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Why orthodontics?

In a profession dedicated to the tiniest of movements, it seems as if orthodontics is in constant motion. There is always something new to catch the eye and capture the imagination: new brackets and bands, new techniques and treatments, new ways to treat and diagnose patients. Even when we reread classic orthodontic books or articles, we are able to pick up some new tidbit or detail that we weren’t prepared to understand the first time we went through them. It never ceases to amaze me how much there is to learn once we graduate from school.

As orthodontists, we typically perform full-mouth rehabilitation cases every day. Canines and molars in Class I, a correct overbite and overjet and the completion of the six keys of occlusion are typically our main goal.

In a perfect world, every case would conclude with picture-perfect results. Unfortunately, there are times when the result doesn’t look as beautiful as we hoped it would. As clinical beings, we need to ask ourselves what is the problem in these cases, and how can we eliminate these problems in the future.

To me, the answer starts with this: a multidisciplinary knowledge is essential from the beginning of our treatments. Just like a sculptor, we must have a comprehensive understanding of facial proportions and how these proportions relate to the teeth.

Just as important, we also need the cooperation and input of an esthetic dental specialist to customize each smile. Working in conjunction, these two elements will help us elevate our results so that they attain more than just average results, and achieve a natural smile that reflects the beauty of our patient’s personality.

So getting back to the overriding question that we started with: why orthodontics? For me, the answer comes down to a single word — joy. Because in orthodontics as in life, the final destination is important, but how we get there is what makes life worth living.

Best Regards,
Julia Garcia Baeza, DMD
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Concepts, goals and techniques for successful orthognathic surgery cases

Author: Theodore D. Freeland, DDS, MS

In this article, you will be introduced to the concepts, goals and techniques needed to diagnose surgical cases, when surgical cases should be started and how to gain the knowledge needed to create successful results.

We'll delve into joint status, soft-tissue analysis, surgical treatment objectives, pre-treatment surgical setups and surgical setups. We'll then follow-up by looking at the concepts of natural head position, the axis-horizontal plane and the true vertical line will be introduced. By the end of this article, you should have:

• An overview of the knowledge needed for successful treatment.
• An introduction into what, when and how to perform successful cases.
• An overview of joint health.
• A summary of the soft-tissue analysis.
• An outline of the surgical treatment objective.
• An overview of diagnostic and surgical setups.

Remember that this article is an introduction only; it’s not intended to teach you how to do surgical cases. Advanced training will be needed to master successful orthognathic surgical cases. So with no further ado, let’s get started.

Functional occlusion

The goal is to obtain functional occlusion. Before treatment, you have to determine if you have an orthognathic surgery case. You don’t want to begin orthodontic treatment with the idea that if orthodontics fails, we will do surgery.

You’ll see in Figures 1–3 that this case involves every facet of dentistry. Changes occurred not only in the facial features, but also in the teeth themselves. It involved orthodontic and orthognathic surgery, but also lengthening the front teeth by the restorative dentist to achieve the natural smile in balance (Figs. 1–3). To this end, we need to look at five areas:

• joint status,
• soft-tissue analysis,
• surgical treatment objective,
• pre-surgical setup/surgical setup technique,
• surgery.

We’ll give you a brief overview of the goals for each of the areas, then do an in-depth look into each of them individually.

Joint status

Starting with the first area, you need to know the joint status. Is the joint healthy, is it degenerating, is there a disc problem? This means you’ll need to apply not only a good clinical exam, but also articulated models that can measure the difference between centric occlusion and centric relation.

Soft-tissue analysis

You’ll need to know how to analyze the soft tissue. You’ll need this because you are looking at everything from a soft-tissue standpoint, or put another way, you’re recording the basic measurements that come from soft tissue, not hard tissue. If you deal with hard tissue only, then you will come up short in the soft tissue. Ignoring the soft tissue will result in a face that’s not improved, just different.

Surgical treatment objective

You need to know how to do a surgical treatment objective. You’ll need to know the technique, and you’ll need to know how to apply it because the surgical treatment objective allows you to treat the face, the occlusion, in a two-dimensional medium.
Pre-surgical setup/surgical setup technique

Once you have established what you’ll need to do from the surgical treatment objective, you will need to do what we call a pre-surgical setup. Otherwise you’ll need to apply the knowledge you’ve gained from the patient, soft-tissue analysis and the surgical treatment objective, and perform a three-dimensional workup to make sure what you have planned will work with the joints, muscles and nervous system.

Surgery

Finally, you need to know surgery. I recommend that the orthodontist be in the operating room so you know what the surgeon is doing, and how the surgery goes. It’s very important to know that the surgeon gets the joints seated in a passive manner. If the joint is stressed, then there’s a good chance that we’ll have some surgical relapse.

Joint status

Joint analysis will include three portions: history, a clinical examination and imaging.

Building a history will be similar to traditional patient assessment. We need to know if there are any family members who exhibit TMJ problems. If yes, then there’s a good chance the patient will develop significant joint issues that will affect the outcome of treatment.

After an oral investigation, a thorough clinical examination of the joints will need to occur. We’ll be on the lookout for any type of injuries to the mandible. If the patient has had any injury that involves the chin, there’s a good chance that the joint may have been damaged.

Finally, we need to look into any past treatment. Has the patient had orthodontics before? Has the patient had a lot of restorative dentistry? This is important because all of the above have a tendency to affect joint status.

Clinical examination

Next is the clinical examination. Clinical examination includes the following:

- range of motion,
- symmetry of jaw motion,
- palpation,
- auscultation,
- muscle splinting,
- CR position.
Range of motion should be between 45 mm and 55 mm on opening and includes assessing movement. We’re looking for a symmetrical mandible motion — meaning the chin should not deviate to the left or right on opening — and it should be relatively free of dental interference.

Now check for palpation of the muscles of mastication. If you don’t check the muscles that move the mandible, then there’s a good chance that you’ll miss some sort of functional bite issue.

We also listen to the joint with a stethoscope, and we apply some anterior pressure to the disc through external auditory meatus to make sure the disc is functioning properly.

When trying to manipulate the mandible, one can feel the muscles. If the muscles will not let you obtain a centric joint position, then we cannot do a diagnosis because the muscles aren’t holding the condyle out of the socket. This is usually due to some inflammation.

Finally, we’ll check what we call the centric relation position, which you should be able to feel. It should feel solid and the patient should be able to open from this position with relative ease, and there should be no noises.

Imaging

The clinical examination will tell us a lot about the joint status. The use of imaging will help us build our base of case-specific intelligence. We’ll use two types of imaging: MRI and cone beam.

