Concepts, goals and techniques for successful orthognathic surgery

By Dr. Theodore D. Freeland, USA

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 orthodontic 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 1-5 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. 1-2). To this end, we need to look at five areas:

– joint status,
– soft-tissue analysis,
– surgical treatment objective,
– pre-surgical setups/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 work-up 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 mandibular 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 Ibaeda, we have a way to measure joint position and get an idea of the condyles 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. 5).

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 outline to it as compared 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 heightens our desire to do a cone beam, because we can see that the right joint has definitely lost vertical height, and we definitely have a joint spacer that is excessive (Figs. 4 & 5).

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 would like to see. However, there have been some changes. The left joint has clearly lost height, because we’re starting to see a “hard-breaking” effect in the left joint. This is the same for the joint that are ones that 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 more flat 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’re facing a situation of good functional aesthetics. 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 4, 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 oriented from the axis horizontal plane and the true vertical plane, which is based on the patient’s natural head position.

Figure 5 shows how these two corners are at 90 degrees from each other. In this analysis, we’re recording 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 maxilla. These come from Birkett’s 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 functional 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 orbit, the chin, the sub-pupil, the alar bases, the nasolabial and canthus of the eyes.

All of this enables us to assess if we have transverse asymmetries, where the occlusal plane is cantled instead of level. This is especially true with the mandibular plane, which we may also find is cantled. 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 diagnosis recorded by 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. 6). 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 of Glabella to the true vertical line.

We establish a horizontal plane based on the anterior and posterior segments to the true vertical line combined, and now we have fixed the horizontal plane and the true vertical plane, which is taken from the patient’s natural head position using the ear bow. We’ll use the pointer on the ear bow to mark the nose when the bow is level.

Figure 8 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 occlusion. 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. 10).

In establishing the surgical treatment objective, we see that we need 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 with precision 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...
The importance of cementation: A veneers case using a new universal cement

By Kerer

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ntheotic options in dentistry are the prevailing choice of most patients today. Veneers and bleaching in particular have become buzzwords in popular culture, and TV sitcoms, film and magazine advertising have turned these cosmetic techniques into household names. As a result, dental teams must accommodate the demands of their patients, becoming highly versed in placing metal-free restorations.

Practitioners can find a multitude of educational articles and courses teaching the science and technology of porcelain, zirconia and composite. But while emphasis is frequently placed on the final prostheses or direct restoration, often overlooked are the increasingly important auxiliary materials that contribute equally to the clinical success of these new materials and restorations: impression and provisional materials, bonding agents and cements. Education is imperative because cementation—bonding and capping the two areas of esthetic dentistry that have evolved through generations of products and techniques. These processes are essential in making esthetic restorations both functional and comfortable. That's why veneering can be an optimal, conservative alternative to crowning teeth, since preservation of tooth structure is important to dentists and patients alike. The highly esthetic results are due to the fact that ceramics have a translucent finished surface texture similar to that of natural enamel.2 Therapists, assistants and lab technicians spend vast amounts of time and effort perfecting veneers, avoiding fracture through painstaking preparation, material and shade selection, fit and fabrication. Yet even after such arduous processes, clinical failure and patina disassociation1 frequently occur with errors in cementation.

Cementing veneers is a delicate process with a historical litany of potential problems — color instability, insertion difficulty, handling and cleanup issues, unsatisfactory radiopacity, low translucency after curing, mismatch between try-in gels and final cements, and debonding, to name a few. Cement selection in certain applications necessitates knowledge of the chemistry and physical properties of the particular cement type, and insertion requires an exacting technique for successful clinical results.

This article outlines a veneers case using NX3 Nexus® Third Generation—a new, universal cement from Kerr. The subject is a long-standing patient of record with a current radiological and medical chart. This focus is on the steps and techniques implemented at final cementation of the prostheses.

Clinical Case

A female patient in her mid-fifties presented a chief complaint of being unhappy with her smile. An examination of her hard tissues revealed immediate concerns of multiple fractures, hypocalcification, shortened anterior teeth due to wear and an asymmetrical smile line (Figures 1 and 2).

Prior to the preparation of any of the compromised upper anterior teeth, the patient consented to restoring only teeth numbers 6-11. The patient ultimately qualified for and accepted veneers as the mode of indirect restorative treatment.

Prior to preparation, the tissue around tooth No. 8 was recontoured. Then, the teeth were prepared for pressed ceramic veneers and provisionalized in the standard manner. Occlusal analysis and adjustments were performed over a period of weeks and the veneers were tried-in. After the requisite steps were completed preceding insertion and the veneers were finalized, the provisional was removed and the teeth were cleaned (Figure 5).

Esperia® was used for gingival retraction and hemostasis in order to gain cervical access and control bleeding in that area (Figure 4).

The teeth were then etched for 15 seconds with Kerr Gel Elchant, which is composed of 57.5% phosphoric acid (Figure 5), and then rinsed and slightly air-dried (Note). While a total etch technique was used, NX3 works with both total-etch and self-etch protocols, adding to the distinctiveness of the product.) Per manufacturer directions, Optibond Solo® Plus (Kerr) was brushed onto to the tooth surfaces for 15 seconds (Figure 6), air-thinned for 5 seconds, and cured for 10 seconds using the L.E. Demetron II curing light (kurv) (Figures 7 and 8).

After etching and bonding, the veneers were cemented using NX3 light-cure cement in the clear shade (Figure 9). The cement was dispensed directly onto the internal surface of the veneer and was expected to ooze from all margins when the veneers were placed onto the prepared teeth. With the choice of either the single-syringe light-cure veneer cement or the dual-syringe dual-cure resin, the light-cure method was used because the veneers were not in an inordinately thick. NX3 allows veneers to be cemented all at once (as opposed to cementing centrals first, laterals second, and so on) because of its unique “thixotropic” properties, which enable the vesting to stay where they are placed prior to light-curing. This feature makes adjustments and proper placement easier while decreasing the need to adjust the product the cement proved to be “thixotropic,” the consistency of non-drip paint, the restorations were seated and adjusted before curing with no dripping or running. Color match and optimum retention are some of the attributes necessary when choosing a cement—NX3 met all of these expectations.

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Conclusion

Cementation is an important aspect of functional aesthetics. An understanding of chemistry, technology and physical properties are all essential to proper usage and clinical success. Cement selection was the driving factor in choosing the bonding system for this case. NX3 Nexus® Third Generation cement is free of amines—organic compounds containing nitrogen as their key atoms—which were largely blamed for the colour shifts so prevalent with earlier cement formulations. In an earlier use of the product the cement proved to be “thixotropic,” the consistency of non-drip paint, the restorations were seated and adjusted before curing with no dripping or running. Color match and optimum retention are some of the attributes necessary when choosing a cement—NX3 met all of these expectations.

About the Author

Dr. Mitch Coudill, a 1985 graduate of Baylor College of Dentistry in Dallas, TX, currently practices in Dallas and has published numerous articles reviewing all aspects of restorative and cosmetic dentistry.
The aesthetic performance of dental restorations has always been a factor of utmost importance in the success or failure of the treatment. Lately, as aesthetic awareness of the population increases and the evolution of dental materials have made new techniques possible, optimal aesthetics can be achieved following less invasive restorative procedures. In many cases, multidisciplinary treatment is necessary so that the best possible outcome is achieved with a minimum degree of compromise between invasiveness and aesthetics. Every complex case should be treated planned by a team of specialists, so that every detail and limitation from each point of view is taken into account. The restorative dentist usually designs the smile and oversees each phase of the treatment by all other specialists.

