DR. RUDOLF SLAVICEK

on Clinical and Instrumental Functional Analysis for Diagnosis and Treatment Planning Part 2

DR. GOTTLIEB Do you believe in a cuspid-protected occlusion for everybody?

DR. SLAVICEK I believe that the cuspid is a very important tooth, but I don't like to make it the godfather of occlusion. The cuspid is one part of occlusion—an important one. In our studies we found that some guidance systems are more anterior and some are more posterior. Based on research in the U.S., Pueblo orthognathic people had canine-protected occlusion. Australian aborigines were found to have accentuated curves of Spee and group function. So the number of teeth involved in anterior guidance depends on the skeletal pattern. A chimpanzee's anterior guidance extends back to the last molar, because his face is forward and his heavy muscles are far behind. Our heavy muscles cross the occlusion.

DR. GOTTLIEB So the occlusal scheme is related to skeletal pattern?

DR. SLAVICEK It is. If the face is built more backward and the mandible is more inclined backward in a skeletal Class II, more and more teeth are involved in lateral guidance, and you may have a partial group function. However, the canine still plays a big role. Group function doesn't mean that the canine is less important. The canine is a very strong tooth and should be in the right place. The canine, the premolars, and even the first molar also have to protect in lateral guidance. We can't be dogmatic about it. It depends on the skeletal pattern and the fact that the condyles are not rigid in their fossae. It's a dynamic system. Skeletal Class III means more canine protection. Skeletal Class I creates a situation in which some type of lateral involvement is necessary with the first premolars in the guidance system. Skeletal Class II or bimaxillary protrusion patterns are more likely to be involved in the laterotrusion movement of teeth up to the first molars.

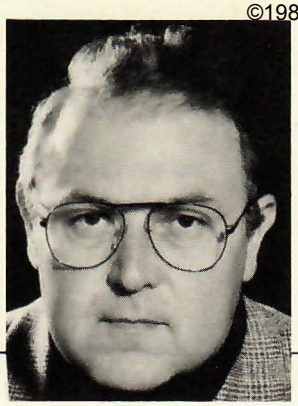
DR. GOTTLIEB In group function?

DR. SLAVICEK We call it sequential lateral guidance. This means that in a very good occlusion the lateral segment starts together as group function and at the last moment at the end of the movement, due to morphology, the canine will separate the side teeth. It is a sequential guidance that starts as group function.

DR. GOTTLIEB If the cuspid is missing or if the cuspid is moved forward to close space for a missing lateral incisor, or if the cuspid is worn and you do not have cuspid guidance, you still can have an adequate occlusal scheme?

DR. SLAVICEK It is important not to forget that the back teeth guide the system for five years during eruption. The canine is one of the last teeth to come into occlusion, and occlusion functions before that. It is nice to see that the canine is a strong and dominant tooth and does a good job, but it is not essential to good function.

Dr. Slavicek's address is Widerhoferplatz 4/5/39, A-1090 Vienna, Austria.



DR. GOTTLIEB Is there an optimal angulation for cuspids in both directions?

DR. SLAVICEK Inclination of upper and lower cuspids should provide free space, which we call the intercoronal angle. Lower cuspids should have an angulation of +9° or +10°. This places the buccal surface in a slightly inclined position. The upper should also be in a positive inclination.

DR. GOTTLIEB Providing freedom toward the tip of the tooth, just as you are suggesting for the incisors?

DR. SLAVICEK Absolutely! The steeper the canine protection, the more you are inviting pathologic side movement in the joint, or side shift. As you increase the steepness, you start to change Bennett movement until it becomes pathologic. The canine needs to be open—not too steep. The entire system requires freedom to move with a noninterfering guidance system, or the joints will loosen to develop this freedom.

DR. GOTTLIEB Do you relate the angulations of teeth to Frankfort, SN, mandibular plane, or occlusal plane?

DR. SLAVICEK Frankfort plane has a problem because of the difficulty in finding porion. It is not a very good plane for research, so we don't use it. We relate to axis-orbital plane which is easy to identify, and can also be established on the articulator. Mandibular plane, occlusal plane, and palatal plane are useful, because we can see them easily, but they do not relate the cranium to the mandible as functional planes.

DR. GOTTLIEB And the angulations of bicuspids and molars coordinate with the angulation of the anteriors?

DR. SLAVICEK Absolutely! We found a positive inclination of the upper and lower incisors and canines, and a change in the premolar region. The second premolar is perpendicular and the molars bend inward. You have positive angulation of the anteriors changing to an upright position at the second premolar and then a bending in of the molars.

DR. GOTTLIEB If you take out bicuspids, what are the implications in that?

DR. SLAVICEK If you take out bicuspids, you have to be aware that you are changing the arch environment from a functional standpoint in a very sensitive region. You have to be aware that the first premolar has a little bit less inclination and the second premolar less and the first molar even less. That means you have a sequence related to tooth morphology. If you take the first premolar out, and if the canine does not work for a lifetime, you have a dramatic jump in guidance angles going to the second premolar. The angulation of the buccal cusp of the second premolar is completely different from the canine and first premolar, and this may cause trouble. Also, if you take the first premolar out, most of the time you will have a shortening and a narrowing of the arch. This is one of the most important functional disturbances we have found in distraction cases in orthodontics.