LCBCT

Most of the time, we start with cone beam because it’s easy to obtain a 3-D image of the joints. Thanks to the work of Rickets and Dr. Ikeda, we have a way to measure joint position and get an idea if the condyle is basically seated. With cone beam, we can measure the health of the condyles.

Our imaging showed a joint that is in a state of degeneration. The condylar head has changed in vertical height. Therefore, we would expect to see an asymmetrical opening where the chin deviates to the affected side. In all three views (sagittal, coronal and axial), we have a condyle that is actually changing, especially when you make a comparison to the left condyle (Fig. 4).

In a side-by-side presentation, you can see that the left side is definitely in a lot better shape, having a more rounded effect to it. The size of the coronal view is one that shows a definite symmetric shape, comparing to the other side. The axial view confirms this; you see that the shape is better and has a more dense outline.

Thus, our basic imaging system helps us determine that, in this case, one side is going to be the problem side, especially as it pertains to orthognathic surgery.

If we go to the two-dimensional images created in the cone beam, we can see that the right joint has definitely lost vertical height, and we definitely have a joint spacer that is excessive (Figs. 5, 6).

In the coronal view, we can even see that there may be some sort of cyst formation. When you compare the right side to the left side in the coronal view, you get a more traditional image, which is what we’d like to see. However, there have been some changes that have occurred, because we’re starting to see a “bird-beaking” effect in the left joint. The images of the joint are ones that are important in determining if we should proceed with any kind of a surgical correction.

In the sagittal view, the right side, the joint looks pretty normal. However, if we look at it in a transverse direction, you’ll see less joint space laterally than you do medially, something we see in both the left and right joints (a much bigger joint space). That’s why it’s important that you not only look at a sagittal view, but you also need to look at the coronal view to see if you have a transverse problem occurring in the joints.

Soft-tissue analysis

When we’re trained in orthodontics, we’re trained in hard-tissue analysis, otherwise all of our cephalometric analysis are based on hard structures. If you use hard structure to determine soft-tissue corrections, then you’ll come up short of good facial esthetics. That’s why a soft-tissue analysis is so important.
Using soft-tissue markers with 3-D facial mapping, we are able to diagnose the soft tissue, and we can also relate it to the hard tissue.

In Figure 5, we’ve overlaid the soft tissue on top of the hard tissue. With the markers on, after we convert it to a two-dimensional X-ray, we can see where the sub-pupillary area is, where the cheekbones are, and where the alar base is. In addition, you will see a marker that we call a hinge access marker, which comes from establishing the true hinge axis of the patient. There is also a marker that’s placed on the nose that we call the horizontal point.

We are going to analyze everything from a basic coordinate system of a true vertical to an axis horizontal.

The image is orientated from the axis horizontal plane and the true vertical plane, which is based on the patient’s natural head position.

Figure 6 shows how these two corners are at 90 degrees from each other. In this analysis, we’re going to record all the soft-tissue measurements, both horizontal and vertical, and we’re going to base them on the line that runs through the subnasale (SN). This establishes the true vertical line based on natural head position.

Furthermore, we’re including a few hard-tissue measurements that will tell us about the architecture of the mandible. These come from Rickets and from the Jarabak analysis. With this analysis, we can cover the basis that we need for orthodontics, but we can also cover what we need in a surgical workup.

We also need a frontal analysis, which is taken from the patient’s face. Most of the frontal workup is done in examining the patient clinically. This enables us to look at the orbital rim, cheekbone, sub-pupil, alar bases, nasal bases and canthus of the eyes.

All of this enables us to assess if we have transverse asymmetries, where the occlusal plane is canted instead of level. This also holds true with the mandibular plane, which we may also find is canted. This is especially true in cases where there’s a degenerative process happening in one joint.

_Head position, profile and frontal analysis_

The natural head position is different for each individual patient. This will make the distance recorded for glabella to the true vertical line different.

To measure how far glabella is from SN (true vertical line), we first need to establish the patient’s natural head position (Fig. 7). To do so, we have the patient stand in front of a mirror. First, the patient is asked to close his eyes and bob his head up and down three times.

After this is complete, the patient is asked to open his eyes and look himself directly in the eyes in the mirror. After we have established the natural head position, we then use the measurement gauge. Our goal is to make sure the leveling bubble is in the lines. This will allow us to take a measurement from the true vertical line to glabella.
Keep in mind that everybody’s head position is a bit different. The further that glabella is from the true vertical line will affect how we look at the lower third of the face.

Now we need to establish the axis-horizontal plane (Fig. 8). First, we establish the horizontal position using the ear bow. We’ll use the pointer on the ear bow to make a mark on the nose when the bow is level.

We have previously established, through axio-path tracing, the hinge axis position on the patient’s right and left sides. In combining the horizontal point with the two axis points, the axis-horizontal plane can be established. The axis-horizontal plane is then transferred to the articulator. This allows us to orientate the CBCT data with the articulator mounting.

Now we have the true axis-horizontal plane and the true vertical line combined, and now facial, skeletal and functional issues can be assessed.

In the example we are using, the patient has a mandible that has an architecture problem, which causes her to occlude only on the molars with an anterior open bite.

Fig. 8. Establish the horizontal position.

Fig. 9. Surgical treatment objective.

Fig. 10. Completed the extrusion of the maxillary segment and balanced the occlusal plane.

Fig. 11. Establishing the true vertical line.

Fig. 12. Shows true hinges access mounting.

Fig. 13. Open bite on hinge-axis mounted model.
This is precisely the kind of case where you should be looking for degenerative joint disease. All of the above enables us to establish the parameters and coordinates we need to analyze the face and occlusion and then apply the correct treatment so the patient will have a functioning stable occlusion with the necessary facial improvements.

_Soft-tissue analysis_

The treatment objectives are based on the soft tissue. You perform the surgical treatment objective in this order.

1) Establish the position of the upper lip to the true vertical line in a vertical and horizontal manner.
2) Determine what you need to do with the anterior teeth to create the correct upper lip position.
3) Once you established the anterior part of the maxilla, then proceed to the posterior part of the maxilla and determine if you need to do an intrusion or extrusion of the posterior segments to level the occlusal plane.

In most cases where there’s a retrusive chin and a skeletal open-bite, the patient has an occlusal plane, measured from the true vertical line that is somewhere between 102 and 108 degrees. By leveling the occlusal plane, based on the anterior tooth position, you can set the mandible to the maxilla. This will usually balance the lower third of the face. If you still find the chin is too far forward or too far back, you may need to do genioplasty.

In the example case (Fig. 9), we have performed a surgical treatment objective, established the true vertical line and we have our axis-horizontal plane. In this patient, we need to move the anterior teeth up because in the frontal analysis the patient showed too much tooth structure and too much gingival tissue. To fix this, we balance the maxillary anterior teeth based on the upper lip position.

