

## JCO INTERVIEWS

# Dr. Rainer-Reginald Miethke on Orthodontic Treatment in Europe

**DR. KEIM** Reggie, how would you describe your treatment philosophy?

**DR. MIETHKE** My treatment approach is pretty much mainstream: I use a preadusted appliance with all typical adjuncts. I used to use a lot of headgears, including protraction headgears, but their application has decreased due to the lack of patient acceptance, the decline of extractions, and the availability of micro-implants. I still use functional appliances in the form of a headgear-activator combination, and also function regulators or other functional appliances. Moreover, I was the first user of Invisalign\* in Europe and still treat a lot of my patients with the Invisalign system. As a typical European orthodontist, I believe in growth control, which means that some of my treatments

start in the early mixed dentition. As far as extractions are concerned, I guess I am also a victim of the general trend toward nonextraction.

**DR. KEIM** Can you elaborate on that last remark?

**DR. MIETHKE** Well, Bob, first of all we have to realize that we have a dramatic decline in tooth decay. We have less space loss, superb bone anchorage, many more non-compliance devices, bracket systems with lower friction—all these have contributed to the worldwide decline in extraction frequency. Even if secondary crowding is not the proper indication for extractions, we had to perform them in the past because of insufficient anchorage control, or we just did it to facilitate treatment. I was always interested in following my patients long after treatment, and, believe it or not, I saw a lot of stable results without disfigured faces. If I look at all the slides I took in these patients, I realize how short the treatment often was back then compared to today, where you struggle to get every last little bit of space. But parents and children object so strongly to extractions nowadays that I try to avoid them as much as medical conscience permits.

**DR. KEIM** Is this approach typical in German orthodontics?

**DR. MIETHKE** Treatment methods in Germany are probably somewhat generation-dependent, in the sense that the older generation still frequently uses removable appliances, whereas younger orthodontists most likely apply the same approach I



Dr. Miethke



Dr. Keim

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described. Now, you might wonder why I am not like other members of the older generation, since chronologically I would belong to this group. The answer is that I was lucky to get some very good training at Louisiana State University from teachers like Jack Sheridan and from my late friend Jack Hickham. So I owe American orthodontics a lot. I will never forget that and will always be much obliged.

**DR. KEIM** Is the German system of health-care delivery different from that of other European countries?

**DR. MIETHKE** Yes, very much so. Europe is like a patch rug: its health-care systems are as different as its countries. The systems in some countries are very much the same as in the States, while in other countries the mandatory health insurance covers a large portion of orthodontic care.

**DR. KEIM** What differences do you see in the delivery of orthodontic care today between Europe and the United States?

**DR. MIETHKE** I guess orthodontics in general is more routine in the U.S. than it is in Europe. To me, it seems as if we on the old continent still have to convince parents again and again that their children need some kind of orthodontic treatment, whereas in the States, orthodontics is almost part of the physiological development process.

**DR. KEIM** What are the similarities?

**DR. MIETHKE** I believe that private participation in financing orthodontics is becoming more and more normal. With the official health-care system in Germany, everybody is eligible for open-heart surgery or an organ transplant. Since the system cannot cover smaller interventions, parents and patients now realize that they have to contribute.

**DR. KEIM** Has this changed over the last 10 to 20 years?

**DR. MIETHKE** Yes, this is a rather recent development resulting from a permanent cutback in public health-insurance coverage.