Congenitally missing lateral incisors are a common dental problem that can be esthetically dealt in three different ways: 1. canine substitution, 2. tooth supported restoration, and 3. implant supported restoration. Tooth auto transplantation (usually premolar) and removable partial dentures are other, less commonly applied treatment options. In the case of only one lateral incisor missing, an additional problem of symmetry exists and needs to be addressed.

Peg shaped lateral incisors pose another aesthetic problem that is usually restored with as follows: 1. all ceramic crowns, 2. porcelain veneers, and 3. direct or indirect composite veneers. Additional to the inadequate width and length of the peg shaped lateral, many times there is also a gingival aesthetic problem that can lead to a square looking restoration and too much gingival tissue display if not properly treated planned with either orthodontic intrusion or gingivaloplasty. The patient was treated with a combination of orthodontic, implant surgical and aesthetic restorative dentistry interventions.

Case report
A 22 year old Caucasian female presented to the clinic asking for aesthetic improvement of her smile. The patient was single and a student of law school. The medical history was unremarkable with no pathologies and no known allergic reactions reported to any kind of medication. No medications were taken on a systematic basis by the patient. The dental history was also unremarkable with only preventive and minor operative dentistry interventions and prophylaxis in the past. The patient mentioned a history of congenitally missing teeth in her family.

The chief complaint of the patient was spaces between the teeth and specifically the missing upper left lateral incisor tooth, the irregularly shaped upper right lateral incisor, and the diastema between teeth #11 and 21. Also, she was concerned about asymmetries in her smile and misalignment of her teeth. Finally, the patient stated she would like to have a brighter smile (Figures 1-3).

The dental examination revealed no pathological findings or signs of dental disease. The DMFT was low and the comprehensive periodontal examination was within normal limits. Soft tissue examination resulted in no pathological findings; radiographic bitewing examination revealed no pathological findings as well.

The aesthetic evaluation of her smile resulted in the following issues that would need to be addressed in the treatment plan: 1. peg shaped lateral incisor #12, 2. congenitally missing lateral incisor #22 with diastema between #11 and 21, 3. dental midline offset; teeth #11 and 21 (Figures 4-6, Table 1). The occlusion was Class I.

The base shade of the teeth was A3 on the upper central incisors and A3.5 on the upper canines with the Vita Classical shade guide (Vita Zahnfabrik, Bad Sackingen, Germany).

Photographs and alginate impressions were taken in the exam appointment to fabricate study models. Then the team of aesthetic/restorative dentist, orthodontist and periodontist treatment planned the case. The recommended treatment plan was accepted by the patient in favor of the alternative treatment plans.

Orthodontic phase
The orthodontic treatment goals were as follows: 1. intrude #11 to align the incisal edges of the centrals, 2. equalize the spaces between #11-15 and #21-25, 3. transfer the dental midline to the left, and 4. correct misalignments and minor rotations in different areas. Some composite resin was bonded on the facial surface of tooth #12 to facilitate bracket placement. The composite was in shade to

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Table 1: Teeth and spaces between them were measured. The proportions of the teeth (length to width ratio) and the arrangement of the spaces are crucial information in treatment planning, especially in patients with a high lip line.

Figure 4 - 6: Retracted view of the teeth before treatment. Note the peg shaped #12, the missing #22 and the asymmetry of the spaces between teeth #11-13 and 21-23.

Figure 7 - 9: Photographs of the patient during the orthodontic phase of the treatment.
A multi-disciplinary approach to minimally invasive functional aesthetic dentistry

By Dr. Tif Qureshi, UK

Simple tooth alignment is rapidly becoming accepted as the norm in cases that previously would have been treated with porcelain veneers. However, patients often present with a mix of problems such as previous metal ceramic work, the treatment of which should be integrated as part of the treatment plan. Timing becomes a vital part of the treatment when mixing restorative care, alignment, tooth whitening and occlusal planning. The following case illustrates an effective approach to treatment.

Case report
A patient presented complaining that “his two front teeth [old upper anterior crowns] felt as if they were too large and were always hitting the lower teeth”. In addition, his bite never felt “right” (Figure 1). He also wanted to try to improve the appearance of his teeth. He was aware of what could be done with porcelain veneers, but wanted to try to make the best of his own teeth.

Examination
On inspection, it was clear there were several issues:
1. Occlusion - The irregular alignment of the lowers and the thickness of the upper old crowns were adding to the problem of unbalanced anterior contacts. The back of the crowns, especially the upper left central, were hitting the front of his lower teeth, in particular the lower left central.
2. Thickness/aesthetics of crowns - The occlusion meant that the upper central crown had been placed quite labially and because they were metal ceramic, made them feel particularly thick. They also appeared rather opaque.

Treatment plan
A combination of techniques and good timing can make sure we optimize the opportunity for treatment. In this case, the treatment plan was as follows:
1. Remove the two upper crowns and replace them with temporary crowns, which could be merely cleaned and treated as natural teeth had darkened a little.
2. Simultaneously fit a lower Inman Aligner to align the lower incisors into a better functional position, while using bespoke clear aligners to slightly tilt the upper crowns into better alignment. The rationale for using upper clear aligners and a lower Inman was that only 1 mm of movement was needed for the uppers and about 2.5 mm of movement was required for the lowers. Inman Aligners are much faster than clear aligners with these kinds of movements. And 2-3 clear aligners can be as quick with very small movements of 1 mm and can be a little more cost effective if made bespoke. It would also allow us to treat both arches more or less simultaneously.
3. Whitening the teeth (during last week of treatment).
4. Change the composite temp to all ceramic crowns.
5. Retain the lower arch.

Alternative options
Alternative options were discussed, fixed braces were discounted because of the cost, the difficulty in simultaneous whitening and added difficulty in having the crowns as temporary structures. The patient’s posterior occlusion was also good. Full anterior veneers were discussed, but after the patient understood how simply and quickly the alignment could be done, seemed a completely ridiculous and unethical solution.

Two weeks later, the patient returned. The Inman Aligner and clear aligner were fitted on the lower and upper teeth respectively. Minimal interproximal reduction (IPR) was started. Despite calculating the amount of crowning present, the IPR is never carried out in one go. Only IPR strips or discs are used. This gives the opportunity to ensure the stripping is far more anatomically respectful than using burs or heavy discs. This massively reduces the risks of excess space formation, gouging or poor contact anatomy. Now only 0.15 mm per contact on the anterior teeth was adjusted on this single visit. The contacts are smoothed and fluoride gel is applied each time.18
The patient was then sent home. The Inman Aligner was worn for 16–20 hours per day with the patient removing it for eating and rest. 20 hours a day is the maximum amount of wear recommended to achieve a stable result. The patient returned after 2 weeks later. It was clear that the contacts had closed tight and the teeth had moved a little.

More IPR was carried out on both the upper and lower incisors. The occlusal contacts of the upper permanent crowns were adjusted to allow clearance for the lower teeth to move and the lower left lateral to advance particularly and the patient was fitted with a multistrand retainer for 2 weeks. The temporaries were also facially contoured to ensure they were flush with the natural teeth. On the subsequent return visit, it was clear that the teeth were aligning rapidly and especially well (Figures 4 and 5). We then decided to start some simultaneous tooth whitening. Impressions were taken, even though the result was still 25% from completion. Sealed, rubber trays were made and careful instructions given to the patient. While the patient is concentrating on using the Inman Aligner, they are always highly receptive to using bleaching trays. It adds greatly to motivation and often means they achieve a far better result. Day-While from Oral Healthcare (formerly Discus Dental) is used so that the patient only needs to wear the bleaching trays 55–45 minutes a day.

