward.

From the time pre-treatment records were taken, the father delayed treatment for eight months. The Frankel III appliance was inserted on July 10, 2012. Treatment was started one month after the patient's 13th birthday. Fig. 9 is an anterior intraoral photograph showing the treatment progression by date. Results were fast and efficient and required almost no adjustments.

In reviewing patient treatment records, the appliance broke on Dec. 6, 2012. It was sent to an ortho lab, repaired, and returned as soon as possible. On Dec. 20, 2012, the patient canceled appointments for insertion of the repaired appliance. One week later, the appliance was inserted.

Fig. 3 shows an older-style Frankel III appliance without side screws. The author recommends that practitioners instruct lab technicians to place side screws on the left and right buccal shields. Fig. 10 show this patient's Frankel III appliance with side screws.

On March 11, 2013, the patient's maxillary tissue developed and butted against the maxillary pads. The condition was tested using a plastic-tipped perio probe, and there was no space to allow the probe to move from side to side. Both side



Fig. 8: Shown are the patient's pre-treatment intraoral photographs.



7-10-2012 Frankel III insert 8-2-2012 3 weeks later 8-30-2012 11-1-2012 3-11-2013

Fig. 9: Shown are the patient's anterior intraoral photographs at different stages of treatment with a Frankel III appliance (from insertion to eight months later).

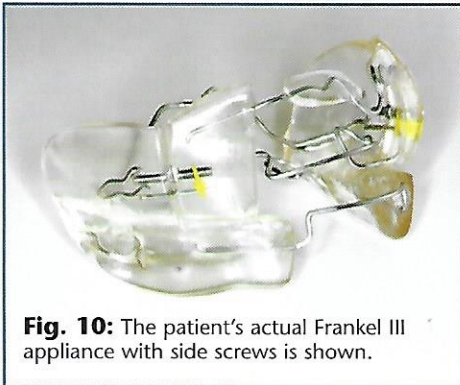


Fig. 10: The patient's actual Frankel III appliance with side screws is shown.

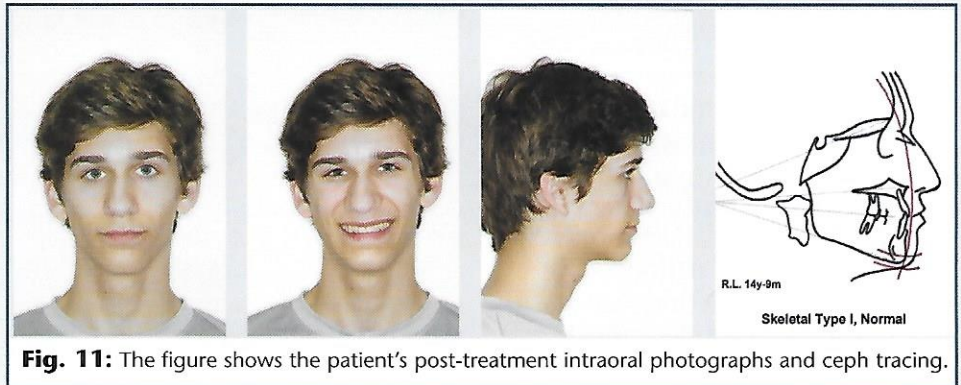


Fig. 11: The figure shows the patient's post-treatment intraoral photographs and ceph tracing.



Fig. 12: Shown are post-treatment intraoral photographs.

screws were turned to advance the maxillary pads approximately 2 mm away from the maxillary tissue. Although treatment was essentially completed in 10 months, the author advised the father to have his son wear the appliance longer. Meanwhile, the appliance broke several more times and had to be repaired. On July 16, 2013, the maxillary pad had to be advanced again. Had the appliance not broken and been repaired, the only adjustments required would have been turning the screws to advance the maxillary pads twice during treatment.

On March 11, 2014, post-treatment records were taken. Fig. 11 shows a post-treatment facial photograph and Jefferson Ceph analysis. The post-treatment ceph tracing shows significant improvement in developing the maxilla forward to nearly ideal A-P positing. Concurrently, the patient's mandible is in ideal A-P position, and his mandibular vertical position is also ideal. Post-treatment, his maxilla and mandible were nearly in perfect position. His Jefferson Skeletal Classification post-treatment was skeletal Type I, normal vertical.

Fig. 12 shows the post-treatment intraoral photographs. The patient and his parents were pleased with the treatment results. During Phase II, no fixed appliance therapy was necessary, and the parents did not want it. After treatment, no retainers were inserted.

Fig. 13 shows pretreatment and post-treatment cephalometric radiographs. Note the pretreatment and post-treatment cephalometric radiograph. Both the maxillary sinus and pharyngeal airway appear to be significantly larger after treatment than they were before—thus

enhancing the patient's upper airway respiration and total health and wellness. The patient was referred to an ENT specialist before treatment to evaluate his upper airway patency. As expected among most patients with underdeveloped maxillae, he was diagnosed with nasal breathing issues. Endoscopy revealed inflammation and swelling in the nose. He was prescribed medication to treat the underlying allergies and swelling that were contributing to his inflammation. After Frankel III treatment, his nasal respiration was improved. He did not have swollen tonsils/adenoids; therefore, adenotonsillectomy was not indicated. Most patients with upper airway obstructions tend to have chronically swollen tonsils and/or adenoids.