DR. GOTTLIEB How about taking out second bicuspids?

DR. SLAVICEK I think if you want to take out a bicuspid, it is preferable to take the second rather than the first, but you always have to deal with the fact that you are narrowing the arch.

DR. GOTTLIEB What do you consider to be an appropriate occlusal plane orientation?

DR. SLAVICEK In our study of adult patients, we found that the occlusal plane travels with the APg plane. I prefer to say APg rather than APo, because to me Po means porion. If we level the arch and rotate the occlusal plane downward during treatment, the curve of Spee and the occlusal plane both revert after treatment. In a skeletal Class I, the occlusal plane is 90° to APg plane. In a skeletal Class II, it is 85°. In a skeletal Class III, it is 95°. This enables us to plan for occlusal plane orientation right at the beginning of the case, if it can be visualized in the treatment objectives where the mandible will be. At least we know how nature does it.

DR. GOTTLIEB Is there a relationship of the anterior teeth to the angle of the eminence?

DR. SLAVICEK I feel that the angle of the eminence is not a primary pattern. It is an adaptation to eruption of teeth between birth and 10 years of age. Ninety percent occurs during that time. Another 9 percent occurs to the end of growth, and 1 percent for the rest of life.

DR. GOTTLIEB Are Class II cases more prone to joint problems than other cases?

DR. SLAVICEK Class II, division 1 cases have fewer joint problems. Class II, division 2 cases have more of a tendency for joint problems. Class I cases and Class III cases are in the middle. The Class II, division 1 case has a tendency to function anteriorly, and cases with anterior freedom have fewer joint problems.

DR. GOTTLIEB They are compensating for their skeletal pattern?

DR. SLAVICEK Yes, they are staying a little bit anterior.

DR. GOTTLIEB One of the problems that orthodontists have is that you have a lot of retrusive mandibles in Class IIs. If you aren't going to change the mandible, and if you retract upper anterior teeth to match retruded lowers, you have an imperfect occlusion at best. What is the answer to that?

DR. SLAVICEK The answer to that is if you have a Class II due to the mandible, the only help would be to try some advancement of the mandible by growth using functional appliances early, very early.

DR. GOTTLIEB What age is early?

DR. SLAVICEK Early is the moment you see the functional matrix is causing the problem of the retrognathic mandible. I think it should be right at the beginning of the eruption of the permanent teeth, let's say 6 years of age. In some cases it might be a little bit earlier if you have a mechanical problem—a deep overbite case that is restricting the mandible. Interceptive orthodontics with functional appliances would be indicated in all retruded mandible cases during the early period of growth, with a second step of orthodontic treatment. Severe retrognathic cases should not be treated in the maxilla.

DR. GOTTLIEB What happens after growth is completed and you have the retrognathic mandible to deal with?

DR. SLAVICEK If you have a retrognathic mandible after growth, if you have a very wide

overjet, maybe you can do asymmetric extractions or surgery in such cases as a compromise. If we have a strong bony discrepancy, we sometimes have to do surgery. Some cases are borderline.

DR. GOTTLIEB How do you feel about the surgical procedures?

DR. SLAVICEK There are cases that need surgical treatment, but I feel that the decision to perform surgical procedures must be made very carefully. In the past we have seen surgery done instead of orthodontics on pure orthodontic cases, and there were a lot of relapses. We have seen a great reduction in the enthusiasm to do this kind of treatment.

DR. GOTTLIEB With a retrognathic mandible that is treated orthodontically without surgery, do you try for some lesser goal?

DR. SLAVICEK If we are able to establish a compromise occlusion for the patient where he is able to function, and if there is not a serious esthetic problem for him, we try to avoid surgery; but advancement of the mandible in some cases produces a dramatic change in the functional pattern, and sometimes we have increased esthetics and decreased dysfunction.

DR. GOTTLIEB Would you refer a non-grower with a retrusive mandible but no joint problems for surgery for esthetic reasons?

DR. SLAVICEK If he has no problems, if they are functioning well and have what I call a happy Class II, division 1, I prefer to let them go. But surgery may be needed if you have no other way to solve the problem. I do not think that surgical procedures should be used without a very careful evaluation of what will happen later on and what the patient's expectations are from surgery. The relapse of surgical procedures is high and it is not predictable at the moment. Some cases that are overcorrected surgically stay overcorrected. Some are overcorrected and have a tendency to relapse. We don't have too many long-term studies to know how different procedures act in different cases. I think a surgical bony correction is not very easy, and I have become a little conservative. I would discuss the possibilities with the patient and try to find the treatment that may be the easiest way for him to solve his chief complaint. Sometimes it might be a little submental surgical procedure. Total mandibular advancement causes problems for our patients.