The patient returned after another 3 weeks and was happy with the result. New, stiffer bleaching trays were achieved. Upper and lower alignment was now complete. An impression was taken for a lower retainer wire to be fitted later. The temporary crowns were removed, the prep cleaned with CHX and new impressions were taken after some minor adjustments to the incisal margins.

A new lower impression was taken of the lower teeth using a preformed wire on a jig made by the orthodontic technician. The temporary crowns were removed and new IPS e.max HT (Ivoclar Vivadent) crowns were bonded using Variolink II (Ivoclar Vivadent) and Optifil II (Iv) (Figure 11). The occlusion against the aligned lower teeth was checked. The patient was extremely happy with the end result and felt his teeth looked natural (Figures 6–12).

Discussion
The case is another example of why a progressive form of smile design can be so essential in any case where a patient is looking to improve their smile. At every point, the patient sees their smile improving, first with the upper teeth and then with whitening. If they are still keen to have full crowns, then at least the teeth are straight and light, so less invasive and more translucent veneers can be used. More often than not, patients prefer a more natural result where we make “their own teeth look as good as they can”. In a case like this with previous metal ceramics, one can see how integrating alignment, and whitening can enhance aesthetics and simplify restoration dramatically. This makes a stable and aesthetically pleasing outcome far easier to achieve (Figures 15–17).

Conclusion
In each of our practices, there must literally be hundreds of patients who have issues similar to this gentleman’s complaint. Previously, conventional solutions often placed a barrier to treatment, adding time and cost into what was already an expensive treatment. Most patients just could not be bothered and would live with it. Now, simple anterior alignment can be so much quicker and more cost effective. I am amazed at the sheer volume of patients who will have treatment like this done if they are suitable. Being able to combine whitening because the aligners are removable is just another bonus so we can capitalize on the patient’s current compliance and get an even better result. Of course, case selection is absolutely vital!

Contact Information
Dr. Tif Qureshi is Immediate Past President of the British Academy of Cosmetic Dentistry. He has a special interest in minimally invasive cosmetic dentistry and presents hands-on courses and lectures on the Inman Aligner worldwide.
Dr. Tif Qureshi teaches Inman Aligner Training. Inman Aligner courses can be booked at www.inmanalignertraining.com

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make it easier to distinguish and completely remove it after the orthodontics were completed. After treatment, the goals set were accomplished (Figures 7-9).

Surgical phase
As stated previously, the dental team decided to align the incisal edges of #11 and 21 and not intrude further #11 to align the gingival zeniths. This decision was based on the fact that the teeth showed no signs of wear, in which case the worn tooth would be intruded more to be back in its original pre- wear position and then would be treated restoratively. The goals of the periodontal surgery were:

1. Align the gingival zeniths of teeth #11 and 21, 2. gingivectomy with osseous reduction on #12 to reduce as much as possible the gingival display without compromising the long term prognosis of the tooth due to loss of periodontal support, 3. gingivectomy in mostly all the upper teeth to bring the gingival display to a more pleasing appearance. After surgery, a healing period of 8 weeks was recommended by the periodontist before the restorative procedures start (Figures 10, 11). The option of a single implant placement for the missing lateral incisor #22 was rejected before surgery, as an additional bone grafting procedure would be required and this was not accepted by the patient (Figure 12).

Aesthetic/Restorative phase
Six weeks after the periodontal surgery, in-office whitening was performed so the patient's desire for brighter teeth is met (Phillips Zoom, Philips Oral Healthcare, Stanford, USA). The shade of the teeth 10 days after the whitening was completed was A1 for the upper centrals and A2 for the canines (Figure 13).

After proper healing of the periodontal tissues was confirmed with the periodontist, tooth #22 was prepared for an all ceramic lithium disilicate crown and an e.max press Maryland type all ceramic bridge with wings is fabricated.

After the restorations were fabricated (Figure 14) and the temporary crowns were removed, they were tried in and the fit and contacts were verified. Another try in was performed with a glycerin based paste (KY Jelly) so that the shade, contour and surface texture were assessed and approved by the dentist and the patient. At the same appointment the restorations were bonded after the porcelain was etched with 9% hydrofluoric acid and silanated. (Ultradent Products Inc, South Jordan, UT, USA), and the teeth cleaned with pumice. A 5 step etch and rinse adhesive (All Bond 2, Bio, Schau- burgh, IL, USA) and a dual cure resin-luting cement (Dowlin, Bisco, Schaumburg, IL, USA) were used. Spot curing was performed and excess cement was removed and after light curing for 60 sec each surface, the cement was left for 5 additional minutes to complete the chemical cure mode as well. Final finishing, adjustments of occlusion and polishing were performed with finishing diamonds (KOMET, Lungen, Germany), rubber points (Astropol, Ivoclar Vivadent, Schaan, Lichtenstein) and finishing strips (Sollex, SM ESPE, Seefeld, Germany). Finally, a diamond polishing paste was used (Ultradent Products Inc, South Jordan, UT, USA) on a Flexluff (Cosmedent, Chicago, IL, USA). An alginate impression was taken to fabricate a new Essix orthodontic retainer in the in-house lab within 1 hour. Oral hygiene and maintenance instructions were given to the patient and a follow up appointment was scheduled after 4 weeks (Figures 15-21).

A multidisciplinary approach in treatment planning and performance, as well as the use of contemporary restorative materials and techniques allow for a conservative, yet very aesthetic final result.

References
2. Prevalence of peg-shaped maxillary permanent incisors: an additional bone grafting procedure would be required and this was not accepted by the patient (Figure 12).

The author would like to thank the Orthodontist, Dr. Evita Ia- koratzi and the Periodontist, Dr. Alexis Bakopoulos for their con- tribution to the treatment of this case.

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The Author would like to thank the Orthodontist, Dr. Evita Iakoratzi and the Periodontist, Dr. Alexis Bakopoulouss for their contribution to the treatment of this case.
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18 NEWS
Dental Laboratory

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19
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Ref: CHSAU/CHPLD/0008/14c
Dear Friends and Colleagues,

November is upon us once again. This year for the sixth consecutive time the amazing Jumeirah Beach Hotel in Dubai will host the Dental Facial Cosmetic International Conference for a two day scientific weekend offering all dental professionals the latest research and developments in the field of Aesthetic Dentistry. The Dental Facial Cosmetic International Conference has become a vital platform for the success and perception of dentistry in the Middle East region. Yearly hundreds of top dental professionals, practitioners, researchers and industry players gather together to listen to the latest world acclaimed professional Key Opinion Leaders as well as discuss hot topics through the interactive networking opportunities the event offers. The interdisciplinary meeting brings together the dental and medical professionals with common interests in facial aesthetics and cosmetics exchanging knowledge for the best quality of patient care.

This year's conference will cover several subjects related to Aesthetic Dentistry enlightening all delegates with experiences from over 25 International Key Opinion Leaders who have gathered in Dubai. Participants will also have the unique chance to see the latest equipment which will be showcased at the product display made available by the top of the dental industry. We sincerely hope that this meeting will let delegates with experiences from over 25 International Key Opinion Leaders who have gathered in Dubai, participants immerse themselves in plenty of knowledge, exchange and share opportunities with one another.

On behalf of Emirates Dental Society, I would like to wish you all the best possible solutions for their esthetic needs. We will continue this unsurpassed cooperation to bring to our audience the most recent updates of technology in the dental field with few "surprises" as well.