**DR. KEIM** Do you think that orthodontics is moving toward a global standard of care?

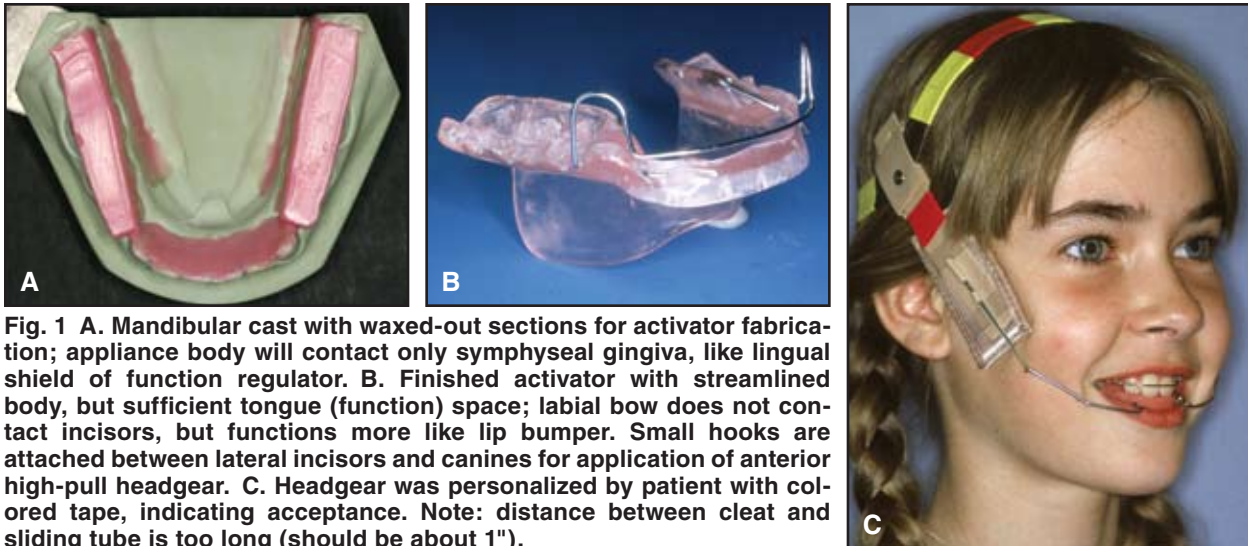
**DR. MIETHKE** Again, this is my personal opinion, but not mine alone, because I sought advice from others who are well aware of the European situation, like my friend, Dr. Wolfgang Schmiedel, President of the General Dental Council of Berlin. Yes, I think all European countries will move toward a global standard of care. This is due to the fact that we have outstanding lecturers who impart knowledge throughout the world. We have congresses all around the globe, and we have professional journals that are read across the continents, like JCO, which also has its readers in Germany.

**DR. KEIM** How do payment options for orthodontic treatment differ between the U.S. and Europe?

**DR. MIETHKE** Well, Bob, I do not know very much about your payment system, but I am somewhat familiar with the European one. This is because in 2002, Prof. Frans van der Linden, Dr. Schmiedel, and Dr. Ronald Bijlstra published a compilation of the various payment modalities in Europe (besides many other professional aspects). More detailed information is available at [http://www.efosa.org/EFOSA\\_2003/index.php](http://www.efosa.org/EFOSA_2003/index.php). Admittedly, the overview is not very recent, and things have changed since then—everything has declined all over the world. All in all, however, there is no better source of information than this website.

**DR. KEIM** Do you see differences in orthodontic philosophy across the countries of the European Union?

**DR. MIETHKE** Yes. I feel that in the Scandinavian countries, everything is very much the same as in the States. Germany and Austria apply the approach I have described as mine. In Holland, Belgium, and England, you may often find the Begg technique or its derivatives. But England seems to be a country where removables are also used in many patients (I hope this does not upset my English colleagues). What I said about removables is definitely true for the Eastern European countries.



**Fig. 1** A. Mandibular cast with waxed-out sections for activator fabrication; appliance body will contact only symphyseal gingiva, like lingual shield of function regulator. B. Finished activator with streamlined body, but sufficient tongue (function) space; labial bow does not contact incisors, but functions more like lip bumper. Small hooks are attached between lateral incisors and canines for application of anterior high-pull headgear. C. Headgear was personalized by patient with colored tape, indicating acceptance. Note: distance between cleat and sliding tube is too long (should be about 1").

**DR. KEIM** In general, are removable functionals such as the bionator and the function regulator becoming more or less popular?

**DR. MIETHKE** I am afraid they are becoming less popular. Why do I say I am afraid? Because I feel we are relinquishing all possibilities of influencing facial growth. Yes, I am familiar with the different studies demonstrating that functional appliances have little or no skeletal effect. But I have to say that these studies are not flawless for the following reasons: no two activators are alike, Class II is not one entity but a complex of many different configurations, facial growth can only be influenced when it really occurs, etc., etc. To conduct a study in which all these factors and many more are controlled seems more or less out of reach. Orthodontists should also be aware that only a very limited investment is required to achieve results that meet the needs of families with low budgets.

**DR. KEIM** Are Herbst\*\* appliances now used more than headgear in the correction of Class II malocclusions?

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**DR. MIETHKE** This answer can be very short: yes, definitely!