DR. GOTTLIEB When is joint surgery indicated?

DR. SLAVICEK Beyond critically locked joints or a need to alter the morphology of the condyle for function, it is difficult to consider surgery unless you are confronted with a tumor.

DR. GOTTLIEB What is the value of arthroscopic surgery of the joint?

DR. SLAVICEK Arthroscopic surgery for the upper compartment of the joint is just beginning. We can use it especially in pathologic soft tissue problems such as adhesions of the upper joint compartment. If adhesions are limiting the sliding of the upper part of the synovial joint, you can easily loosen these adhesions and this is a dramatic aid for the patient. There are limited applications for arthroscopic surgery, and I don't know how successful they will be long-range. I have the same feeling about the conservative disc repair techniques. What we are now hearing in the long term is that they are not very successful. After two, three, or four years the patient is back where he was. Therefore, I attempt other means of treatment, such as unloading the joint with posterior support, before considering surgery.

DR. GOTTLIEB When you have an interdisciplinary approach on occlusion, who is the team leader?

DR. SLAVICEK The one who has to finalize the case is the chief of the team. If this is an orthodontic case, and the orthodontist will finalize the treatment, he is the one. If this a case in which the orthodontist will do prosthetic treatment, the practitioner who referred the case and will do the final treatment is the one. The same thing in a team approach that includes surgical, orthodontic, and prosthetic procedures. Surgeons are always out of trouble early. Orthodontists and prosthodontists have to take over and finalize the case.

DR. GOTTLIEB What does a dual bite do to the joint?

DR. SLAVICEK This, of course, depends upon the dual bite's role in affecting either or both joints, which must be analyzed. But I am not happy with a dual bite. A patient who has a good occlusion, even if it is a distal occlusion, is able to function. A Class II that is not a severe Class II, who has a proper occlusal relationship, may function well for a lifetime. The canine functions with the lower lateral incisor.

DR. GOTTLIEB What do you do about slide in a Class II, division 1 case?

DR. SLAVICEK I do not like to have a slide, but a slide in a naturally occurring Class II, division 1 is not a problem for me if there are no symptoms. If the patient has symptoms that need treatment we have to make a change, but in some cases we will land in a disaster. One problem is the more severe a dysgnathic case is, the more the occlusion has to be a protective mechanism. Any borderline case with a slide in centric will create more problems with the neuromuscular system than one with a very distinct occlusion. A frequent finding in a compensated Class II, division 1 case is that the first prematurity occurs with the distal edge of the lower canine contacting the mesial of the upper first premolar. If you guide the mandible back, it occludes in an open position with the tip of the lower canine hooking into the mesial of the upper premolar. These patients use this very sensitive position to guide their neuromuscular systems.

DR. GOTTLIEB Do you keep that as a permanent mechanism?

DR. SLAVICEK I do not like to equilibrate these teeth. I keep the morphology intact if they have no symptoms or not too many symptoms. This is a very sensitive mechanism for discluding the back teeth, but still with a kind of anterior guidance, because the prematurity keeps the mandible forward. If you grind it away, the patient will close in a more retruded position. Never change a team that is working, even in a malocclusion. If you equilibrate this case, you will end up 5mm more posterior and then it is a surgical case.

DR. GOTTLIEB How much slide do you tolerate?

DR. SLAVICEK In a mounted case, a millimeter of slide in the joint is nearly half a premolar width in the dentition. We have to be aware of this relationship of slide in the joint and in the occlusion. Half a premolar width slide is dramatic. You go from a Class I to half a Class II. The transverse ridge of the first molar affords half a millimeter of retrusive protection. If you have more than half a millimeter, you jump over into the distal fossa with your lower cusp. Immediately you have a change in the bite.

DR. GOTTLIEB Years ago, Sassouni and Krogman used all the analyses that were available at that time and diagnosed one case. They wound up with three groups of conclusions about where the seat of the problem

was—some analyses said the mandible was retruded, some said protruded, some said neutral. How do you resolve that problem in your analysis?

DR. SLAVICEK I try to correlate everything—clinical analysis, instrumental analysis, skeletal analysis, dental analysis, and cephalometrics—in a computer-aided diagnostic program called CADIAS. I take everything about the patient into consideration, and arrive at individualized guidelines, not fixed norms. The computer is wonderful for storing data; and no one can analyze data as a computer can, but the computer is still only a machine. I use computer-aided diagnosis as a very good tool to help me and save me time. I can interact with it and I don't adhere to one analysis. If I am in doubt, I can go to another analysis or I can go back to measurements. The computer collects and correlates all the data, and describes the patient in question. Now I can determine how this patient differs from the ideal and what his pattern is.

DR. GOTTLIEB There are sometimes "what if" questions. What if I place the lower incisors a millimeter farther forward? What if I could stimulate 2mm of additional growth of the mandible?

