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JCO Interviews Dr. James A. McNamara, Jr., on the Frankel Appliance, Part 2: Clinical Management

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DR. JAMES A. MCNAMARA, JR.

DR. GOTTLIEB Jim, let's begin at the beginning in your approach to the clinical management of the Frankel appliance and the Frankel patient.

DR. MCNAMARA Before the patient comes in, I always want to know who referred him to the office--whether it was a general dentist with whom I have a good working relationship and who is familiar with Frankel therapy, or whether it was another Frankel patient. In other words, I want to know whether they are coming to my office expecting a traditional approach to treatment, or whether they are acquainted with functional jaw orthopedics.

DR. GOTTLIEB Why do you especially want to know that?

DR. MCNAMARA It is a question of how much time I will have to spend explaining what functional appliances are all about. If someone is coming in expecting headgear and fixed appliances and I plan to use a Frankel, time is spent describing how muscle, bone, and teeth are treated simultaneously, rather than just teeth.

At the time of the initial phone call to my office, the prospective patient is told that two headfilms--lateral and PA--will be taken at the initial examination.

DR. GOTTLIEB Why do you do that?

DR. MCNAMARA The films are taken for two reasons: diagnosis of the malocclusion, and to look for any possible underlying airway problems, which might not be obvious during a clinical examination. It is also an excellent visual aid when I discuss the patient's problem.

DR. GOTTLIEB Do you just eyeball the films or trace them? And what are you specifically looking for?

DR. MCNAMARA At the initial examination, I make a brief analysis of the films--visually or by tracing. In the lateral headfilm, I look for the presence of hypertrophied adenoids and enlarged tonsils, for missing and unerupted teeth, or any-thing else unusual. In the PA film, I am primarily concerned with enlarged turbinates and deviation of the septum.

I also take a health history on a form that is given to the patient when they arrive at the office. This is the usual family history, general medical, and dental and orthodontic information. I also ask specific questions regarding their respiratory history--whether they snore when they are sleeping, what they are allergic to, whether they breathe through their mouth, if they have frequent colds, if they have frequent sore throats or tonsillitis, or if they have any chewing or swallowing difficulty. I also ask for their complete ear, nose, and throat and allergy history, including whether or not tonsils and adenoids have been removed.

DR. GOTTLIEB Do you routinely refer patients who have a significant problem in this area to a specialist?

DR. MCNAMARA Yes, I would say 10-15% of my patients are referred at some time to an ENT specialist for an evaluation.

DR. GOTTLIEB Prior to treatment?

DR. MCNAMARA Usually, but it also can be during or after treatment.

DR. GOTTLIEB What did you do to establish a relationship with an ENT physician or physicians? You didn't just send a patient over?

DR. MCNAMARA When I became interested in the relationship of upper airway obstruction to craniofacial growth, I called my daughter's pediatrician and asked him to recommend an ENT specialist who would be intellectually alert, open to new ideas, and able to evaluate research data. I also asked him to locate a pediatric allergist with the same qualifications. The four of us met for lunch. I showed them some cases and explained what I was looking for, and they were interested. So I arranged for an evening meeting in my practice, and I invited eleven patients whom I suspected of having various respiratory problems to come in with their parents. We each took turns examining the patients and the records, and I explained what I thought was wrong. They were amazed at the quality of the radiographs, and what they could see on them. ENT physicians do not routinely use lateral and PA headfilms to diagnose enlarged adenoids and tonsils.

DR. GOTTLIEB Has this group diagnosis approach continued on a routine basis?

DR. MCNAMARA My main interaction has been with ENT physicians. I have had some interaction with pediatric allergists, but not too much with pediatricians. I usually refer a patient with a respiratory problem directly to the ENT physician, and send a copy of my referring letter to the pediatrician. I might add that I have made it a point to address almost every group in my area associated with these kinds of problems, including the ENT department, the allergy section of internal medicine, the dental assistants, the oral surgery and plastic surgery departments, and the pediatric association. These people are at least aware of what I am doing.

DR. GOTTLIEB As a practical matter, do you find referrals coming back in your direction from these specialists?

DR. MCNAMARA Not in any abundance. Occasionally, I will get a referral from one of the three ENT physicians to whom I refer patients. I also have had a few referrals from the allergist and several pediatricians. However, as we all learn from one another, I expect this interaction to increase.

DR. GOTTLIEB Let's continue with the first visit. I interrupted you at history taking.

DR. MCNAMARA The next thing I do is observe the patient from a distance, either in the waiting room or in the operator chair, just to see if they are active or quiet. Not every patient is a Frankel candidate, not only from a physiological standpoint, but also from a psychological standpoint.

DR. GOTTLIEB Do you screen out the hyperactive patient?

DR. MCNAMARA Not necessarily, but presentation must be tailored to the needs of the patient. With some I can be gentle and relaxed, and with others I must be quite forceful. So, I like to observe the patient from a distance to evaluate which approach is more suitable. Then I start with a discussion of the "chief complaint"--to find out why the patient is there, whether or not they are concerned about facial esthetics, whether the visit was recommended by a dentist, a family member, or a friend. I usually do a thorough clinical examination, based on my cephalometric diagnostic criteria (McNamara, '82a), with the headfilms right on the viewbox next to the patient.