**DR. KEIM** Do you use them yourself?

**DR. MIETHKE** My honest answer is a very shy “no”. Believe it or not, I did not really have a chance yet with my patients, or maybe I did not see the justified indication. So many of my patients come early enough that I can get really good results with an activator-headgear combination. In my older patients, I thought surgery was better indicated for a good profile change. But basically, I have no objections and will use a Herbst appliance in the next patient in whom I feel it is the best treatment option. In the department I oversee, quite a good number of patients are wearing a Herbst appliance, so it is not a matter of principle.

**DR. KEIM** What are the functional appliances that you use?

**DR. MIETHKE** I have different horses in my functional appliance stable. My workhorse is an activator-headgear combination (Fig. 1). This is an appliance that Jack Hickham introduced me to. The main characteristics are that the mandibular working cast is waxed out, so that the appliance



**Fig. 2 A.** Patient with blocked-out maxillary left lateral incisor and maxillary midline shift to same side. **B.** Space gain after headgear was permanently tied in for four months. Headgear was actually secured only with thick elastics, which could easily have been cut in case of emergency, but patient believed it was permanently attached. **C.** Patient after treatment.

body contacts only the lingual symphysis, like a Fränkel lingual shield; the appliance body is reduced to a minimum, because a functional appliance should impede function as little as possible; and the headgear, mostly an anterior high-pull, is attached to hooks inserted between the canines and the lateral incisors to control vertical facial growth. As was pointed out as early as 1965 by Fred Schudy, there is an intimate relationship between the vertical and horizontal dimension, or effective mandibular length.<sup>1</sup>

In my stable there are also function regulators, my first choice in patients who have an Angle Class III and also a space-deficit problem, which I try to solve without extractions. The somewhat seldom-deployed horses are elastic open activators and bionators, which I choose when a treatment will last very long—for instance, in patients with delayed tooth eruption where cooperation will be the main problem. The appliance body should again be reduced as much as possible while still guaranteeing stability.

**DR. KEIM** In what age groups do you use these appliances?

**DR. MIETHKE** This aspect is most important, but still paid too little attention. First of all, I want my functional appliances only to have an orthopedic effect. That means I use them preferably in the (almost complete) early permanent dentition. That is the time around the pubertal growth spurt when

the permanent canines and the premolars have erupted, so that their high cusps ensure a safe intercuspation. If there is little growth, the appliance has to be worn a long time, which increases the probability of dentoalveolar changes; plus, the low cusps of the first molars and the flat cusps of the deciduous posterior teeth cannot stabilize the occlusal correction.

**DR. KEIM** Do you really see orthopedic skeletal changes with your functional appliances?

**DR. MIETHKE** The answer is a qualified “yes”. A prospective study of our activator-headgear-combination therapy in only 21 consecutive patients showed that this device has two-thirds skeletal and one-third dentoalveolar effect.<sup>2</sup> Of the two-thirds, however, only one-third is an advancement of the mandible and the remaining one-third a restriction of the maxilla. This is about 10% more skeletal effect than reported in other studies, in which, unfortunately, the differentiation between mandibular and maxillary effect is not described. A study on the function regulator type III in patients with mandibular prognathism showed that you can control the existing situation, but not really improve it.<sup>3</sup>

**DR. KEIM** What percentage of your patients cooperate with headgear treatment?

**DR. MIETHKE** In my early, heroic orthodontic years, I tied some headgears in permanently—of





**Fig. 3** A. Severe rotations of both maxillary second premolars after previous extraction of first premolars by unknown practitioner. B. Overcorrection of both premolar rotations (right more than left) after treatment; patient was released without retainers. C. Proper positions of second premolars after 12 years without retention.

course, with the permission of the parents. This is when I learned how much you can accomplish with a headgear in an extremely short time (Fig. 2). Most of the headgears I use nowadays are cervical-pull headgears, which I utilize as orthopedic appliances to increase the vertical facial dimension. I emphasize the necessity of headgear application to both patients and parents from the first consultation on. Before I insert a headgear, I take the parents into my private office and tell them if they now make one negative remark, we can forget the whole procedure. Headgears are devices like eyeglasses and shoe lifts, which are also not negotiable. And I only request in-house wear, which is already a lot; anything more seems unrealistic to me. With these two prerequisites, I get almost 100% cooperation, which means they wear the headgear at least at night. My basic idea is to filter my patients before commencement of headgear therapy.