Fig. 14 shows a side-by-side comparison of the patient's pretreatment and post-treatment

Jefferson Ceph analysis. The post-treatment analysis showed significant improvement in developing the maxilla. Based on the Jefferson Ceph analysis, both the maxilla and mandible were almost in perfect anterior-posterior position, and the mandible was almost in perfect vertical position.

Conclusion

The public and healthcare professionals, especially dentists, pediatric dentists, orthodontic practitioners, and maxillo-facial surgeons, are largely unaware that the Frankel III appliance can be used to treat the skeletal Type III abnormality quickly, efficiently, and unobtrusively. The treatment is more unobtrusive than reverse face-mask therapy and less costly and risky than orthognathic surgery followed by orthodontic therapy. Treatment time is significantly less

than that of any other treatment modality. For the treating doctor, minimal time and effort is required for adjustments.

It is the author's hope that orthodontic practitioners will accurately diagnose the cause of the facial-skeletal Type III disharmony and not assume that all skeletal Type III problems are due to prognathic mandibles. As McNamara's research has shown, approximately 80% of skeletal Type III cases are due to underdeveloped and retrognathic maxillae. Hopefully, more and more orthodontic practitioners will learn to use this appliance for their skeletal Type III patients. The appliance introduces minimal risks to the patient; if the treatment is unsuccessful—likely due to poor patient compliance—it can simply be discontinued.

The Frankel III appliance not only enhances facial esthetics, but it also alleviates upper airway obstructions and enhances patients' total health and wellness. The benefits are potentially life changing—a gift that treating doctors can offer to their patients.

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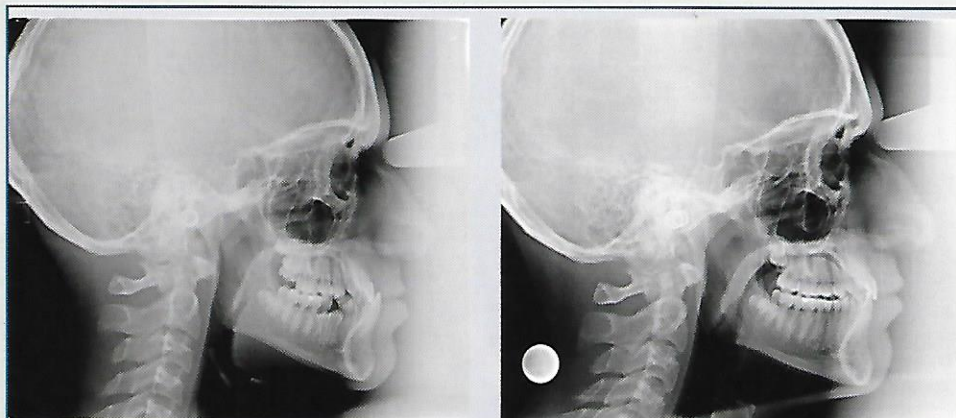


Fig. 13: The left image is a pre-treatment cephalometric radiograph; the right image is a post-treatment cephalometric radiograph.

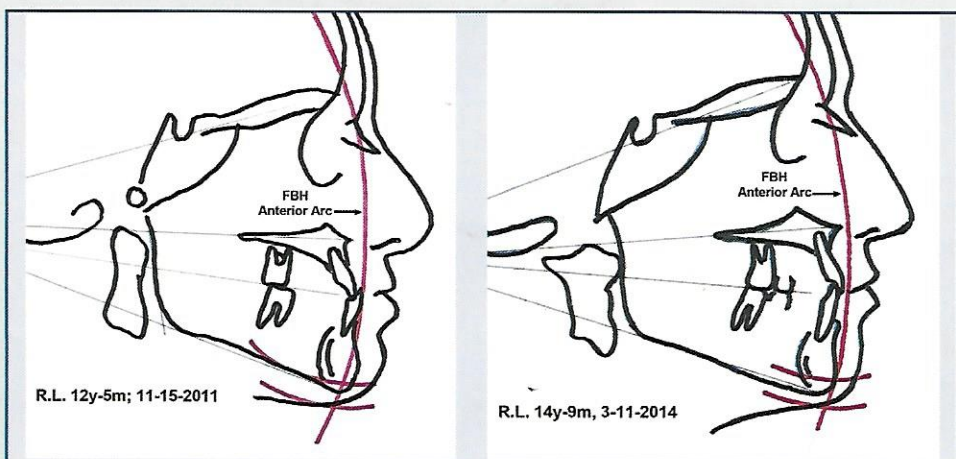


Fig. 14: A comparison of the pre-treatment and post-treatment cephalometric analysis is shown.