I am sure that this conference will be of the greatest help to develop our knowledge and sharpen our skills in pursuing the goal that we all share, to provide our patients with the best possible solutions for their esthetic needs.

see you all in the dynamic Emirate of Dubai.

Dr. Aisha Sultan
President Emirates Dental Society
President of the Conference

Dear Colleagues of the Dental Team,

It is my honor and pleasure to welcome you all to our 6th Dental - Facial Cosmetic International Conference.

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We have the unique chance to see the latest equipment which will be showcased at the product display made available by the top of the dental industry. We sincerely hope that this meeting will let delegates with experiences from over 25 International Key Opinion Leaders who have gathered in Dubai, participants immerse themselves in plenty of knowledge, exchange and share opportunities with one another.

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Dr. Aisha Sultan
President Emirates Dental Society
President of the Conference

Dr. Munir Silwadi
BDS, MRCDOS, DUSS, FADI, FICD
Conference Chairman & Scientific Advisor

Dr. Munir Silwadi
Conference Chairman & Scientific Advisor

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Dr. Aisha Sultan
President Emirates Dental Society
President of the Conference

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Oral Health Management: Between Myth and Reality

9:45 - 10:30
Prof. Mary Rose Pincelli Boglione, Italy
Lecture
Management of The Orthodontic Patient

10:30 - 11:15
Victoria Wilson, Dental Hygiene Therapist, UK
Lecture
Communication & Implant Maintenance

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Teeth whitening from A to Z...

13:45 - 14:30
Dr. Costa Nikolopoulos, Greece
Lecture
Simple Fast & High-Quality Implant Dentistry

14:15 - 15:00
Dr. David Galalgui, USA
Lecture
An Introduction to Digital Impressioning and the Digital Workflow

15:00 - 15:45
Dr. Richard John Simonson, USA
Photography – Clinical for Dentistry, and Nature for Hobby

15:45 - 16:00
DISCUSSIONS

16:00 - 16:45
Prof. Carina Mehanna Zogheib, Lebanon
Lecture
Teeth whitening from A to Z...

16:45 - 17:30
Prof. Khalid Balwi, JSA
Lecture
The Effect of manufacturing features of rotary NiTi files on their performance: A clinical approach for analysis

17:30 - 18:15
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CBCT and CAD/CAM allow for one-day restoration of Tooth #9

Case Overview

Our office received a frantic phone call from the mother of one of our twelve-year-old patients, who stated that her daughter fell while in P.E. class and broke a front tooth. We advised her to bring her daughter to the office as soon as possible. Immediately after her arrival a periapical radiograph of tooth #9 and extraoral photographs were obtained (Fig. 1).

Upon clinical examination and review of the digital radiograph, I saw tooth #9 was horizontally fractured at the middle third. There was no pulp exposure evident, but the tooth did have a pinkish tint on the lingual. No mobility was noted and no peri-apical changes or root fractures were obvious at this time. The new American Association of Endodontists guidelines recommend taking one occlusal and two periapical radiographs with different lateral angulations for all dental injuries, including crown fractures. If cone beam-computed tomography is available, it should be considered to reveal the extension and direction of the fracture.1

Dr. Edward Mills in his presentation on Site Development and Implant Protocol Based on Etiology of Tooth Loss refers to a similar traumatic injury in which CT images revealed not only a root fracture within the bone but a fracture of the lingual plate.2

A limited field 3D scan 5cm x 5cm at 500 voxels was taken with the CS 8100 3D to rule out buccal or palatal plate fractures (Fig. 2). None were evident on the scan. While her parents were upset that she had been injured, the ability to view a 3D image reassured them that the damage appeared to be limited to the tooth’s coronal structure.

Treatment Plan

The patient’s treatment options were: 1) do nothing; 2) restore with a composite restoration, realizing that this would have a questionable long-term prognosis due to size of fracture; 3) restore with a CAD/CAM milled crown. The patient and her parents were advised that cases where teeth have been injured traumatically such as in this case, one might experience a post traumatic irreversible pulpitis at a period of time beyond the initial trauma. In some cases, this condition may be treated by endodontic treatment and crown restorations but in other cases root resorption may take place precipitating the loss of the teeth. These teeth will be monitored every 6 months over several years with periapical radiographs. Every appropriate effort to maintain the tooth in place and avoid the need of an implant until the patient reaches maturity. Dental implants in adolescent patients may affect vertical growth and development of the alveolar ridge because the osseointegrated implant acts as an ankylosed tooth. At a focus conference on Advanced Dental Implant Studies, Dr. Mills summarized that jaw growth in a young adolescent patient may compromise the outcome of the oral rehabilitation using an implant supported prosthesis even if implants successfully integrated. After presentation of the treatment plan and discussion of risks, benefits, options, and alternatives; the parents and patient elected to restore tooth #9 with a CAD/CAM crown.

The parents understand this crown will likely need to be replaced once she reaches adulthood for the best cosmetic appearance, as her teeth and face will change with further growth and development.

Tooth #9 was anesthetized and prepared for a ceramic crown. I utilized the CS 5000 intraoral scanner to scan the prepared maxillary anterior quadrant and the opposing mandibular anterior quadrant as well as obtain a bite registration (Figs 3, 4). CS Restore software was then utilized to design the anterior crown (Figs. 5-7). The CS 5000 milled the crown from an irreversible pulpitis at a period of time beyond the initial trauma. In some cases, this condition may be treated by endodontic treatment and crown restorations but in other cases root resorption may take place precipitating the loss of the teeth. These teeth will be monitored every 6 months over several years with periapical radiographs. Every appropriate effort to maintain the tooth in place and avoid the need of an implant until the patient reaches maturity. Dental implants in adolescent patients may affect vertical growth and development of the alveolar ridge because the osseointegrated implant acts as an ankylosed tooth. At a focus conference on Advanced Dental Implant Studies, Dr. Mills summarized that jaw growth in a young adolescent patient may compromise the outcome of the oral rehabilitation using an implant supported prosthesis even if implants successfully integrated. After presentation of the treatment plan and discussion of risks, benefits, options, and alternatives; the parents and patient elected to restore tooth #9 with a CAD/CAM crown.

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The parents understand this crown will likely need to be replaced once she reaches adulthood for the best cosmetic appearance, as her teeth and face will change with further growth and development.
Porcelain laminate veneers – avoiding complications

By DCDM

Dental Veneering is the process of covering the facial surfaces of teeth by using various types of dental materials. Most commonly used are porcelain veneers which are thin shells of porcelain that are shaped like the outer layer of the teeth and are used to cover the teeth, aiming to enhance their appearance.

Many celebrities opt for this esthetic treatment to achieve what may seem like a picture-perfect smile. This may lead people to a false expectation that every one is a good candidate for veneers. However, from a dental clinician’s perspective preparing and planning for veneers is very challenging, and if proper assessments of the patient and proper techniques in preparing the teeth are not used, multiple complications can occur. These include gingival inflammation, chipping and breaking or even complete de-bonding of the veneers.

To decide whether a patient is a good candidate for veneers many factors should first be assessed; the condition of the patient’s teeth, habits, periodontal condition and most importantly the patient’s expectations and willingness to maintain their veneers after they are placed.

We should start by analysis of the teeth. This involves assessing their shape and proportion; diastemas, and analysis of the occlusion. Regarding shape and dimension, there should be sufficient tooth structure to retain the veneer, otherwise the longevity can be severely affected. In teeth with small surface areas such as lower incisors, or teeth with multiple cavities and fillings which decrease the available surface for bonding, there is an increased chance of the early displacement of the veneer. In such cases full crowns may offer a better long term option (H.Serdar Cotert et al, 2009).