**DR. KEIM** What do you do if the patients fail to cooperate?

**DR. MIETHKE** To be honest, not much. First of all, I think I cannot replace the parents, whose responsibility it is to make their children go to school, see a doctor, and take a prescribed medication. I do not get upset, because my lifetime is limited, and what remains I like to enjoy. The only action I take is to talk to the patient in the presence of the parents and tell them that because of this cooperation failure, I can only accomplish a sec-

ond-class result. The other option they have is orthognathic surgery. This serious information might help in about 50% of the non-cooperative patients.

**DR. KEIM** Do you believe in overcorrection of Class II correction or rotations?

**DR. MIETHKE** My answer is manifold. In an orthodontically corrected Class II, I would say “no”, supposing the teeth have high, well-defined cusps, the occlusion is well settled, and there is no Sunday bite, which has to be checked for carefully. If the cusps are small and attritioned, the occlusion is not well settled, and there is a big CR-CO discrepancy, I think we get the short end of the stick anyway. If the Class II will be surgically corrected, I have to entrust this option of overcorrection to a certain degree to the surgeon. When it comes to rotations, my answer is “yes, yes, yes” (Fig. 3). That is one of the reasons I like indirect bonding so much, because there you have the chance to fine-tune your overcorrections (I even used Tom Creekmore’s Slot Machine for this purpose). Finally, this is one of the good features of Invisalign—that you can plan for overcorrections, assuming the rotations occur in the first place.

**DR. KEIM** What appliance do you favor for adult treatment?

**DR. MIETHKE** I favor “invisible” braces. For me, this is mainly Invisalign and Crozat appli-



**Fig. 4** A. Anterior spacing in adult patient who requested “invisible” braces before development of Invisalign. B. Clear buttons bonded to four maxillary incisors, which were retracted and intruded with elastic attached to lever arms of Crozat appliance (note cribs on first molars). C. Patient after treatment.



**Fig. 5** A. Position of mandibular left canine before Invisalign treatment. B. After Invisalign treatment, customized splint is fabricated with clear canine bracket and molar attachment. Lingual and occlusal canine region is waxed out on working cast to upright and extrude this tooth with programmed lever. Patient inserted and removed spring with mosquito forceps. C. Position of canine after auxiliary treatment; more extrusion would have been desirable, but was not permitted by occlusion.

ances (Fig. 4). I like Crozats a lot; especially in combination with clear buttons and elastics, one can get surprisingly good results. The biggest problem with Crozat appliances is fabrication—you need a good, experienced lab, which is not so easy to find because these appliances are too seldom ordered. To me, invisible braces are easier accepted, because they interfere very little with social life. Many adult patients had orthodontic treatment earlier, so their occlusion is good, but they just want to get rid of some crowding or spacing, and any fixed appliance is almost overkill. Also, many of these patients have artificial tooth surfaces, on which bonding is not easy. Many times the result of such invisible therapy is not as perfect as with fixed appliances. But when you have already accomplished some remarkable improvement, patients are much more inclined to accept a few clear brackets. A few are always enough, because the last aligner is used with a

cutout to prepare all the necessary anchorage (Fig. 5). With Invisalign, there is one more advantage: patients can see beforehand the course of treatment and the end result, they can discuss it with us, and we can change it when reasonable. I am afraid we are such dedicated professionals that we have no idea how limited the dental knowledge and imagination of our patients are.

**DR. KEIM** Has the use of temporary anchorage devices become mainstream in Europe?

**DR. MIETHKE** Absolutely—for the younger generation and also for the open-minded “best-agers”. Do not forget that somebody like the Chairman of Orthodontics at the University of Mainz, Dr. Heinrich Wehrbein, was one of the first to gain clinical experience with these devices.<sup>4</sup> As one of the good-agers, I use TADs, too, as you know by my answer to your opinion poll (JCO, September

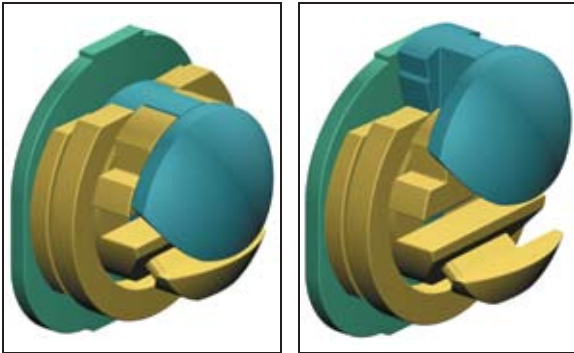


Fig. 6 Edgelok bracket in closed and open positions. (Images courtesy of Strite Industries.)