DR. SLAVICEK Yes, the computer can quickly refigure and redraw relationships based on changes in the input data. We are able with interactive planning to predict where he has to go. You can interact and say, "What happens if I do so and so?" You can simulate initial treatment and see how the joint position changes. There is a cross-evaluation of all the data, and the computer may tell you, "I now need an axiographic record", and you say, "Why?" Then it tells you you have a patient who answered question number 5 with yes, or in the muscle analysis there was a sensitive spot on the lateral pole of the joint and, therefore, you need axiography to find out what is going on with the joint. Incidentally, we now have the electronic axiograph, which enters the data directly into the computer. The next step is to go to a three-dimensional analysis of occlusion. Nobody else is doing that. They all relate to one plane.

DR. GOTTLIEB Flatland.

DR. SLAVICEK Flatland, yes. If we do it three-dimensionally, we enter a completely new world. We are able to move teeth in space on the computer. We can do a computer setup of the occlusion. I try to see how nature arranges things. If nature says the upper teeth should be 5mm in front of APg plane, I say, "What are the anterior and posterior limits for this face?" If the computer says 3, 4, 5mm is fine, I can formulate my treatment plan within this range and within the patient's soft tissue structure without any compromise. Interactive planning deals with the patient's individual pattern. Then I see how the face is arranged with relation to the joint, especially in an adult case or when I am finalizing a child's case. If I see disturbances or dysfunction in a case, I always look for what does not fit together, and I am very attentive to the compensating mechanisms of nature.

DR. GOTTLIEB What compensating mechanisms are you referring to?

DR. SLAVICEK There are three or four important compensating mechanisms. If you have skeletal discrepancies, vertical dimension compensates. The lower the vertical dimension, the more you are compensating for Class II relationships skeletally. Number two is dentoalveolar inclination. If a mandible is two standard deviations retrognathic, how do those cases look if they have been successfully compensated in nature? I take the case to the computer and it may say, "In this case, inclination of the lower front teeth may be more anterior and the upper more posterior." Therefore, I am compensating in a skeletal

way. Next is articular compensation for skeletal pattern. The moment you go forward with a retrognathic mandible to follow the maxilla, you develop some stretch in the joint. Nature is working like an activator, but it is more effective than an activator because it is muscular positioning. Therefore, if you get in early enough, you can go to functional treatment to activate joint compensation. Later, maybe you will decide to keep a slide. You are in some anterior position and you keep it for a lifetime to compensate for skeletal discrepancies. In my opinion, orthodontics must follow the way nature treats cases.

DR. GOTTLIEB Orthodontists should preserve those compensations?

DR. SLAVICEK It is important to observe how skeletal discrepancies are stabilized by nature so that they can function. In our research on 2200 people with no orthodontic treatment and all types of faces, we didn't see any ideal occlusions, and we concluded that the most important observation was the absence of symptoms or signs of disease, healthy teeth, good function, good occlusion, and little or no dentistry. There are strict rules of compromise in nature. Occlusal plane looks different in different skeletal patterns, alveolar process looks different, front teeth are related in different places. Let's follow nature with our orthodontic movement. Go to an individual treatment design, not to a predesigned, uniform Class I designed case. In Caucasian samples, 52 percent have Class II skeletal relations. Do you think this is nature's mistake? It is a good working skeletal type, compensated to a Class I dental arrangement. Thirty-six percent have a Class I skeletal relationship. They are a minority, but we are always treating to this face. Why? The skeletal Class II type is the majority, and a long-term study shows that they keep their teeth longer. Keep in mind that the Class II has the right to be Class II. It's not abnormal. Angle was right in saying that teeth fit together best in a Class I relation, but everybody then concluded that it was best all the time. It is right for skeletal Class Is, but don't mix occlusal patterns and skeletal patterns.

DR. GOTTLIEB The orthodontist will then say, "What do I do in a skeletal Class II to satisfy the patient's need for a good cosmetic result?"

DR. SLAVICEK I promise you a good classical Class II face from a skeletal standpoint with nonextraction treatment, if there is no need for extraction because of tooth size discrepancies or arch width discrepancies. There is a serious indication for extraction in some cases—I do not rule out all extractions—but I say that a Class II looks very good and not protruded if you follow the rules of nature. It is very difficult for me not to want an individualized arrangement related to the skeletal relation of the patient.

DR. GOTTLIEB Do you equilibrate the teeth?

DR. SLAVICEK Equilibration of natural teeth has to be carried out very carefully, because you have to see that the occlusion is stable later on. A very good understanding of equilibration sequences is necessary. You must know what you would like to achieve, what cusps you have to adjust, and how this cusp will move out of this fossa later on. The patient who is equilibrated must feel comfortable. In my experience as a teacher, equilibration is the last thing you have to learn. Equilibration is an irreversible change in occlusal surfaces. In my opinion it is the most favorable way to finalize a case, but don't do it too extensively. Don't overgrind teeth. I try to be as careful as possible, as limited as possible. We always do it on the casts first. The art of equilibration is that after equilibration you do not know it has been done.

DR. GOTTLIEB Do you ever equilibrate during treatment?