In terms of diastemas, if these are too large veneers can only partly reduce the space, otherwise gingival inflammation and/or recession can occur due to the bulkiness of the veneer (Weissgold and Cohen, 1981). Additionally, a tooth which is unnaturally wide for its height looks unattractive. Orthodontics may be more appropriate to close diastemas than veneers. When assessing a diastema the clinician must establish if it is stable or increasing since the latter may indicate periodontal bone loss or a harmful habit.

Finally in tooth analysis the occlusion must be considered. For veneers to have a longer survival rate they should not have excessive biting forces on their edges as is common in patients with an edge-to-edge occlusion which can lead to chipping and breaking of the veneers. Care must also be taken in patients with missing posterior teeth, as this increases the loading on the anterior teeth. Patients’ habits of the gnawing and grinding habits which can lead to dark stains around the margins of the veneers (Fig 1). Since patients with dark stained teeth will often consider veneers as a solution, habits should be identified and changed after veneer placement to maintain the esthetics of their veneers (Beier et al, 2012).

Marginal stains can be minimised by brushing or rinsing after smoking and consumption of dark colored foods. The patient’s oral hygiene must also be assessed, which leads us to the last key point of gingival health. Veneers should not be prepared on bleeding inflamed gingiva, which indicates poor oral hygiene. If this is done, complications which arise include placement of the veneer margin too deep due to gingival enlargement, and bleeding during preparation and bonding leading to poor marginal seal and marginal staining after veneer placement. Eventually gingival recession or worsening inflammation will result. Good oral hygiene and gingival health should be achieved before veneers are started. All of these factors need to be considered during the initial assessment to avoid complications.

Additional complications can arise during the preparation of teeth. There are two common approaches to placing porcelain veneers, one is done without altering the natural teeth - bonding the porcelain veneers to unprepared teeth. This might seem a conservative choice avoiding alteration to tooth surfaces, but it inevitably creates a bulky over-contoured appearance and increases the risk of the veneer de-bonding and gingival complications. Alternatively teeth are prepared for veneers by changing external contour, removing less than a millimetre of the facial surfaces and around 2 mms of the incisal edges, thus porcelain replaces the tooth structure removed, ensuring the porcelain is seated properly onto the tooth with enough bulk of porcelain at the edge to minimise chances of chipping and breaking. Studies have shown that the overall success and survival of the first method is much lower than the second method. The commonest complications with veneers are breaking and chipping (H.Serdar Cotert et al, 2009)(Leaton and D’Pulh, 2013) (Akoglu et al, 2011).

A study analyzing the overall survival rate of porcelain veneers over a 20 year period concluded that the estimated survival rate over a 5 year period is at 95%, at 8 years is 94%; at 10 years is 86% and at 20 years is 85% (Beier et al, 2012). It should be noted that these were veneers placed after adequate tooth preparation.

The clinician must consider all these factors before choosing to place veneers if complications are to be minimised and patient satisfaction achieved.

References are available from the authors.
Case report surgical correction of a class III malocclusion in an adult

By Dr. Fabien Depardieu

This case report describes a successful orthodontic treatment of a skeletal Class III malocclusion with mandibular prognathism in an adult individual. The patient with Class III malocclusion, having mandibular excess in sagittal and vertical plane was treated with orthodontics, bilateral sagittal split osteotomy. The surgical-orthodontic combination therapy has resulted in near-normal skeletal, dental and soft tissue relationship, with marked improvement in the facial esthetics in turn, has helped the patient to improve the self-confidence level. The interdisciplinary approach is the treatment of choice in most of the skeletal malocclusions (1).

Keywords: Class III malocclusion, decompensation, Orthognathic Surgery, Bilateral sagittal split osteotomy, prognathism, surgical orthodontic treatment.

Introduction

The Skeletal Class III malocclusion is characterized by mandibular prognathism, maxillary deficiency or both. Clinically, these patients exhibit a concave facial profile, a retrusive nasomaxillary area and a prominent lower third of the face. The lower lip is often protruded relative to the upper lip. The upper arch is usually narrower than the lower, and the overjet and overbite can range from reduced to reverse.

The effect of environmental factors and oral function on the etiological factors of a Class III malocclusion is not completely understood. However, there is a definite familial and racial tendency to mandibular prognathism. For many Class III malocclusions, surgical treatment can be the best alternative. Depending on the amount of skeletal discrepancy, surgical correction may consist of mandibular setback, maxillary advancement or a combination of mandibular and maxillary procedures. After surgical correction of the skeletal discrepancy, the occlusion is usually finished orthodontically to a Class I relationship. However, if surgery treatment is not performed, and the final molar relationship is Class III or Class I, there are challenges specific to the static and functional Class III occlusion that must be considered. Sometimes a Class III relationship is caused by a forward shift of the mandible to avoid incisal interferences. This is a pseudo-Class III malocclusion. In these cases, it is important to establish the inter-occlusal relationship with the teeth in the retruded contact position.

In this paper, the surgical orthodontic treatment of a young adult patient with a Class III malocclusion is illustrated.

Diagnostic and Etiology

The patient was a 28 year-old man who had a Class III facial type and slight crowding with a complete Class III relationship. His chief complaint was an esthetic facial and uneven bite. His medical history showed no contraindication for orthodontic therapy and orthognathic treatment. No one in his direct family had a skeletal Class III features.

The pretreatment extra-oral photographs showed symmetric facial structures (Fig 1). The patient had a concave profile, a decreased nasolabial angle and a protusive lower lip. The intra-oral photographs (Fig 2) showed a Class III occlusion on each side with an anterior crossbite and without apparent crowding. Overjet was -2.0 mm, and overbite was -3.5 mm. His maxillary anterior teeth were prognathic, with inadequate display when smiling.

The mandibular dental midline was deviated 2.5 mm to the right, although the maxillary dental midline was coincident with the facial midline. There were no signs or symptoms of temporomandibular joint dysfunction. Mandibular movements, such as maximal opening and lateral and anterior displacement were within normal limits. No deviation and pain were discovered during the border movement of the mandible.

A cephalogram and a panoramic radiograph were taken before treatment. The cephalometric analysis and its tracing showed that the mandible protruded relative to the cranial base (SNB angle, 82°; ANB angle -5°). The panoramic radiograph showed no other abnormal signs. After the analysis of the photographs, the casts and radiographs, it was decided to approach his problems as a skeletal Class III malocclusion with an anterior cross bite and a lower deviated midline (2).

Treatment Objectives

The treatment objectives (5) were to obtain a harmonious facial profile by decreasing the protrusion of the mandible, improve the occlusion, including correction of the anterior crossbite, establishment of ideal overjet and overbite, achievement of a functional molar relationship; and place the dental midlines in the middle of the patient’s face.

We planned:
- To set back the mandible to correct the prognathism and the midline deviation.
- To relieve the proclined maxillary incisor position and to relieve the dental compensations.
- To relieve the dental compensations by straightening the mandibular incisors to an upright position over basal bone.

Treatment Alternatives

The first alternative was orthodontic treatment with extraction of 4 premolars. Through the retraction of the mandibular anterior teeth, the anterior crossbite and Class III molar relationships would be corrected and the concave facial profile would be camouflaged. Nevertheless, the mandibular incisors were not suitable for much distal movement because of the thin trabecular bone in the mandibular anterior area that could damage the periodontal tissues by gingival recession, fenestration or dehiscence.