DR. GOTTLIEB What are you specifically looking for in the clinical examination?

DR. MCNAMARA I always measure the relationship between the upper lip and the tip of the incisor clinically, because this is difficult to evaluate from a radiograph. I also measure the amount of gingiva showing when the patient smiles broadly. I like to see the upper lip at about the gingival border, although some people have a short upper lip and some have a long upper lip, so there is some variation. It is also extremely important in a clinical examination to evaluate facial muscle balance. Of particular interest to me is a hyperactive mentalis muscle, which is usually an indicator of a hypoactive orbicularis oris muscle, since one of the goals of Frankel treatment is to eliminate the hypoactivity of the orbicularis oris and the hyperactivity of the mentalis through lip seal exercises in conjunction with appliance wear.

DR. GOTTLIEB I think that Frankel believes that is one of the main differences between his appliance and others.

DR. MCNAMARA Absolutely. Incidentally, Mike Dierkes, Bob Scholz, Ray Howe, and I recently visited the orthodontic department of the University of Bonn in West Germany, where we examined patients treated with activators, bionators, and other similar appliances. One of our principal findings was that the functional appliances in use in their clinic were very effective in the anteroposterior correction of skeletal discrepancies, but had a much less favorable effect on facial muscle balance. We saw many patients, in whom activator-type appliances were used, in which there was still mentalis hyperactivity present at the end of treatment. I must add that mentalis hyperactivity sometimes persists after Frankel treatment, if the lip pads are not placed low enough in the vestibule, or if there is an uncorrected airway obstruction, or if lip seal exercises are not routinely performed by the patient.

DR. GOTTLIEB Do you also look at other facial muscle activity?

DR. MCNAMARA It is important to evaluate the general tonus of the masticatory and facial musculature as a whole. Patients with a very hyperactive muscle activity will usually have a retrusive maxillary and mandibular dentition, and often a retrusive maxilla as well. In such a case, the FR-2 does not increase muscle activity, but rather decreases it. It is extremely important to explain the presence of abnormal muscle function to the patient and parents, using a mirror and audiovisual materials. Occasionally, one or both parents may have a similar problem. Most of the time when I point this out to the parents, they will tell me that they do not like this in themselves, and would like to correct it in their child. Occasionally, I will even prescribe lip exercises for the parents, if they are interested in doing them.

I then have the patient bring the lower jaw forward to an anterior position. In a likely Class II Frankel candidate, the lower jaw should be able to be brought forward and produce an improvement in facial form, provided that the incisors do not interfere.

Also, at the first appointment, I usually show the patient a videotape, put out by Unitek, which is a short overview of what to expect. This really helps in giving the patient and parents the feeling of what I am trying to accomplish.

Hopefully, by the end of the initial examination, the patient and parents understand the basic philosophy of Frankel therapy, which is treating not only the teeth, but also the skeletal structures and the muscular system at the same time. I talk about the goal of

treatment, namely facial balance a normal relationship between the cranial base, the maxilla, and the mandible in the vertical, transverse, and anteroposterior dimensions. I emphasize that this treatment removes inhibiting factors and maximizes skeletal growth. This is in contrast to traditional orthodontic therapy, which exerts a force to produce a result. I show how the FR-2 will help retrain the mentalis muscle, which will allow for the possible repositioning of the lower incisors; how it will retrain the lateral pterygoid muscle to fire in a different way, which ultimately leads to alterations in mandibular growth; and how the buccal musculature can be retrained, thereby increasing arch width.

The last thing that is done at the initial examination is to prescribe a series of lip exercises in which a tongue blade or toothpick is held between the lips with the teeth together for at least 30 minutes per day. At the same time, the patient is instructed to consciously try to relax the mentalis muscle.

DR. GOTTLIEB And, once again, what do you want to accomplish with the lip exercises?

DR. MCNAMARA The purpose of the lip exercises is to encourage nasal breathing, strengthen the orbicularis oris muscle, and decrease mentalis activity.

DR. GOTTLIEB Is this usually accomplished, and if so, in how much time?

DR. MCNAMARA Improvement in mentalis muscle function should be noticed in two to four months. Remember that, as soon as possible, the FR-2 is inserted and the exercises are done with the Frankel in place. So, with the appliance in place, the mentalis is being inhibited by the lower labial pads.

I also recommend another exercise that can be done when the patient is reading or watching television. The patient is instructed to use his index finger to hold down the mentalis muscle while closing his lips together. It is quite a strain to do it. Frankel recommends that the patient use some kind of reminder to keep his lips together, such as self-stick notepads with a picture of lips drawn on them or the word "LIPS" written on them. These can be placed in various positions around the house--on the TV, mirror, refrigerator, and bedstand. Several companies that produce patient motivational materials have produced stickers that are useful in reminding the patients to keep his or her lips together.

DR. GOTTLIEB It sounds as if that first appointment takes a long time.

DR. MCNAMARA The first appointment usually takes about 30 minutes.