2008). By the way, TADs can also be very helpful in combination with Invisalign treatment.

**DR. KEIM** In what types of cases have you used miniscrews?

**DR. MIETHKE** In patients in whom I needed to intrude teeth or move them distally. This includes Invisalign cases in which I tip posterior teeth distally to shorten the lengthy period of moving them with aligners.

**DR. KEIM** Is cone-beam computed tomography used much in Europe?

**DR. MIETHKE** Not yet, because it is still quite expensive, and insurance pays for it more or less only in exceptional patients, like those with cleft lip and palate or severe disfigurements.

**DR. KEIM** Have self-ligating bracket systems been widely accepted?

**DR. MIETHKE** Self-ligating bracket systems are becoming more and more popular. This is due to several factors, not least among them being marketing by companies and also by some very talented gurus. To me, this is rather hilarious, because in 1978 Jack Hickham introduced me to Edgelok\*\*\* self-ligating brackets (as developed by Jim Wildman), which I hated at first and loved in the end. They were exceptional (Fig. 6). Wherever Jack lectured, he advocated these brackets, as I did

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Fig. 7 In vivo friction test.<sup>6</sup> Maxilla is fixed in custom-cast splint, leaving mandible free. Testing machine pulls straight wire with preadjusted angulation and inclination through bracket on central incisor of spaced dentition. Whenever patient occludes, friction is immediately and markedly reduced.

later on when I entered the lecture circuit. But obviously neither of us were gurus; we could not convince anybody to buy them, and sales with these brackets were so marginal that Ormco gave up producing them. My point is that I personally liked and still like self-ligating brackets very much for various reasons. What I do not like is the frenzy, the fact that they are presented as something completely new, as objects with almost magical qualities that have not been proven, although these brackets have been in use for some time. Allow me one last word: unfortunately, these brackets are not “self-ligating”, but, at best, “ligation-free”.

**DR. KEIM** Don't these brackets reduce friction?

**DR. MIETHKE** Honestly, Bob, I do not know. Let us face the fact that there are at least four different methods for testing friction, including fixed angulation/inclination, varying angulation/inclination, and computer simulation, as developed by Prof. Dieter Drescher from the University of Düsseldorf.<sup>5</sup> These three are in vitro tests, but it seems much more reasonable to test friction intraorally, as attempted by only a few researchers so far (Fig. 7). Influencing factors other than those mentioned above include brackets (material, mesiodistal width, occlusogingival height, slot refine-



ment), archwires (material, cross-section, size), type of ligation, interbracket span, force application point, tooth mobility, and environmental setting. My point is that any given friction result is only true for the conditions under which it was tested. Let us also make the following clear: nowhere in the mouth does a wire slide through a bracket slot, but a tooth slides along an archwire. That is why even intraoral experiments are only an approximation to the truth.

Two more things: I do not understand why ligation-free brackets are always tested against brackets in which the archwire is secured with AlastiKs.† Every knowledgeable orthodontist will use very lightly tied steel ligatures at the start of leveling. Also, we should never forget that friction has a Janus face: it makes moving teeth more difficult, but we also need teeth which do not move because they are one of our principal sources of anchorage.

**DR. KEIM** What is the current status of surgical-orthodontic treatment in Europe?

**DR. MIETHKE** I would say we have quite a large number of skillful maxillofacial surgeons who produce stable, high-quality results that fulfill standard criteria. This is very good because a growing number of patients are seeking combined therapy. The reason is that insurance policies often have clauses covering treatment costs for such patients. This approach seems reasonable because, with these complex therapies, a patient's malocclusion is usually quite severe.

**DR. KEIM** What is your opinion of "surgery first", as demonstrated in the February JCO?<sup>7</sup>

**DR. MIETHKE** I like it a lot and agree completely with the authors. In the past, I had patients with an extreme anterior crossbite in whom it was almost impossible to upright the mandibular incisors sufficiently because of the strain of the lower lip—besides all the other problems described in the Nagasaka article. Myself, I have limited expe-

rience with surgery first only in Class III patients, but all of them are absolutely positive. I am happy our maxillofacial surgeons are very open-minded when it comes to this procedure.