Once we’ve established the correct tooth position in the anterior, we’re able to set up our occlusal plane at 95 degrees, showing us what we need to do with the posterior segment. In the example case, we need to extrude the posterior segment.

Figure 10 shows how we’ve completed the extrusion of the maxillary segment, and we’ve balanced the occlusal plane. The next objective is to place the mandible with the correct overbite. This is not 2 mm but 4 mm. This is because you want to have an adequate overbite to create adequate disclusion. In establishing the mandible, you can see in our example how the lower part of the face is placed normally enough with the true vertical line (Fig. 11).

In establishing the surgical treatment objective, we see that we want to place the anterior section in the superior direction and the posterior in the inferior direction. These are all the measurements we need to establish a surgical setup. Hopefully, this is performed pre-treatment so the patient has a good idea of what needs to be done.

_Pre-surgical and surgical setups_

The pre-surgical and surgical setups are techniques that do require the clinician’s time. It’s not something that can be outsourced to a lab. You need to spend the time in doing these setups to determine if it’s something that can be treated. Remember, there are cases where you cannot achieve the goals.

Before we get to the setup, it’s worth examining the three basic concepts that this whole system is based on. That’s not just orthognathic surgery, but orthodontics itself.

**Concept No. 1: You need to start with a seated condilar position.** You will need to learn techniques to know when you have a seated condyle, and if it’s in a stable position.

**Concept No. 2: You can’t believe what you see in the mouth.** This is foreign to what we’re taught in the orthodontic profession. We’re trained that when we finish a case we have the patient bite down, and we say that the occlusion looks good or it doesn’t. However, you need to understand that this is a learned muscle position. It’s not a position that is usually conducive to normal joint function.

**Concept No. 3: Quit trying to do the impossible with orthodontic tooth movement.** This is where orthognathic surgery comes into play. Don’t try to fix skeletal aberrations with orthodontic tooth movements. Too often cases are treated with a compromised treatment plan, but due to the skeletal dysplasias it is impossible to establish a functioning occlusion, thus resulting in failure.

We need a ruler to measure how we come up with a diagnosis and then we need the same ruler to measure our successes. So in the sample case, the ruler consists of five goals: joints, face, perio, teeth and function.

In a pre-surgical diagnostic setup, which is a trial treatment, the case can be diagnosed and treated before you start. This way you have the result in mind before beginning (five goals). The orthodontic, surgical and restorative modalities can all be combined pre-treatment. This way the patient knows what is needed to solve his or her particular malocclusion.

These pre-treatment setups are based on the VTO (tooth movement) and the STO (skeletal movement). Once all treatment modalities have been tried, the clinician will know if orthognathic surgery will work for the patient.

The surgical setup is performed just before surgery to determine the skeletal changes needed to correct the skeletal malocclusion and see if the prediction setup is correct. We use our ruler again...
to make certain that the five goals are obtainable. The surgical splint can also be constructed from the surgical setup. The surgical splint is used to place the skeletal parts in their correct position.

_Steps in pre-surgical setups_

First, we need to get the maxilla positioned in the articulator. We still recommend that you use the articulator as a tool to do your setup. Virtual setups tend not to include the patient’s true functioning hinge axis. If you don’t have the axis, you’re liable to setup an arc of closure that distracts the condyle.

We establish the functioning terminal hinge access of the patient on both the left and right. We’re then transferring the hinge access to the side of the face. Once we have it on the side of the face, we can do our axis-horizontal transfer. The dot shows the functioning hinge axis on the patient, represented on both the right and left sides.

The axio-path tracing that we created while trying to find the terminal hinge axis of this patient allowed us to look at the angle of eminence. What we like to see is a steep angle of eminence as that helps disclude the posterior teeth in lateral border movements. Moreover, we like to see nice, smooth curved lines in the jaw motion, as that tells us the condyle and disc are working in harmony with each other.

We determine the best centric relation position in the mouth. Nevertheless, remember, you can’t believe what you see in the mouth. That means this may even be worse, especially when we do a true hinges-axis mounting.

Figure 12 shows a true hinges-axis mounting. We have the true hinge axis, we have the axis-horizontal plane and we have the teeth position according to this setup. That means the pin, which was removed for the photograph, would be the true vertical line. The articulator mounting is now the same as the CBCT imaging.

What we see in the next image is that this patient only hits on the left side. Nothing touches on the right. As you can also see, the open bite is even worse on hinge-axis mounted models (Fig. 13).

_Diagnostic setup_

The diagnostic setup we’ve been discussing is based on the VFO, STO and the articulated cast mounting. The orthodontic setup, as well as a surgical setup, can be done on the same set of hinge-axis mounted models. We can also include in the diagnostic setup the correct arch form so a mutually protected occlusion can be obtained (Fig. 14).

_Surgical setup_

The surgical setup allows us to plan the surgery case before we go to the operating room. We perform this after we’ve finished the pre-surgical orthodontics and we’re getting ready for the surgery itself.

What you should find when you compare the pre-treatment setup with the surgical setup is that the bony part should look very similar on the articulated mounting as the pre-treatment.

In this case, we’ve leveled the occlusal plane as part of our surgical setup. In doing so, we gained a large correction of the mandible without doing gen-
Now that the surgical orthodontics has been completed, and the patient is now ready for surgery, we go back and do the natural head position and measure how far glabella is from SN. We then do our axis transfer and place the markers. Then we double-check that we have the natural head position (Fig. 15).

Next, we do our axis transfer, placing the maxilla exactly how it's related to the axis-horizontal plane. This is important because it enables us to place the maxilla on the articulator exactly as it exists on the patient, to the functioning axis.

Figure 16 shows the surgical models mounted according to the axis-horizontal plane. We use a centric bite to position the mandible to the maxilla, allowing the musculature to seat the condyles up and forward.

We then get into our surgical correction. We've corrected the maxilla. To maintain the proper torque of the anterior teeth, we'll need a four-part maxilla. Now we have our anterior segment (lateral to lateral) and two posterior segments (cuspid to second molar) and the palate. The anterior segment is positioned vertically and horizontally to the maxillary relaxed lip position. In addition, we take into account the tooth and gingival display the patient exhibits.

We've done the correction in the maxilla, putting the uncorrected mandible on. This shows the discrepancy you see once you've leveled the maxillary occlusal plane. Now we position the mandible. If we've done our pre-treatment surgical orthodontics correctly, things should fit together. Thus, after the mandibular correction is completed in the setup, an uncorrected maxilla is placed on the articulator. You should see a large posterior open bite.