The second alternative was combined surgical and orthodontic treatment. The anterior crossbite would be corrected with a single-jaw surgery; a mandibular setback. The concave profile would be improved
as well. It was decided to extract the upper second premolars to relieve the dental compensations by repositioning the upper incisors.

The third alternative was to correct the class III malocclusion by miniscrew-assisted mandibular dentition distalization. However we decided that the skeletal problem was too excessive and required orthognathic surgery.

After we discussed the three alternatives with the patient, he chose the second option.

Treatment Progress

The preoperative orthodontic preparation began on December 2011. Before the levelling and alignment procedures (4), the maxillary second premolars were extracted to decamprpose the maxillary incisor inclination and to reduce the acute nasolabial angle.

Pre-adjusted 0.022-in edgewise brackets were bonded to all teeth. The preoperative orthodontic treatment was achieved in 12 months, ending with 0.018 x 0.025 stainless steel surgical archwires for the maxillary and mandibular arches.

The orthognathic surgery involved a set back of the mandible with a bilateral sagittal split osteotomy. This was performed to improve the mandibular position and to achieve the Angle Class I canine position with ideal overjet and overbite.

After the surgery, the patient was placed in intermaxillary fixation for 2 weeks. Two months after surgery, finishing was performed with maxillary and mandibular 0.016 x 0.022-in titanium-molybdenum alloy archwires. The appliances were removed after 16 months of active treatment. Bonded lingual retainers were fitted to the lingual surfaces of the anterior teeth in both arches. Maxillary and mandibular essix retainers were delivered with instructions to wear them full time for two weeks and then night time.

Treatment Results

The post treatment photographs (Fig.3) showed that facial aesthetics were improved, and ideal occlusion was achieved with proper overjet and overbite. The maxillary dental midlines coincided with the facial and mandibular midlines. The occlusion was finished to a therapeutic Class II.

Discussion

The decision for surgical orthodontic treatment for this patient was based on the fact that his primary concern was his facial profile.

Before the single-jaw surgery: a mandibular setback, preoperative orthodontic treatment, including decompensation of the malocclusion, is necessary. The dental decompensation we performed was intended to retract the proclined maxillary incisors to a normal axial inclination. Lack of optimal dental compensation compromises the quality and quantity of an orthognathic correction. The patient’s teeth were decompensated by extracting the upper second premolars and levelling the mandibular arch. This phase was achieved in 12 months.

Conclusion

This case report describes the surgical orthodontic treatment of a young adult man with dental and skeletal class III relationships. The orthognathic treatment was the best option for achieving an acceptable occlusion and a good esthetic result. An experienced multidisciplinary team approach ensures a satisfactory outcome.

Presurgical orthodontics removes all the dental compensations and suggests the extent of the skeletal discrepancy. Normal skeletal base relationship is achieved by osteotomy and setback of the prognathic mandible, postsurgical orthodontics guides the normal occlusal rehabilitation by correcting any emerging dental discrepancies.

References


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Wednesday 26th November 7:30pm

Restorative Dentistry/Orthodontics Relationship: How to improve the communication

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Dental implant competitors shake things up amidst economic uncertainty

By Kristina Vidug, USA

In 2015, the global dental implant market—composed of the sale of dental implant fixtures, final abutments and other devices—was valued at over US$3.7 billion. The European market, valued at nearly one-third of the global market at close to US$1.2 billion, contracted through 2014, as uncertain economic conditions continued to reduce procedure volumes and as more low-cost competitors entered the market, driving down prices.

These factors hampered the expected economic recovery and resumption of growth projected for 2015. As a result, the dental implant market will continue its decline before stabilising in 2015. Only then will the European market slowly begin to recover. Factors such as low gross domestic product growth and high unemployment continue to render dental implant procedures—which are primarily paid out of pocket by patients—cost prohibitive, while alternatives, such as bridges and dentures, that are perceived as more affordable will represent attractive options.

Dental implants were invented in Sweden; as a result, it is not surprising that a great number of premium manufacturers are based in Continental Europe. In the past, premium manufacturers, such as Straumann and DENTSPLY Implants, were able to rely on their long-standing reputations in the market and the high quality of their products to command higher prices than did some of their competitors.

More recently, however, some of the premium competitors have employed strategies to appeal to increasingly cost-conscious consumers. For instance, Straumann has reduced the price of its titanium implants by 15 per cent in Austria, Germany and Switzerland. The price change only came into effect in the first quarter of this year; the strategy appears to have been effective because the company reported a 6 per cent rise in first-quarter revenue compared with a 6 per cent decrease in the same period last year.

The price reduction has come at a perfect time: while economic conditions begin to slowly improve, consumers are still extremely price sensitive. These price cuts therefore allow dental professionals to offer premium implant products to their patients at a reduced rate.

Straumann’s price reduction is not its only foray into the value market. In the first quarter of this year, the company purchased US$50 million worth of bonds from low-cost South Korean dental implant manufacturer MegaGen. The investment, which will be converted to shares in 2016, will help bolster Straumann’s revenue while allowing it to participate in both the premium and value segments, thus appealing to a wide range of practitioners and patients alike.

Straumann is not the only company shaking things up in the world of dental implants. Zimmer Dental recently announced its acquisition of rival Biomet. While both companies are better known for their orthopaedic products, they are fairly significant competitors in the dental industry as well. Lay-offs are not uncommon when companies merge, especially when the companies in question offer the same types of products. This can have a negative impact on sales in the short term, as the newly conjoned companies’ sale force decreases, leading clients to switch to other competitors.

However, this will not be the case with the Zimmer–Biomet merger, at least not in the short term, as the sales teams from both companies are expected to be retained through the merger. The cost of retaining both sales teams has been estimated at US$40 million. While the effect of this acquisition on the market remains to be seen, the fact that the sales force will not be decreasing bodes well for the newly merged companies, likely resulting in an increased market share in the dental implant segment.

There is discussion of merger and acquisition activity among other companies in the segment too, with Nobel Biocare reportedly in talks to sell to private equity firms and strategic buyers. While these talks are still in the very early stages, what is certain is that there has been a great deal of activity in the competitive landscape in the past several years.

This, combined with the aforementioned economic factors, is turning the once stable and mature market into a dynamic, action-filled space. With the dental implant market set to rebound in Europe and with revenues expanding in other countries—particularly in the rapidly developing BRIC and Middle Eastern markets—the global industry is poised for even further change, and the competitive landscape could look entirely different a few years from now.

About the Author

Kristina Vidug is Market Research Analyst at Decision Resources Group, a U.S.-based market information provider.
Same Day Dental Implants® & Teeth
A Surgical & Prosthesis Protocol

By Costa Nikolopoulos Oral & Maxillofacial Surgeon (S.A.) & Petros Yuranoglou Specialist Prosthodontist (U.S.A.)

The Branemark protocol advocated the use of a two stage surgical approach where the turned (smooth) implants were buried for several months under the mucosa. With the advent of surface enhanced and tapered implants the protocol later evolved into a one stage approach.

Several clinicians then proceeded to immediately load these one stage implants with good success provided good primary stability (more than 45Ncm) was achieved at time of implant placement and provided micro-movements could be limited to 100μm. Ample reports have been published on immediate loading of dental implants showing an initial unloaded period of 5–6 months is not necessary. From a patient’s point of view the reduction of treatment time between implant placement & installation of a functional prosthesis leads to increased patient satisfaction & treatment acceptance and a gain in time for the patient implies an economical benefit especially for professionally and/or socially active patients.