DR. SLAVICEK I do not like to have an unfinished case equilibrated. Finalizing a case means you have to be there and then only make final adjustments.

DR. GOTTLIEB Routinely or just on selected cases?

DR. SLAVICEK It is not routine. I don't like to be better than nature. If it is necessary, we do some equilibration.

DR. GOTTLIEB Are balancing interferences on the lingual cusps of upper second molars an anatomical problem or a treatment deficiency?

DR. SLAVICEK They are both, but in most cases the second molars are not aligned as they should be. The lower second molars are sometimes turned and tipped in too far, and not kept in proper position with the upper second molar. The upper second molar is varied anatomically. There are three-cusp and four-cusp types. Therefore, the rotation of those teeth is not always tooth-stabilized.

DR. GOTTLIEB Very often they are not included in the orthodontic setup.

DR. SLAVICEK Therefore, in some cases, especially in lateral and medial protrusion contact, you have contact of lower second with upper first molar, which is important in mediotrusive interferences—especially when you have overrotated and overtipped. This problem is related to treatment that drives the upper teeth too far posteriorly.

DR. GOTTLIEB Second and third molars get squeezed upward and backward.

DR. SLAVICEK Absolutely. Anything that brings the upper molar back increases the supereruption of the lower, because the upper is not coming into occlusion at the right time. There is very often a one-year delay if you distally drive the upper posterior teeth. The dentition was designed to act forward, not backward. Therefore, most of the treatment in the upper should have an anterior rather than a posterior direction.

DR. GOTTLIEB How do you use splint therapy?

DR. SLAVICEK The purpose of the splint is to get the patient out of occlusion and to let him act freely while the splint is adjusted to pacify the muscles. In my opinion splint therapy is an aid, but it is overused. In our initial treatment of functional disturbances, splint therapy is used in only 25 percent of the cases, and for a very short time. We do not like to have a patient on splints too long.

DR. GOTTLIEB Do you use the same splint for all cases?

DR. SLAVICEK There are four types of splints.

The myopathic splint deals with myopathic patients whose signs and symptoms are related to muscular problems. This is the easiest one. It tries to pacify the musculature by interfering with the occlusion, and recreating a normal mandibular position. This treatment lasts a maximum of six weeks, and we try to do it in a shorter time by helping with biofeedback and with some type of physical therapy—some massage. Initial treatment in a myopathic case includes the myopathic splint, pacifying biofeedback, physiotherapy, muscle exercises, and sometimes medication but very rarely.

In constructing the myopathic splint, we mount our casts and build the splint with two layers of a .5mm vacuum-pressed material to the lower jaw, for a buildup of 1mm over and above the first prematurity to open the vertical a little bit, and then we add one layer of self-curing material. We split the splint and later tie the two halves together with elastics. Then

we adjust it so that it touches the tongue very little, and so there is only a single-line contact of the front teeth and a very small dimple contact posteriorly. We pacify the patient with biofeedback. I bring the splint to the mouth and, with the patient's head positioned so the hyoid process is relaxed, I adjust the splint so the patient feels both sides equally. The recall sequence is: first day after insertion, second day, one week, one week. This is a very rapid procedure. Splint therapy in a very rapid manner will be one of the features of orthodontics of the future. An additional advantage of these splints is that the patients wear them.

The decompression myopathic splint is used to unload the joint. If there is no occlusal support and the patient has a feeling of compression, we add an unloading feature to the myopathic splint by placing .3mm of shimstock under the ball of the articulator. The mandible rotates down and back. The patient seems comfortable after 20-25 minutes, and his condyle goes downward, allowing the disc to take up more fluid—sucking a little bit more liquid into the upper compartment—and to establish a new position. After a while you will see that the disc has more resilience, and now you have to establish the occlusion in that position, supporting the posterior occlusion through orthodontic treatment.

The verticalization splint is used for patients with reduced vertical dimension due to lack of supporting occlusion or overgrinding procedures or abrasions. We make a very high step—a 5mm increase in vertical dimension to pacify the closing muscles. Amazingly, these patients are pacified very rapidly and without pain.

The repositioning splint is used to reduce the joint—to seat the condyle in the disc. Let's assume you have a reciprocal click. We mount the casts in the posterior position, but now we protrude the articulator 2mm anteriorly. The jaw is protruded and the incisors meet edge-to-edge. We build a projection on the splint to create a prematurity when the patient closes, just like the natural one previously described between the lower canine and the mesial of the upper first premolar. This is the most frequent naturally occurring prematurity in an articular compensated case that is in an anterior position. The patient is forced to go forward. If he goes back, he falls out.

DR. GOTTLIEB What do you mean by "falls out"?