This is also an easy way to construct our intermediate surgical splint, which you can see in Figure 17. Note how we changed the plane of the mandible. This is based on doing the mandible first. By placing the mandible correctly in all three planes of space, we can establish the functional axis of the mandible.

This helps eliminate some of the errors that occur in orthognathic surgery. If we do the mandible first, and we know the vertical measurement that we need, it’s easy to place the maxilla correctly to the mandible.

There are certain surgical techniques that need to be applied to accomplish the surgical corrections. By following the proper surgical techniques, the postsurgical relapse can be kept to a minimum.

The other thing that we can do is establish even centric stops, according to the axis position. That's why in Figures 18a and 18b the models are painted red. We can do an occlusal analysis and equilibration and establish a stable tooth fit before surgery; all of which is based on the true terminal hinge axis.

We're able to get a Class I and we're able to gain enough overbite. We will need to do some postsurgical orthodontics to finish the occlusion, but the image shows the hinge axis closer on the articulator.

If you were able to hold the model, you would notice that there's no rocking. Everything is stable. You don’t want the patient to come out of surgery
and find that the patient has trouble finding a stable maximal intercuspation with the joint seated.

In order to gain even stops, we had to remove some tooth enamel around the upper and lower arches. That’s what we do in the operating room before we begin the operation. We do the equilibration when the patient is asleep and before the operation begins.

As you can see in the post treatment intra-oral and extra-oral photos (Fig. 19), the facial changes include a shortening of the lower facial third. An adequate overbite has been established so a mutually protected occlusion can seen. The proper disclusion, where the back teeth separate by at least 2 to 3 mm, has been established.

If we apply the second concept (“you can’t believe what you see in the mouth”), we need to go to post treatment hinge-axis mounted models. Figure 20 shows the cone-beam data, both pre- and post treatment. Note the double plates on the mandible to establish a stable platform to position the maxilla.

_Surgery_

One of the most important take-away lessons from this article is that you need to know your surgeon. Establishing a one-on-one relationship with your surgeon can be challenging. If the orthodontist does not know what the surgeon goes through, then in the planning stage pre-treatment, the teeth may be placed in a position that the surgeon will have trouble establishing in the correct skeletal position. This is a relationship that simply takes time.

Once you have knowledge of the surgeon, then you need to know what happens at the hospital because this becomes an important part, especially during recovery.

The people who are handling recovery need an exceptional level of compassion, and they need to be able to handle emergencies. Oftentimes the patient will get sick, and his or her teeth are held together with elastic and wires. The healing period normally lasts 10 weeks. It may be longer depending on how the segments are healing. The point is that we don’t get into post-surgical orthodontics before the segments have stabilized.

_Additional considerations_

We know that you need to know the joint status. You’ll need to know how to do a soft-tissue analysis and how to establish a surgical treatment objective.
You’ll need to know how to do pre-treatment setups and surgical setups. You need to apply all of these techniques on all patients (mixed dentition, adolescent or adult).

If the teeth aren’t in the correct position in the jaw, then there’s no way the surgeon can place the parts correctly, resulting in surgical failure. Most surgical failures happen because of orthodontics.

One of the things you need to keep in mind in your pre-treatment surgical orthodontics is that you established the correct arch form. Without the correct arch form, it’s difficult to put the parts together.

The other thing to keep in mind is the actual 3-D position of the teeth. If you have up-righted the upper anterior teeth, the surgeon will have a difficult time fitting the mandible to this.

If you have tipped the lower anterior teeth back too far — such as in a Class III — then you cannot obtain a good maximum inter-cusptation because of the incorrect torque of the anteriors. The setup part of the procedure will give you this information.

_Age_

If it’s an adolescent patient, you can do the pre-surgical orthodontic and establish the correct axial position of the teeth in each jaw. However, do not try to fix the occlusion. That means the teeth will be in the proper positions when you approach the surgery.

As a rule, I won’t get into a surgical case before a female is in her early 20s, and with males in their mid 20s. I’ve seen cases where they were done earlier and actually grew out of the correction.

_Learning these techniques_

We all need to be taught to do these things, and it needs to be from someone who has done them for a number of years so you can be certain that the methods you are learning will work. They are taught in the Advanced Education in Orthodontics (AEO) course, and we do practice them.

That includes surgical setup, orthodontic setup, soft-tissue cephalometric analysis and surgical treatment objective. They need to be practiced a number of times. It’s not something you can learn on your own. You need a mentor who will teach you all the characteristics you’ll need.

In the lab phase of the AEO class, we do get into mounting cases on the true hinge axis. You will learn how to establish these on patients. They are not time consuming. Normally, establishing a hinge axis in the axio-path tracing and transfer takes no more than six or seven minutes, so the clinician is not using a lot of his or her time to establish a correct hinge-axis mounting.

The instructors will demonstrate how it’s done, and then have you perform the procedures. Under the proper guidance, you can learn these techniques and apply them in an office setting in an economical manner.

Without the coaching, these procedures can feel like too much of a chore. Moreover, without coaching, there’s no way to do a surgical workup for the benefit of the patient, which of course, is the main reason you need to know these procedures.

It also helps if you work with the surgeon and the restorative dentist because it’s the restorative dentist who obtains the final outcome, and he or she needs to finish the case from where you left it.

It takes some time and it takes some effort to learn these protocols. But once you do learn them, and you have the technique, your surgical cases will be more stable, and you’ll cut down the instances of surgical relapse that you see.

Above all, remember this is all for the benefit of the patient. You need to spend time learning and you need to spend time in the operating room to know the problems the surgeon encounters. Then you need to spend time in the diagnoses and workup.

However, the benefit is for the patient, who winds up with a functioning occlusion and improved face, and the gingival tissues are healthy and the jaw functions correctly._

_on the author_

Theodore D. Freeland, DDS, MS, is a board-certified orthodontist in Gaylord, Mich. After graduating from Albion College in 1967, he attended the University of Detroit Mercy, earning a dental degree in 1971 and his master’s of science in orthodontics in 1978. Freeland has completed Dr. Gene Williamson’s course in occlusion and TMJ and the Roth/Williams course in advanced orthodontics. In addition, Freeland has served as an adjunct professor in orthodontics at the University of Detroit Mercy, and held appointments at the University of Detroit in fixed prosthetics and orthodontics; the Roth Williams Center as a clinical instructor; and the Advanced Education in Orthodontics Group as director and instructor. Freeland is an accomplished author who lectures nationally and internationally.
Leading The Way

Introducing the Leadership Committee of the Complete Clinical Orthodontics

Dr. Antonino Secchi
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Clinical Assistant Professor and Former Clinical Director of the Department of Orthodontics at the University of Pennsylvania, Dr. Secchi received his DMD, Certificate in Orthodontics, and a Master of Science in Oral Biology from the University of Pennsylvania. He is a Diplomate of the American Board of Orthodontics and member of the Edward H. Angle Society of Orthodontists. In 2005 he received the David C. Hamilton Orthodontic Research Award from the Pennsylvania Association of Orthodontists (PAO) and in 2010, the Outstanding Teacher Award from the University of Pennsylvania.