DR. GOTTLIEB Do you conduct the whole meeting?

DR. MCNAMARA Yes, I do. However, I am sure that in some offices auxiliary personnel might be very helpful.

DR. GOTTLIEB The next appointment is the records appointment?

DR. MCNAMARA Yes. Usually, in my office, the lateral and PA headfilms have already been taken. At the records appointment, a panoramic radiograph, intraoral and extraoral photographs, and impressions for dental casts are taken. It is also a good idea to make an 8mm movie or a videotape record on selected patients. It is difficult for most people to appreciate the changes that occur with

Frankel therapy from a static photograph. A videotape before treatment, and at six months, at one year, and at two years after the beginning of treatment is one of the best ways for the clinician to make his or her own patient motivational material.

DR. GOTTLIEB With that lengthy initial visit, how long is the consultation visit which follows the records appointment?

DR. MCNAMARA If both parents have been at the initial examination, the consultation can be rather short. It is usually longer if one of the parents was not present for the initial examination. I encourage both parents to be at the consultation and, if possible, all of the siblings. All of the family members must be very supportive, and help the patient to remember to keep the appliance in with a minimum of teasing. Getting the family on the orthodontist's side is important in receiving the proper amount of cooperation.

At the consultation visit, it should be made clear that the Frankel is not the only appliance that will be used. Usually, there are three phases--an initial fixed appliance phase, primarily for the rotation of molars, and for the vertical and anteroposterior positioning of upper and lower incisors; the second phase is the Frankel phase; and the third phase is a final phase of fixed appliance therapy, usually lasting 6 to 9 months.

DR. GOTTLIEB Do you charge a separate fee for each phase of treatment?

DR. MCNAMARA I avoid charging a separate fee for Frankel therapy. I believe it is important to incorporate a functional appliance as one part of the total therapy. That is my style. I know other orthodontists who do charge a separate fee for each phase.

DR. GOTTLIEB Let's run through what you would consider to be a typical three-phase treatment.

DR. MCNAMARA In the first phase, the fixed appliances are usually limited to the incisors and molars, with bands on the molars and bands on the incisors. With the exception of the vertical position of the upper incisors, which is determined at the time of

clinical examination, incisor positions are determined cephalometrically. The facial surface of the upper incisors should be 4 to 5mm ahead of a vertical line dropped from Point A. The upper incisor tip should be 2 to 3mm below the upper lip line at rest.

Anteroposteriorly, the lower incisors should be 1 to 3mm in front of the A-Po line. (The use of the A-Po line in mandibular retrusion cases is discussed in detail in McNamara, '82a.) The vertical position of the lower incisors is related to the existing anterior facial height. If there is an excessive curve of Spee and the anterior facial height is either normal or excessive, intrusion mechanics with a utility arch is usually used. If there is an excessive curve of Spee and a short anterior facial height, no attempt is made to intrude the lower incisors in the first phase. Molar extrusion usually occurs during the Frankel phase in short face individuals.

The molars are usually rotated posteriorly, if necessary, with a transpalatal arch. When the incisors and molars are oriented properly the archwires and appliances are removed and the impressions for the FR-2 are taken.

DR. GOTTLIEB How are the teeth held in place while the Frankel is being made?

DR. MCNAMARA I now use a technique suggest by Ray Howe. At the time the impressions are taken for the Frankel models, an additional set of impressions is taken and upper and lower invisible retainers are made.

DR. GOTTLIEB What is an invisible retainer?

DR. MCNAMARA This is a type of retainer developed by Bob Ponitz ('71). Thin sheets of clear acrylic are heated and then sucked over the work models. The acrylic is then trimmed at the level of the gingiva. The retainers are worn full-time until the Frankel appliance is delivered, as well as during the break-in period when the Frankel is not in the mouth.

We should talk some about the impressions for the Frankel, because it is extremely important to anatomically reproduce the soft tissue with no lateral distortion. A traditional orthodontic tray with a wide bead of wax is not adequate for the Frankel impression in most instances, because it does not allow for an accurate reproduction of the soft tissue.

DR. GOTTLIEB What trays do you use?

DR. MCNAMARA The two types of trays that I have found to work are individually molded (custom) trays and thermal sensitive trays. I currently use thermal sensitive trays (Great Lakes Orthodontic Products, Buffalo, New York), which are made out of non-heat-conducting plastic. The trays are dropped in a water bath at about 175 degrees, placed on the study model for a rough trim, placed back in the water bath, and then placed in the patient's mouth and molded to fit the patient's arch. Compound can be used to extend the trays in the lower labial region and in the areas of the tuberosity. It is only necessary to use about one-half of the usual amount of alginate in these trays, because they fit so closely, and it is not necessary to use adhesive. If the trays are dried with an air syringe, the alginate will usually stick to the tray.

DR. GOTTLIEB What should a good Frankel impression look like?

DR. MCNAMARA The ideal Frankel impression has maximum extension vertically, but minimum extension laterally and anteroposteriorly ([Fig. 9](#)). There should not be thick rolls of alginate in the vestibule, because this will distort the extensions of the vestibular shields when the appliance is made.