DR. SLAVICEK When the lower cuspid hooks in mesial to the upper first bicuspid, the condyle is in the disc. If the patient comes off that position, he is off the disc. The prematurity prevents him from taking the posterior position. After two weeks of treatment, he assumes this position naturally, and we adjust the splint to bring the patient back to centric relation. Wearing the splint, the patient does muscle exercises. Our splint therapy is very easy for the patient. We try to have only these four types of splints, and to get the patient off splint therapy as soon as possible. In the United States, patients are on splints much too long and too many people have splint therapy and nothing more. I don't like that. I use the splint as an aid to pacify the patient's muscle system, to readjust the position of the condyle to the disc, maybe to increase vertical dimension so the face is no longer compressed, but then I want to get off the splint as soon as possible and go to a definitive course of treatment. After successful splint therapy, the occlusion does not fit together in many cases, and we have to decide whether to equilibrate in some of the less severe cases or to go to orthodontic treatment. Fifty percent of our adult dysfunction cases have orthodontic treatment to finalize the case. This will be a major, dramatic role for orthodontists in the future. Incidentally, in most cases our splints are done on the lower teeth.

DR. GOTTLIEB Why on the lower teeth?

DR. SLAVICEK The advantage of the lower splint is that the patient has no interference with the tongue, and we have a good approach to settling the teeth to the mandible. It helps because the upper teeth are not locked together and their proprioception is active during the grinding procedures.

DR. GOTTLIEB What is the reason for splitting the splint?

DR. SLAVICEK If you use self-curing acrylic in one piece in a horseshoe, it has a tendency to open up after it cures. If we split it, it fits better and is more comfortable, and we get a very good result.

DR. GOTTLIEB Do you ever use TENS to pacify the muscles?

DR. SLAVICEK No. We routinely use biofeedback stimulation and homeopathic medication—magnesium carbolicum, which is very pacifying. They pacify horses with it before they are going to be transported. Holopathic drugs are forbidden for racing horses, but homeopathic drugs are OK and very pacifying. We borrowed this drug from the horse doctors. There is a problem with strong medications. Americans often use pain killers, but pain is one of the most important health signals we have. It's like the modern sophisticated cars with computers to diagnose the situation with oil, fuel, doors—control of everything. If you are going along the road and one of those lamps lights up, it is a signal that there is a problem. What is your reaction? Are you now going to find a switch to turn the light off? If you could turn the light off, it wouldn't solve the problem. Pain is the same. If you have pain, something must be causing the pain. It is a warning signal. Pain is the most important health monitor of the body. Therefore, my therapy should be not to kill the pain. My therapy should aim to eliminate the pain. Put oil in the car. Then the lamp will go out. Don't cut the wire.

DR. GOTTLIEB You don't use any other medication?

DR. SLAVICEK Medication sometimes is necessary. When we have problems related to dysfunction, they may need medication. A simple example—let's say a problem in an adult female 42 years of age. She is premenopausal. We know that 10 percent of females react with rapid change in the calcium metabolism of the body. They are prone to osteoporosis. It may create pain with a psychological aspect to it. Then they are creating a joint problem. If you treat them with a splint or with pain killers, you are violating the principles of medicine. You are not treating the cause of the pain. You have to refer her to regulate her hormonal disease that is causing periodontal migration because the bone is not supporting the teeth as well, and then go ahead. Let's consider a 12-year-old girl. She has changing hormonal problems. She has a high turnover of bone and now she has some type of compression joint. She has a condylar resorption. Now let's say she's 14 years of age and now she's taking the pill. She is increasing the problem. Everything that is going on now is not caused by occlusion. It is caused by hormonal problems, and if you treat the occlusion and forget the hormonal problem, it's your problem. You must be aware of the hormonal problem and refer the patient to support your own therapy in occlusion. Similarly, if you have a rheumatic disease in a juvenile joint, you have to deal with another profession. You do your job, they do theirs. Patients see a dentist more often than any other doctor. We have to know what is going on, even if it is caused by other problems.

DR. GOTTLIEB How, when, and for whom do you prescribe exercises?

DR. SLAVICEK It depends on what is causing the problem. In most hyperactive cases, the closing muscle group is most likely to be hyperactive—masseter, medial pterygoid, and

temporalis. The patient is clenching and grinding. You have to pacify these muscles by exercising. The closing muscles are hyperactive, the opening muscles are too passive. Therefore, we strongly believe in muscle exercises that will increase the activity of the opening muscles. Let's say, for example, a patient has a hyperactive masseter. We have him lean several times a day supporting his jaw with his arm on the table and we have him open against this force, training the suprahyoid muscles to harmonize closing and opening muscle groups. This is one simple example. In a case of repositioning of the joint—reduction of the luxated joint—we know that the superior head of the lateral pterygoid is related to closing. If we want to treat the disc problem, we have to pacify the closing activity. Therefore, we do not place splints today without muscle-pacifying exercises for the closing muscles and biofeedback training for the opening muscles. If the patient is active with his closing muscles, biting in the splint, the disc is rotated with the capsule medially and anteriorly against our goal of treatment. If we have a very active lateral pterygoid, we activate the posterior temporalis by exercises. We always go in the direction of balancing muscle activity.

DR. GOTTLIEB Do you use muscle training on a vertical splint?