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A graduate of St. Louis University’s Orthodontics Program, Dr. Clark maintains a full-time orthodontic practice in Greensboro, North Carolina. He is a sought-after speaker on a variety of topics including the business aspects of managing an orthodontic practice and practice transition information. He also presents courses on achieving exceptional results and optimizing efficiency using self-ligation.

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CCO Leadership, Colombia
After graduating as a dentist at Universidad Autonoma de Manizales, Dr. Giraldo made his postgraduate studies as an orthodontist in Universidad Militar Nueva Granada. He is the director of Universidad Autonoma de Manizales orthodontics program and the director of the pre-clinic and clinic of CCO in Universidad Autonoma de Manizales orthodontics program.

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A Diplomate of the American Board of Orthodontics and member of the Spanish Society of Orthodontics, Dr. Baeza received her DMD from the European University of Madrid, Spain and her Certificate in Orthodontics, and Master of Science in Oral Biology from the University of Pennsylvania.

Dr. Celestino Nobrega
CCO Leadership, Brazil
Director of ORTOGEO, an orthodontics school in Brazil, Dr. Nobrega has over 20 years of experience in scientific research and cutting-edge technology. He completed his general dental training at Sao Paulo State University, his certificate in Orthodontics and Masters of Dental Science at Rio de Janeiro State. He is leading a project of biomechanical studies regarding interactive self-ligating systems based on friction and flexibility studies, and the impact of low intensity laser and vibration therapy during treatment.
Dr. Sam King
CCO Leadership, USA
After receiving his DDS at Ohio State University, Dr. King completed his three-year residency in orthodontics and received a Master of Science in Oral Biology from the University of Pennsylvania in Philadelphia before completing the two-year Roth/Williams AFO Program.

Dr. Luis Nunez
CCO Leadership, Uruguay
A graduate of the University of the Uruguayan Republic in 1996 and from the Roth/Williams course at Catholic University in Uruguay in 2004. Dr. Nunez is a member of both ALADO (Latin American Orthodontists Association) and WHO and an international lecturer.

Dr. Ryan Tamburrino
CCO Leadership, USA
After achieving dual degrees in Biomedical Engineering and Mechanical Engineering/Materials Science from Duke, Dr. Tamburrino earned his Doctorate of Dental Medicine and Certificate in Orthodontics from the University of Pennsylvania. He is on the faculty at the University of Pennsylvania in the Department of Orthodontics.

Dr. Dan Fishel
CCO Leadership, USA
Trained in orthodontics and periodontics. Dr. Fishel completed his dental training at the Harvard School of Dental Medicine and his residency training at the University of Pennsylvania. He emphasizes educating his patients on the best treatments dentistry has to offer, and providing orthodontic, periodontal and dental implant treatments that maximize health and longevity.

Dr. Raffaele Spena
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After receiving his degree in Odontostomatia e Protesi Dentaria at the II Facolta di Medicina e Chirurgia of Napoli, Dr. Spena got his Certificate in Orthodontics at the Dental School of the University of Pennsylvania, Philadelphia and his degree of “Specialty in Orthodontics” at the University of Ferrara. He is a member of the AAO, the Angle Society of Europe and the World Federation of Orthodontists.

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After receiving her DDS from the University of Bordeaux, France in Orthodontics and Periodontics, and her Master of Science in Oral Biology from the University of Pennsylvania, Dr. Mortalena completed a two-year advanced course in functional occlusion from the Roth/Williams Center for Advanced Orthodontic Education. She also is a Diplomate of the American Board of Orthodontics.
Orthodontics and esthetics: A multidisciplinary approach

Authors: Julia Garcia Baeza, DMD, and David Garcia Baeza, DMD

These days, we are seeing a growing number of adult orthodontic patients. However, adult cases present unique challenges to the orthodontist. Missing teeth, root canals and periodontal problems are all common situations when dealing with adult patients.

Unrealistic esthetic expectations are another challenge when dealing with adult patients. This is the patient who comes in with a request that his (or her) smile look like his favorite movie star. That’s why it’s important to make sure the patient has a firm grasp of what is possible and what is not.

The patient should know that we have the ability to level and align teeth, to coordinate arches and to improve occlusion, but we do not have the ability to change the texture of the enamel or the shape or form of teeth.

With adult treatments on the rise, establishing a good multidisciplinary team is essential. This is a two-way street. Just as a secondary team of specialists can be essential to achieving a successful orthodontic outcome, orthodontics is also a valuable tool for other specialties to have at their disposal. This includes esthetics, but can also be a means to improving the health of the soft and hard tissues.

We’re going to look at a case that will highlight the importance of the orthodontist in working with other specialties.

Case report: Part I

In this case, the patient had a trauma and presented the left central incisor apically displaced (Fig. 1). The patient not only showed a fracture of the left central incisor, but also an apical displacement of the root (Fig. 2), taking the gingival margin to a higher situation (Fig. 3).

This case could be approached in two different ways: extracting the damaged tooth and placing an implant or extracting the damaged tooth and regeneration (with the risks that regeneration entails).

The risks associated with implantology include the loss of soft tissue and the loss of volume when implants are placed. This means that if the starting point of the gingival margin is higher than it should be after the implant placement, the gingival margin will be even more apically. This means a complete asymmetry of the soft tissues.

With this aspect in mind, the vision of a prosthodontist is to extract the damaged tooth while trying to increase the soft and hard tissues to avoid the gingival margin asymmetry between both central incisors.

These types of treatments are technique sensitive when mucogingival procedures are involved. Orthodontists must show their colleagues that they have the tools to help improve situations such as the one presented in this article.

In this case, the orthodontist can make the situation more favorable for the prosthodontist. The left central incisor was to be extruded in order to bring the gingival margin even lower than the right central incisor. As we said before, what the prosthodontist is simply looking for is a favorable situation.

When the gingival margin of the left central
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incisor is higher than the right central incisor, the situation is complicated. When the gingival margin is at the same level, it is less complicated. However, when it is even lower, the problematic situation of losing soft tissue might not be entirely solved, but it is a much more favorable situation.

In this case, the extraction of the tooth was expected from the very beginning, so why not use it before its extraction by bringing the soft tissue to a better position by using different orthodontic forces and vectors and facilitate the work of the rest of the multidisciplinary team?