**DR. KEIM** Do you feel that early treatment is more common in Europe than in the U.S.?

**DR. MIETHKE** I think it is much more common. Maybe some of the procedures our orthodontists perform would be delivered by pedodontists in the States. In many European countries, we have no specialized pedodontists. So if the family dentist sees a problem which requires preventive or interceptive orthodontic measures, she or he would refer the patient to an orthodontist, who will take care of the condition. Could it be that, in general, U.S. orthodontics is more mechanically oriented than European orthodontics, with its growth and development orientation?

**DR. KEIM** Is serial extraction still practiced in Europe?

**DR. MIETHKE** Considering our discussion about extractions, I guess it is practiced less and less. Again, though, I wonder whether this is good or bad. First of all, I treated one of my daughters with serial extraction and nothing else. Her dentition came out perfectly straight, with one little space between the canine and second premolar on the left mandibular side. And she has a pretty face—at least in her dad's eyes. Second, who can be sure that third molars are not being removed more and more often instead of the premolars, which would normally be sacrificed during serial extraction? Besides, from all I have heard, wisdom tooth removal is no fun. But your question should actually trigger a study of the type that is frequently done by JCO.

**DR. KEIM** What are the major trends in orthodontic clinical research in Europe?

**DR. MIETHKE** I see that Europeans publish in professional journals all around the world, just as Americans publish in European periodicals. But I would like to draw your attention to one aspect. A

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**Fig. 8** A. Patient wearing Copyplast‡ splint retainer with both maxillary left premolars cut out to promote extrusion and settling. B. Dr. Miethke wearing Imprelon‡ splint retainer; stiffer material makes cutouts somewhat more difficult. C. Fixed retainer does not allow flossing, making plaque accumulation more likely, and does not guarantee stability (photo courtesy of Dr. Vittorio Cacciafesta).

very recently published Health Technology Assessment stated that orthodontics has no benefit for a patient’s health.<sup>8</sup> I do not want to go into details of this report. But it caused the chairpersons of the German dental schools to initiate a prospective multicenter study on this problem. I feel it would be good for orthodontics as a whole if such data would emerge.

**DR. KEIM** What do you believe contributes to the stability of treatment results?

**DR. MIETHKE** Number 1 would be a perfect alignment, where the teeth were moved only within the dentition-surrounding envelope of relaxed and active muscle tone. In other words, I learned from my mentors to keep the archform as constant as possible, I followed their example, and I think this served me well. This means that I still reshaped every archwire on the base of a Brader template (it could also be a different template, though it had to come in different sizes and widths). Second, and at least as important, is normal orofacial function—and this includes a physiologic function of the tongue, lips, and cheeks (including nose breathing and absence of parafunctions) without any habits. Finally, in my opinion, cessation of growth contributes to the stability of our treatments—though, unfortunately, it sometimes occurs very late, especially in those Class III patients where we need it most badly.

**DR. KEIM** What about canine guidance?

**DR. MIETHKE** I still attempt to establish a solid canine guidance, since, according to several studies, this will lower the muscle activity and thus the loading of the dentition during parafunctioning. I know there is no scientific proof that canine guidance is superior to any other form of occlusion, but then again, canine guidance is almost inevitable if all teeth are well aligned—in other words, all their physiologic contact points are tangent to one another.

**DR. KEIM** Do you believe in the concept of permanent retention?

**DR. MIETHKE** Yes, everything is constantly changing in our body; why should our dentition not adjust, too? My favorite mode, however, is aligner-like splint retainers (Fig. 8).

**DR. KEIM** Why do you prefer splint retainers?

**DR. MIETHKE** They do not interfere with flossing. They allow slight corrections or overcorrections. They protect the occlusion from attrition, which is more and more frequent in our times with stress from various circumstances. Attrition will not only destroy the teeth, but is the consequence of parafunctions. These splint retainers protect the occlusion from parafunctions, which will release the “anterior component of occlusal force”, as

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Southard described it.<sup>9</sup> According to him—and I follow his line of thinking—this can be one cause of relapse of anterior crowding and malalignment. This is not to say that I would not place a fixed 1-1 retainer in a patient with a maxillary midline diastema or an intracoronal splint fixation in a periodontally compromised patient with highly mobile teeth. But to make doubly sure, I would even place splint retainers in these patients.

**DR. KEIM** On behalf of our readers, I'd like to thank you for your candid and enlightening remarks.

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