DR. SLAVICEK Yes. We pacify the closing muscles by exercise to balance them. It is very necessary for the patient to keep working in this way without the splint, too. And the patient feels real good with it.

DR. GOTTLIEB How do you decide to send people for massage or other physiotherapy?

DR. SLAVICEK If I find any posture problem in my clinical examination, it means the neck muscles are not harmonized. Is the atlas sensitive on one side? Do I have the impression that the body posture is not harmonized? Are the left and right shoulder angles different? Then I want to have a diagnosis from an expert physical therapist and I cooperate very closely with one. If he tells me the patient has problems with the vertebrae, I may decide he should take care of this problem, while I do my job with the occlusion. With this team approach, I can decrease the treatment time approximately 50 percent, and the patient is now aware of his problems. He is not just an occlusal-minded person any more. Now he knows it is a multifactorial problem, and he can do something about it. He can change his posture, change his behavior. This removes the focus from being entirely on his teeth.

DR. GOTTLIEB How do you decide when you are finished?

DR. SLAVICEK The muscle is no longer active when it is stabilized on the splint. It happens with two to three weeks of intensive treatment. I see my patients next day, two days later, two days later, two days later . . . adjust, adjust, adjust to keep the muscles running, which is very effective therapy. During that time the patient has some counseling, some biofeedback, some physiotherapy.

DR. GOTTLIEB How do you know that a muscle is pacified?

DR. SLAVICEK When the pain is eliminated and the muscle regains its functional role. This can be verified by doing axiography, preferably using the electronic axiograph, CADIAX, to obtain timing data of mandibular movements for the purpose of analyzing muscle balance and coordination.

DR. GOTTLIEB Do you get a recurrence of symptoms during orthodontic treatment, after they have come off the splint?

DR. SLAVICEK We start many of our cases with orthodontic treatment. A lot of our pa-

tients react better to orthodontic treatment than to splint therapy. If you eliminate the cause of the problem, the system pacifies.

DR. GOTTLIEB So you might skip the splint therapy in cases where you are going to do orthodontics?

DR. SLAVICEK Right. We may go immediately to orthodontic treatment.

DR. GOTTLIEB In an acute case, do you do the splint therapy to pacify the muscles and then go into orthodontics?

DR. SLAVICEK Yes, but don't stop in the middle of the road. It doesn't make sense to me to pacify a system and to heal everything, and still have occlusal problems that force the mandible into dysfunction again. I do not like to keep patients on splints for more than six months at most. Why? Splint therapy is a kind of orthodontic treatment. You are intruding teeth, you are doing everything you should not do to occlusion.

To answer your question, if it is acute, I have to start to consider a therapy to take the pain away. I do a definitive treatment plan after I pacify the patient. If I have a simple case and I see that the problem is occlusally related and I am not going to adjust these teeth with grinding procedures, I start with orthodontic treatment. We have done many successful cases and the patients are very satisfied. Let's say there is a clicking joint or a locked joint in a Class II, division 2 case. How can I do something for the joint if the patient goes a little bit anteriorly in a reduced situation of the joint and he is edge-to-edge with his front teeth and has a posterior open bite of 6mm? It cannot be done. Therefore, I move the front teeth out of the way and allow the lower arch to settle. Then secondary splint therapy is not necessary in a lot of the cases. The orthodontist will play a large role in the future in the treatment of TMJ dysfunction. He has to be an expert on it. He has to understand the problem.

DR. GOTTLIEB What is the definition of a successfully treated TMJ case?

DR. SLAVICEK I think we should have one thing in mind. If you have a progressing TMJ case, it is a success to stabilize the case. Don't be a hundred percenter. Don't think you can treat everything to its original state. What you have to do in a progressive case with increasing problems is to stabilize it first. Then try to normalize the case. It depends on the age of the patient. If you treat early enough—in a growing stage—everything may return to its original state. The later you are, the lesser than 100 percent result you will get, and the longer the sequence. To me it is a success to stabilize the case without pain. Pain is my chief concern. Chronic pain is very hard to take. The patient with chronic pain alters his psychological situation. He is no longer a healthy patient.

DR. GOTTLIEB Some people have the same postural problems, but no symptoms. What is the difference between people who get away with it and people who don't?

DR. SLAVICEK People who have very active isotonic activity are taking care of the problem. If people are freezing in an isometric posture—let's say if somebody has problems in the pelvis and he is a more static person, working without any change in posture—this causes problems for the muscles. If a patient with the same problem is moving around—always changing his position a little bit—then the muscles keep busy and nothing is programmed in so deep. Therefore, to avoid problems we exercise these muscles. Muscle is designed to move. This is one of the things that we call to the patient's attention with splint therapy. Don't wear it day and night. Take it out. Move. Keep in mind what we want to do with the splint, but the rest you can do

yourself. Eat without the splint. I only have them eat with a splint in very rare cases.

DR. GOTTLIEB How much do you have patients wear the splint?