Depending on the type of extrusion, soft or hard tissue can be extruded. The boundaries of hard and soft tissue extrusion are not clear in the literature. Yet, what is clear is that soft tissue will come down with an extrusion. In the case shown here, the new soft tissue formed after the orthodontic extrusion will help the outcome.

In the next peripheral radiographs (Fig. 4), the extrusion of the left central incisor is shown as a visual reference of the orthodontic extrusion, so the excess of gutta-percha can be used. A 4 mm displacement of the root was created, which was the amount of gingival margin needed for the prosthodontics to work (Fig. 5). At this point, the gingival margin of the left central incisor is even lower than the right central incisor. The amount of hard tissue extrusion in this case was almost imperceptible.

In these types of cases, an excess of soft tissue will facilitate the implant surgery (Fig. 6). Even though new soft tissue is formed orthodontically (vertical dimension), every time an implant is placed in the anterior zone, a soft-tissue graft is performed at the time of the surgery at the buccal zone. This is how the prosthodontist will reproduce the volume of soft tissue in the area of the implant (Figs. 7, 8). This will help avoid future translucency of the implant.

Once the braces are placed, the orthodontist can solve the small rotations to achieve a better situation in the anterior zone.

During the healing period (Fig. 9), no orthodontic movements must be done. It is of great importance that during this period, the temporaries perfectly seal the soft tissue. A comfortable temporary is fabricated to use during orthodontic treatment. Because of the round wire used at this point in the treatment, we use a stainless-steel ligature to fix the brackets and avoid any orthodontic movement. The temporary will seal and protect the soft tissue of the compromised area (Fig. 10).

Two months after surgery, the soft tissue presents healthy and the soft tissue at the compromised area is below the level of the gingival margin of the right central incisor.

**Case report: Part II**

Orthodontic treatment in this multidisciplinary case was used not only to align the teeth but also to extrude the left central incisor (which was going to be extracted from the beginning) in order to create a more favorable situation for the rest of the specialists.

The treatment plan option for this case was set up before starting the orthodontic treatment. A tooth replacement was planned for the left central incisor, and a veneer was planned for the right central incisor to achieve a great esthetic result.

Knowledge of the treatment plan before beginning will allow the orthodontist to help improve future restorative procedures.
Aligning for good

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To learn more about DOS and the Access to Care Partner program, visit NESO.org/AccessToCare.
At this point, everything that could possibly be done for the left central incisor was finished. However, could the orthodontist help with the future restoration of the right central incisor?

When tooth preparation is done for a future veneer, the prosthodontist will remove the enamel. Even though adhesion to dentin is good, adhesion to enamel is better. When prosthodontists work with veneers, if they can bond to enamel they will improve the result.

Having this knowledge, the orthodontist can still create a more favorable situation for his or her colleagues. In this situation, if the right central incisor was placed a little more lingualized, the amount of tooth structure that will need to be removed for the veneer preparation will be less.

Would it be possible for the orthodontist to lingualize that tooth? How is the orthodontist going to control the amount of tooth displacement? In this case, a composite veneer was built on the buccal face of the right central incisor (Fig. 11). The future veneer has a thickness of 0.5–0.8 mm. The same thickness was built for the composite veneer. A caliper was used to confirm the thickness before and after the composite veneer was placed. The orthodontist placed the bracket on top of the temporary veneer, and the tooth was palataly displaced 0.5–0.8 mm. This way, the tooth preparation will be less aggressive, and the final veneer will have better adhesion to the enamel than to the dentin.

With the orthodontic treatment in this case, we achieved a more favorable situation with the soft tissue around the tooth that was going to be extracted, and a more advantageous position for the other central incisor via a less aggressive tooth preparation. After the orthodontic treatment, it was time for the rest of the specialties to take over the case.

Model (Fig. 12) wax-ups for the temporaries (not only for the extracted tooth but also a wax-up of the veneer) (Fig. 13) enable us to achieve the best symmetry after orthodontic treatment.

The relatively long temporaries phase (Figs. 14a, b) helps encourage a successful result (Fig. 14c). After the patient and the prosthodontist are satisfied with the provisional results, another specialist plays a role in the patient’s treatment. The lab technician needs as much information as we can offer to be able to achieve the proper color and shade. Color guidance (Fig. 15) photographs and models should all be provided to the lab technician.
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Buddy Davis, D.M.D. Greer, SC

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Lawrence B. Evans, D.D.S., M.S. Lawrenceville, GA

“I can say nothing but good things about Benton Clark & Copple. We were served with excellence in every respect. I highly recommend them to anyone considering the transition/valuation process.”
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Fig. 16 shows the minimal amount of tooth preparation that was needed before the veneer placement because of the orthodontic treatment. Figure 17 shows the importance of the soft-tissue extrusion and the connective tissue graft placement at the surgical site. This will maintain the buccal volume to achieve a great emergence profile to recreate the final tooth (Figs. 18–20).

**_about the authors_**

**Julia Garcia Baeza, DMD,** is a diplomate of the American Board of Orthodontics and a member of the Spanish Society of Orthodontics and American Association of Orthodontics. She received her DMD from the European University of Madrid; and her certificate in orthodontics and master’s of science in oral biology from the University of Pennsylvania. Garcia Baeza’s interest in research in orthodontic appliances now finds her in a PhD program at the University Complutense of Madrid. She has published in various research and orthodontic journals and presented an investigation at the 2010 IADR meeting in Barcelona and at the 2012 EOS meeting in Santiago.

**David Garcia Baeza, DMD,** is a 2002 graduate of the European University of Madrid. He received a certificate in dental implantology from the European University of Madrid in 2006 and a master’s in oral biology from the University Complutense of Madrid in 2007. Garcia Baeza has been running a multidisciplinary dental practice, CIMA, in Madrid since 2005. He also serves as both an associate professor and assistant professor at University Europea of Madrid and University Complutense of Madrid. He’s had numerous articles published in the leading Spanish-speaking orthodontic journals and remains a sought-after lecturer in the greater European area since 2008.
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How ‘a penguin’ can help your practice (really!)

Author: Jerry R. Clark, DDS, MS

This complex orthodontic case was chosen to illustrate the significant benefits of using In-Ovation R self-ligating brackets. Throughout this article I plan to demonstrate how these self-ligating brackets allow one to treat cases more efficiently and effectively, thus reducing patient discomfort, treatment time, the number of patient visits and also the amount of patient chair time needed to successfully treat the case. I know from experience that the CCO bracket prescription for the InOvation bracket consistently delivers precision torques and angulations making it an ideal choice for all of my patients.