High treatment acceptance and patient satisfaction are the most important advantages of immediate loading and immediate function.

Surgical Protocol
The surgical protocol of immediate loading of dental implants with same day teeth is based on the following:

1) Angled implants in a tilted manner placed into available bone anterior and posterior to the maxillary sinus (Fig. 2).

2) Wider and appropriately shaped implants planted into immediate extraction molar sockets thereby avoiding socket or sinus grafting (Fig. 5).

3) High Primary Stability
An important factor for immediate loading success is high primary implant stability (greater than 45Ncm) which can be achieved by using a surface enhanced tapered implant design to enhance lateral compression of bone. By underprepping, high insertion torque and primary stability can be achieved even in cases of decreased bone density such as is often the case in maxillary alveolar bone and as well as in osteoporotic patients. Primary stability can easily be measured during implant placement under a torque wrench (Fig. 4).

If 12Ncm insertion torque is not achieved, the implant should be removed and further bone preparation a 3mm wider implant is placed.

This usually results in adequate primary stability of 45Ncm for immediate loading. If 45Ncm insertion torque is not achieved then again the implant can be removed and replaced with an even wider diameter implant if the available bone width permits. This usually results in adequately high insertion torque and primary stability which is measured during implant placement. If primary stability is not achieved, the implant should be removed and without further bone preparation a 4mm wider implant is placed.

This usually results in adequate primary stability of 45Ncm for immediate loading.

If 45Ncm insertion torque is still not achieved then again the implant can be removed and replaced with an even wider diameter implant if the available bone width permits. This usually results in adequately high insertion torque and primary stability which is measured during implant placement. If primary stability is not achieved, the implant should be removed and further bone preparation a 4mm wider implant is placed.

4) Patient’s Age

5) Implant length & diameter

6) Implant distribution (A-P spread)

Prosthodontic Protocol
The Prosthodontic protocol of SameDay Dental Implants & Teeth is focused and designed around the patient’s needs. It’s fast, efficient and doesn’t compromise quality. The patients are never left without teeth for more than six hours. As a result treatment acceptance is high.

All implants with good primary stability (>45Ncm) are immediately loaded with screw retained teeth. For single implant cases, the final all ceramic screw retained tooth is fabricated and delivered to the patient within six hours. For multiple implant cases, temporary screw retained acrylic teeth are fabricated with an even wider diameter permanent screw retained all ceramic or metal ceramic teeth are delivered one week later.

Timing of Immediate Loading Dental implants either should be loaded the earliest possible (never exceed ten days after surgery) or alternatively two months after placement. This is because the so-called initial stability (mechanical stability) that an implant has, starts to drop gradually and the implant becomes more liable to failure if forces are applied. Fortunately, simultaneously a “secondary stability” (Osseointegration) starts to build up. The sum of the two “stabilities” which is demonstrated on the stability graph (Fig. 16), gives us the “total stability”. As a golden rule implants ideally should never be disturbed during the “stability dip” period.

Preoperative Preparation
In order to achieve this protocol preoperative screening and detailed surgical and prosthodontic workup is needed.

- Complete medical history:
  - Allergy history:
    - Oral (e.g. sulpha, antibiotics)
    - Medications:
    - Smoking
  - General health:
  - History of antibiotic prophylaxis
  - Alcohol consumption
  - Personal and family history of osteoporosis
  - Medications for systemic diseases
  - Immunosuppressants or immunomodulatory treatments
  - Current medications (generic names):
    - Nonsteroidal anti-inflammatory medications
    - Chronic disease medications
    - Osteoporosis medications
  - Other medications:
    - Nonsteroidal anti-inflammatory medications
    - Chronic disease medications
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Prosthesis onto the mature soft tissues, two months after surgery.

Fig. 25. Adaptation of the final prosthesis. The passive abutment is cemented by the dental technician onto the fitting surface of the prosthesis, in the lab. The master implant model is used as a blueprint for the cementation. Based on our experience over the past 15 years of using passive abutments, the metal try-in procedure is not necessary, thus speeding up the fabrication of the final prosthesis.

Placement of the Permanent Teeth

One week after the implant surgery the patient returns for the placement of the permanent teeth.

The temporaries are removed, the prosthetic platform of the implants is cleaned, and immediately the permanent teeth are screwed onto the implants.

There is a big benefit having to work only with “one-piece screw retained” (Fig. 24) prostheses.

For multiple custom abutments to be positioned first, the retrieval of the “one-piece prosthesis” makes adjustments much easier, there is no excess cement to deal with, thereby cementation that can cause significant complications if left accidentally under the immaturities.

Fitting of the prosthesis is assessed under the light with the help of i) the interchangeable implant and temporary models, ii) the silicone keys, iii) the anterior custom made guiding table (Fig. 22) which will allow him to reproduce the occlusal schema of the temporary teeth to the permanent teeth.

Two months later the temporary teeth are placed again in the mouth of the patient and the provisional prosthetic teeth are adjusted again.

Permanent Teeth Fabrication

With the help of i) the interchangeable implant and temporary models, ii) the silicone keys, iii) the anterior custom made guiding table, iv) the photos and v) the videos the photos starts to fabricate immediately the permanent screw retained porcelain teeth.

The permanent teeth need to be ready in one-week’s time and should have perfect fit onto the implants. This is one of the most important prerequisites for optimum implant longevity.

The material of choice, used by our dental lab, for the past 20 years, is porcelain fused to metal. The fabrication of the metal ceramic prosthesis involves a series of technique sensitive procedures, inevitably in each step, small “5 dimensional inaccuracies” are introduced into the prosthesis. The sum of these in accuracies is never zero. As a result, at the end of the fabrication procedure, the final prosthesis will never have a perfect fit onto the implants.

The use of the “Passive Abutment” (Fig. 25), which is a titanium machine-cut interfacial component/cylinder, offsets all the 5D inaccuracies, provided that the implant model is accurate. The passive abutment is cemented by the dental technician onto the fitting surface of the prosthesis, in the lab. The master implant model is used as a blueprint for the cementation. Based on our experience over the past 15 years of using passive abutments, the metal try-in procedure is not necessary, thus speeding up the fabrication of the final prosthesis.

Impression During Surgery

An impression of the implants is taken during the surgery, either at implant level for single implants or at abutment level for multiple implants. It’s imperative to make sure that the impression copings are seated all the way onto the implants (peritapical x-rays can be used for verification).

For an accurate impression, the open tray technique is recommended with the use of very hard additions and silicon impression material.

At the end of each surgery, preoperative impressions, impressions of the implants and bite registration are provided to the dental lab (Fig. 16). The dental technician mounts the implant models and starts the fabrication of the implant prosthesis.

Single Implant Reconstruction

For single implant cases the permanent, screw retained, all ceramic zirconia teeth are fabricated immediately with the use of prefabricated zirconia cores (Fig. 19). They are available in different sizes and shapes, according to the prosthetic platform of the implant in use and the available prosthetic space, between the adjacent teeth.

While the patient is waiting in the recovery room, the dental technician grinds and shapes the zirconia core and eventually bakes the porcelain on to it. Four to six hours later the permanent tooth is placed into the mouth of the patient and the prosthetic screw is torqued down to 45Nm. A peritapical x-ray helps to verify the perfect fit (Fig. 17) on the implant (Fig. 20).

Occlusion is checked and verified with the help of sq thin “schimshock” articulating paper. The prosthetic access hole is obturated with a paper point and the impression of the implants and bite registration are provided to the restorative dentist to record all the necessary modifications are made to the prostheses.