DR. SLAVICEK They have three advices about when to wear the splint: at night, if you are carrying heavy loads, and if you are psychologically stressed. If you are aware that you are relaxed, you don't need a splint. If you know that you are under tension and you are not using your system properly, put it in. It is a reminder device for you. This also applies to functional appliances. They only work if people exercise with them. If you put a Frankel II in with a heavy palate to change the muscles, have the patient wear it during the day and instruct him about exercising with it. Close your lips. That's how Frankel does it, and he is very successful with it. Don't give it to the patient and have him sleep with it.

DR. GOTTLIEB People change over time. Even with the precise approach that you have, occlusion and muscles change, joints change. Does that imply that orthodontists should not consider patients to be transient, that orthodontists ought to be seeing patients indefinitely?

DR. SLAVICEK I think our system changes slowly. We know today that the more balanced, the more harmonious the system, the fewer the changes that take place. Therefore, our main concern must be to maintain a harmonious situation after we have treated the patient. To do this, I think the orthodontist in the future should have a recall system to see what happens. I would like to see my patients once a year to see what is going on and to document what is going on.

DR. GOTTLIEB And on recall would you go through the same clinical evaluation?

DR. SLAVICEK Yes. A recall must be scheduled for about 20 minutes. It would include asking some questions, doing a muscle examination, looking to the occlusion. You don't have to take plaster casts, etc., although on some you might take full documentation. I would like to see practitioners concerned with documentation.

DR. GOTTLIEB What do you think is the incidence of TMJ problems?

DR. SLAVICEK Studies we did in Austria, which agree with other studies all over the world, show that at least 75 percent of the population have symptoms of dysfunction in the stomatognathic system, and all of the studies showed a 20 to 25 percent disease rate. That means the orthodontist's task is no longer just producing nice-looking teeth. He is healing patients. He has to make a diagnosis and determine a course of therapy to eliminate disease.

DR. GOTTLIEB Is the incidence different in children and adults?

DR. SLAVICEK Our studies have indicated that the only difference is that adults are more aware of their problems and more ready to tell us about them. Children have the same problems, but don't tell their mothers. For instance, there is evidence that children have the same rate of headaches that adults do, but the adults take drugs or go to the doctor. The child has the same pain, clicking joints, muscle pain, and posture pain, but assumes that that is normal. If you question the child, you will get a high rate of symptoms in a growing child.

DR. GOTTLIEB When you say 75 percent symptoms, are you talking about both signs and symptoms?

DR. SLAVICEK I think symptoms and signs may vary depending on your questions. If you sit down with patients and talk with them or if you only hand them a paper and ask them to check off answers, there is a big difference. We take time for a personal interview, and the number of symptoms coming from the patients is often much higher than if you only have a standard list of questions. Patients don't react well to sheets of questions. It's not deep enough. You have to sit down with a child and talk with him. It takes three to five minutes to make contact—to be switched on with a child. Orthodontists must be aware of this. It's not satisfactory to approach the child, make impressions, and call that diagnosis.

DR. GOTTLIEB The numbers that you have on the frequency of occurrence of TMJ problems are an eye-opener, especially for children.

DR. SLAVICEK All the studies done on young people showed a high rate of symptoms of dysfunction. This doesn't indicate disease for all of them, but there were clicking joints or muscle symptoms; and everyone was aware that at least 20 percent of youngsters are diseased in the stomatognathic system from a functional standpoint.

DR. GOTTLIEB The numbers I have seen in the States for the incidence of TMJ dysfunction are much lower than yours.

DR. SLAVICEK I know. The difference is in doing a study with all the available diagnostic tools, including instrumental analysis. You will detect more symptoms and more problems than if you are using a less sophisticated examination.

DR. GOTTLIEB Is orthodontic treatment creating TMJ problems?

DR. SLAVICEK Studies have found disease after orthodontic treatment, but you have to question was the disease there before or did it occur afterwards. Your treatment may not have caused the problem. The patient may have had the problem at the beginning. It is important to know that.

DR. GOTTLIEB In light of what we have been discussing, how do you see the future of orthodontics?

DR. SLAVICEK The future will see the conversion of orthodontics from a more mechanically oriented profession to one that is concerned with the function of the total stomatognathic system. Orthodontists are presently statically oriented, concerned with how the teeth fit together. They must become more functionally oriented. The system is dynamic and orthodontists will become more concerned with how the teeth work together. One of the most important teachers stated in 1870 that it is not occlusion that we must be concerned with, it is articulation; and articulation is teeth and joints working together. It is movement. It is dynamic. I think as a health professional, the orthodontist has to feel it is important to bring teeth to the correct position as a contribution to general health. The goal is not mechanical—a nice looking set of teeth. It is influencing total health.

DR. GOTTLIEB Rudi, I want to thank you for introducing concepts in this interview that may inspire a number of new approaches to orthodontic treatment. In the rest of the articles in this series, we will be showing the details of your clinical and instrumental functional analysis and of CADIAS, your computer-aided system for diagnosis and treatment planning.

(TO BE CONTINUED)