Case presentation

Lizzy B. presented in our office with a Class II, division 1 dental malocclusion with significant maxillary and mandibular dental crowding; excessive overjet; an end-on molar and canine relationship; an excellent nasolabial angle; a mildly retrusive mandible; and a small chin.

The panoramic X-ray was negative, with the exception of the presence of third molars that will need to be removed in the future (Figs. 1–9).
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Various treatment options were considered before I elected to treat this case using the Penguin Appliance, developed by Dr. Joe Mayes of Lubbock, Texas. This appliance is easy to use and does a very effective job of distalizing maxillary molars in order to correct dental Class II malocclusions and create a Class I molar relationship (Figs. 10–12).

Fig. 9a. Initial clinical records.

Fig. 10. Penguin Appliance.

Fig. 11. Six months after wearing Penguin Appliance.

Figs. 12a, b. Molar and canine relationship before wearing Penguin Appliance.

Figs. 12c, d. Molar and canine relationship after wearing Penguin Appliance.

Fig. 13. Case bonded, Nance Appliance placed.

Figs. 14–16. 0.014 Sentalloy archwires stop at first molar.

Various treatment options were considered before I elected to treat this case using the Penguin Appliance, developed by Dr. Joe Mayes of Lubbock, Texas. This appliance is easy to use and does a very effective job of distalizing maxillary molars in order to correct dental Class II malocclusions and create a Class I molar relationship (Figs. 10–12).
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*Based on an average case load of 150 patients and an average 2 year treatment time.
After six months of wearing the Penguin Appliance, please note that the relationship of the molars has changed from an end-on molar relationship to a solid, if not slightly overcorrected, Class I molar relationship. There has been a significant amount of space created by the distalization of the maxillary molars that will allow for the correction of the maxillary crowding problem. Also, note that the maxillary incisors and the overjet and overbite relationship have not changed (Fig. 12).

The case is now bonded and a Nance Appliance placed so as to maintain the position of the distalized molars and maintain maxillary anchorage. The .022 x .028 slot In-Ovation R-brackets have been bonded, the molars banded, and please note that the .014 Sentalloy® archwires stop at the first molars to prevent these flexible wires from coming out of the mandibular second molar tubes (Figs. 13–16).

After just four months, please notice how much tooth alignment has been achieved and how much space has closed due to the ability of the .014 archwire to freely slide in an almost frictionless manner. The bicuspids and canines have distalized and the maxillary anterior teeth have aligned without the upper incisors protruding. The alignment of the lower anterior teeth has improved significantly and at this appointment, a second .014 Sentalloy archwire is placed to eliminate the remaining rotations in the mandibular arch (Figs. 17–26).
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At eight months, the upper elastic chain is changed to close the remaining space. In the mandibular arch, a .0215 x .028 Bioforce archwire is placed and a panoramic X-ray is taken to verify the root positions and their parallelism (Figs. 36–45).

At 10 months, a full-sized .0215 x .028 Bioforce archwire was placed in the maxillary arch to allow the wire to interact with the customized bracket prescription to produce the proper torque and angulation for each individual tooth. The Nance Appliance is also removed at this time. Elastics are now placed to start the working phase of treatment to correct the biting relationship, with a Class II elastic being employed on the left side to correct the midline discrepancy (Figs. 46–49).

At 12 months, the final set of .018 stainless-steel archwires with soldered spurs are placed to provide for the finalization of the biting relationship, and the seating of the cusps. The mandibular midline is still off to the left, so short triangular elastic are being utilized to correct the midline and seat the cusps. This process of detailing will continue for six months to ensure the proper alignment and occlusion is achieved to promote the stability of the final occlusion (Figs. 50–54).

At 18 months, the appliances are removed and final treatment records are obtained. Results were achieved with only 14 appointments and less than six hours of chair time was needed to successfully treat this case (Figs. 55–64).
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Figs. 46–49  At 10 months, Nance Appliance removed, .0215 x .028 Bioforce archwire is placed as well as elastics.

Figs. 50–54  At 12 months, final set of .018 stainless-steel archwires with soldered spurs are placed.
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One-year post-treatment photos are also included to show how the stability of the case has been maintained and the occlusion has continued to improve, as has the profile and appearance. Also, please note the attractive smile line that has been created. (Figs. 65–71).

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Jerry R. Clark, DDS, MS, maintains a successful orthodontic practice in Greensboro, NC. He received his BS and DDS degrees from the University of North Carolina and his master’s degree in orthodontics from St. Louis University. He is board certified and has practiced orthodontics for more than 35 years and been lecturing on various orthodontic topics for more than 30 years. He is also a partner in Bentson, Clark and Copple, a company dedicated to assisting orthodontists with successful succession planning, practice valuation and sale of their orthodontic practices. For more information call, (800) 621-4664.
Managing your practice’s online reputation

Author: Diana P. Friedman, MA, MBA

By paying attention to what patients say about you on social media, and participating when it’s appropriate, you can help ensure your practice is fairly and positively represented online.

‘Claim’ your online business listings

Without a complete, accurate and up-to-date listing on web portals such as Yelp! and Google+, you’ll miss attracting the attention of many potential patients. After claiming and verifying your practice’s listing on these sites, you can create brand-consistent profiles and monitor them to see what patients are saying. Having verified, standardized listings will also net you a number of SEO benefits.

Monitor online conversations relevant to your practice

By monitoring social media conversations about your practice, you can determine what patients love about their experience and what they don’t. Using this feedback, you can initiate meaningful improvements at your practice. Studies have shown that for every person who complains online, 26 more could complain but don’t, so virtually every negative comment is worth considering.

Respond appropriately to patient comments whether positive or negative

Create a swift and effective response to negative online feedback when appropriate. Be authentic and compassionate: own up to valid complaints, apologize and, if necessary, outline what you’ll do to make things right. Conversely, don’t be afraid to gently correct patients whose complaints contain information you can verify is incorrect. Most issues should be resolved through private correspondence, not in a public forum such as your practice’s Yelp! or Facebook page.

Friedman is president and chief executive officer of Sesame Communications. She has a 20-year success track record in leading dental innovation and marketing. Throughout her career Friedman served as a recognized practice management consultant, author and speaker. She holds an MA in sociology and an MBA from Arizona State University.
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Introducing the NEW DENTSPLY GAC
These are exciting times at DENTSPLY GAC. Having rebounded from the challenges of 2011, we can say with confidence we’re back and better than ever! We’ve strengthened our existing offerings, doubled down on research and concentrated our focus on three principles central to our core identity.

Powering Practice Growth
We are ready to meet your every need with programs like The United Orthodontic Buying Group, now offering stronger benefits including the ability to redeem coupon at GACPowered.com, our practice marketing supersite. We continue expanding The UOBG Preferred Partner Network with leading companies like HR for Health, meeting all your Human Resource needs and Sesame Communications, helping you establish a presence in the digital space. And the Pride Institute providing practice management ideas that maximize business and clinical effectiveness.

Trusted Products Start to Finish
DENTSPLY GAC was the first to offer you the groundbreaking interactive design found in our In-Ovation® line of self-ligating brackets—the recognized industry leader for over a decade. Thousands of clinicians worldwide have trusted In-Ovation to treat their patients. The precision and quality built into every bracket offers you repeatable success, practice efficiencies and beautiful results every time. But it doesn’t end there. Today we’ve got several new bracket systems in development that will build upon our legacy of In-Ovation.

Advancing the Art of Orthodontics
The NEW GAC Clinical Alliance for Research and Education is at the root of the GCARE name and at the heart of what we do. Founded on clinical integrity and shaped by your input—GCARE is focused on keeping you at the forefront of the modern orthodontic movement. From implementing and integrating the latest technology, to enhancing clinical outcomes to practice-growth solutions.
In-Ovation®

The Thinking That Shaped an Industry

There's a reason more than 30 million In-Ovation brackets have been placed to treat more than one million patients. Because In-Ovation is more than a name, it's a commitment to advancing the practice of orthodontics. Only In-Ovation offers you the confidence that comes with using a bracket that's backed by the DENTSPLY international name.

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**Passive Phase**
Small, round wires slide freely, initiating the tooth movement process as the archwire gently levels the teeth and coaxes them into alignment.

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**Expressive Phase**
Square or rectangular wires are gently seated into the base of the slot without contacting the clip. Programming is expressed; rotations are corrected and space closures are completed.

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**Active Phase**
Rectangular archwires extend beyond the slot to fully engage the clip, providing the active control necessary for functional finishing, uprighting of the roots, and adjusting the torque.
The Difference of Interactive Self-ligation

In-Ovation lets you decide the exact degree of wire-to-bracket engagement that's correct for each phase of your patient's treatment.

Advancing Innovation

While orthodontics is a linear process, it's not always about finding the shortest path from point A to point B. While all In-Ovation self-ligating systems are engineered to streamline treatment, they are designed with precision and quality that allow you to start and effectively finish your treatment with one simple system.

Taking Control: Your Treatment, Your Practice, Your Life!

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In-Ovation® R
In-Ovation R has been recognized as an industry leader for over a decade. Thousands of clinicians worldwide have trusted In-Ovation to treat their patients. The precision and quality built into these brackets offers repeatable success, practice efficiencies and beautiful results every time.

In-Ovation® C
In-Ovation C combines superb results with enhanced esthetics. High translucency and a unique rhodium-coated clip make the bracket nearly invisible from a few feet away.

In-Ovation® L
Provides the benefits of undetectable lingual treatment while resolving the difficulties of archwire changes with our easy-open, easy-close self-ligating clip. The extremely low profile coupled with smooth, specially finished surfaces, maximize comfort and offers little or no interference with speech.

MTM® No•Trace
A lingual treatment option for patients requiring 6mm or less of correction. MTM® No•Trace System is designed to treat minor anterior alignment cases in as little as 12-24 weeks. Bonding MTM® No•Trace braces is easy and efficient with self-ligating brackets and optional indirect bonding. And because there's no action required by the patient, compliance is nearly effortless.
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submissions

formatting requirements

Please note that all the textual elements of your submission:

- complete article
- figure captions
- literature list
- contact info (e-mail addy please)
- author bio

must be combined into one Microsoft Word document. Please do not submit multiple files for each of these items. In addition, images (tables, charts, photographs, etc.) must not be embedded in the text document.

All images must be submitted separately, and details about how to do this appear below.

If you are interested in submitting a C.E. article, please contact us for additional instructions before you make your submission.

_Text length

Article lengths can vary greatly — from a mere 1,500 to 5,500 words — depending on the subject matter. Our approach is that if you need more or less words to do the topic justice, then please make the article as long or as short as necessary.

We can run an extra long article in multiple parts, but this is usually discussing a subject matter where each part can stand alone because it contains so much information. In addition, we do run multi-part series on various topics. In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

_Text formatting

Please use single spacing and do not put extra space between paragraphs. We also ask that you forego any special formatting beyond the use of italics and boldface, and make sure that all text is left justified.

If you would like to emphasize certain words within the text, please only use italics (do not use underlining or a larger font size). Boldface should be reserved for article headlines, headers and subheads please.

Please do not “center” text on the page, add special tab stops or underline in your text as all of this must be removed manually before layout. If you require a special layout, please let the word processing program you are using help you to do this formatting automatically rather than doing it manually.

If you need to make a list or add footnotes or endnotes, please let the word processing program do it for you automatically.

There are menus in every program that will help you apply all sorts of special formatting.

_Images requirements

Please number images consecutively by using a new number for each image. If it is imperative that certain images are grouped together, then use lowercase letters to designate the images in a group (i.e., Fig. 2a, Fig. 2b, Fig. 2c).

Insert figure references in your article wherever they are appropriate, whether that is in the middle or end of a sentence, but before the period rather than after. Our preference is to have figure references noted in the appropriate place within the text as it helps the readers to orient themselves when moving through the article. In addition, please note:

- We require images in TIF or JPEG format
- These images must be no smaller than 4 x 4 inches in size at 300 DPI
- Images should be 1 MB in size each

If you have an image that is greater than 1 MB, please do not bother “sizing it down” to meet our requirements, but send us the largest file size available. The larger the starting image is in terms of bytes, the more leeway the designer has in terms of resizing the image to fill up more space should there be room available.

Also, please remember that you should not embed the images into the body of the text document you submit. Images must be submitted separately from the textual submission.

You may submit images through a zipped file via e-mail, unzipped individual files via e-mail or post a CD containing your images directly to us (please contact us for the mailing address as this will depend upon where you will be mailing them from).

Please do not forget to send us a head shot photo of yourself that also fits the image requirements noted above so that it can be printed along with your article.

_Abstracts

An abstract of your article is not required. However, if you choose to provide us with one, we will print it in a separate box.

_Contact info

At the end of every article is a contact info box with contact information along with a head shot of the author.

Please note at the end of your article the exact information you would like to appear in this box and format it according to the previously mentioned standards.

A short bio (50 words or less) may precede the contact info if you provide us with the necessary text.

_Questions? Comments?

Please do not hesitate to contact us for our International C.E. Magazine Author Kit or if you have other questions/comments about the article submission process:

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- Institute a compensation and reward package that creates team dedication and increases profitability
- Develop a solid team meeting structure that maximizes solutions and minimizes wasted energy

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