Multiple Implants Reconstruction

1) Temporary Teeth

For multiple implant cases (three unit bridges to full mouth reconstructions), the temporary screw retained teeth are fabricated by the in house dental lab within five to six hours and are placed again in the mouth of the patient on the same day.

Providing the temporary teeth are immediately not only a great convenience to the patient but is also the best “diagnostic tool” for the restorative dentist to record all the necessary information for the fabrication of the permanent teeth. If needed modifications are easily made to the acrylic teeth either directly in the mouth or in the dental lab.

The patient should be evaluated for esthetics, phonetics and occlusion. Mastication, plane of occlusion and buccal corridors established. The “S” and “P” sounds are checked. The occlusal scheme is adjusted. For extensive cases the “mutually protected occlusion” (Fig. 21) is established which means that in centric occlusion, all teeth are touching but the posterior teeth have slightly heavier contacts compared to the anterior and on lateral and protrusive excursive movements the anterior teeth are touching/guiding and there are no other posterior “working” or “non-working” interferences (anterior guidance). X-rays are taken in order to verify the passive fit of the prosthesis.

Conclusion

By using layered angled implants as well as wide immediate molar replacement implants in a prosthetically driven fashion it is possible in most cases to avoid bone grafts, achieve high primary stability and treat patients with implants and passively fitting, screw retained teeth all in the same day (Fig 27). This reduction in treatment time, immediate function and cost saving leads to high patient satisfaction, therefore leading to implant acceptance by patients.
Intra-bone GPS
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IRIS-100
Implant Real-time Imaging System

- Real-time monitoring of drill position in a CT environment
- Ability to confirm positioning and parallelism with Virtual implants
- Avoids excessive radiation dosages to the patient
- Faster recovery with less trauma
- Safe and reliable results
- Educational versions available
under the high patronage of his Excellency the President of the Parliament of Lebanon Mr. Nabil Berry, Lebanese Dental Association known by its yearly BIDM (Beirut International Dental Meeting) has organized the 24th BIDM 2014 in collaboration with the Saudi Dental Society at BIEL in Beirut on 11-15 September 2014.

Pre-congress courses and workshops took place on September 10 at “USJ” - University St. Joseph - Faculty of Dentistry which was managed by Professor Ghassan Yared and Professor Carina Mehanna, under the supervision of Prof. Nada Naaman, Dean of Faculty of Dentistry.

On the first day of the event the attendees witnessed the ribbon-cutting ceremony followed by a tour of the exhibition exploring the latest dental technologies, equipment and services displayed by numerous key industry leaders and dental manufacturers.

The BIDM 2014 not only opened the doors to open-discussions and learning for the region but allowed the participants to build their skills and use the opportunity for networking by up-to-date knowledge and sharing experiences in the application of technology throughout the event.

President of Lebanese Dental Association, Prof. Elie Maalouf discussed during the opening ceremony: “With the theme “Planning for the Future” we encourage all Lebanese living in Lebanon and abroad, as well as all Arab and foreign dentists to attend this highly regarded meeting, in an effort to plan for a better future, not just scientifically, but culturally and politically.”

Prof. Maalouf further announced, “We should all denounce terrorism and extremist behavior. Attending this meeting and especially in this dire time will tell the world that we are strong together and will show them that no matter how hard they try to separate us we will always find a platform to meet. Lebanon is a small country but it has always reflected to the world a sense of modern civilization and openness to all cultures and religions. Lebanon does not tolerate extremist behavior and will not allow negative media to taint its reputation. Holding ambitious annual dental meetings with world renowned international and local speakers will show the world that we are competing with first world countries regarding scientific achievements.”
The general secretary of LDA, Dr Walid Khattar further declared during the ceremony: “Efforts exerted leading to this conference were colossal, we did very important team work as council members, committee members, professional and competent employees, to accomplish this conference. I hope that you will benefit from interesting scientific topics aiding therefore to dental medicine a new scientific corner stone.”

The conference further proved to be a vital platform for the participants to share ideas, explore the potential of new advances in technology and foster closer ties. The BIDM 2014 gathered under one roof of 6,000 square meters more than 4,500 dental professionals in the dental field.

The scientific conference brought together more than 2,500 dentists registered to the event program from Lebanon and the region and more than 1000 have been registered as visitors to the exhibition area. This year, despite the difficult situation in the region, the event gathered 56 highly esteemed guest speakers from 16 countries around the world (USA, India, France, Germany, United Kingdom, Italy, Bulgaria, Libya, Greece, Spain, Lithuania, and from the Arab countries Kuwait, Sultanate of Oman, Egypt, Kingdom of Bahrain and KSA) in addition to an interesting panel of Lebanese talented lecturers will attempt to clarify during 3 exciting days some of the most important issues and dilemmas arousing today. They highlighted on areas of ongoing developments and frontiers of research challenges in treatment planning, clinical performance and sustainable measures that are essential for a long-term treatment success. The event also received sponsorship by major market players and dealers in the region and the world leading companies, more than 157 companies were part of a unique huge space offered this year.

The event came to a conclusion with 13 lucky draws sponsored by Lebanese Dental Association during the closing ceremony. Overall, The BIDM 2014 was a resounding success with nothing but positive feedback from the visitors.

The courses this year covered a variety of topics including: Endodontology, restorative dentistry, pedodontology, laser in dentistry, Surgery and implant loading. Each course received specific continuing education hours in collaboration with CAPP (Center for Advanced Professional Practices) which is an ADA CERP recognized provider.

For most cases, iRace sequence includes 3 instruments for finishes of ISO 30/.04*
Saliva and Oral Health

By Michael Edgar, Colin Davies & Denis O’Malley and contributed to by Mahbub Navazesh

Excerpt from Saliva and Oral Health An Essential Overview for the Healthcare Professional

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The presence of saliva is vital to the maintenance of healthy hard (teeth) and soft (mucosa) oral tissues. Severe reductions in salivary output not only results in a rapid deterioration of oral health but also has a detrimental impact on the quality of life for the sufferer.

An understanding of saliva and its role in oral health helps to promote proper communication among oral health care professionals of the problems arising when the quantities of saliva flow are decreased; this awareness and understanding is important to the prevention, early diagnosis and treatment of the condition.

There is an extensive body of research on saliva and saliva fluid. It has been used to indicate an individual’s susceptibility to developing caries, it has also been used as an indicator of various physiological and pathological changes which are mirrored in saliva fluid. The benefits of saliva as a diagnostic fluid is that it is easily available for testing and analysis. It can be used to monitor the presence and levels of harmful microorganisms and microorganisms.

The following article provides an overview of oral complications associated with salivary gland dysfunction and its implications on oral hygiene, diagnosis, clinical implications and management of xerostomia.

Xerostomia and Salivary Gland Hypofunction

Saliva plays a significant role in the maintenance of oral-pharyngeal health. Subepithelial depositions of a dry mouth (xerostomia) and objective evidence of diminished salivary output (salivary gland hypofunction) are common conditions, particularly in medically compromised older adults. They can result in impaired food and beverage intake, a sundry of oral disorders, and diminished host defence and communication. Persistent salivary gland hypofunction can produce permanent oral and pharyngeal disorders and impair a person’s quality of life.

Global estimates of xerostomia and salivary gland hypofunction are difficult to ascertain due to varying study design, differential saliva collection methods, and small sample sizes. However, overall, the prevalence of xerostomia and salivary gland hypofunction increases with age and affects approximately 60 million people aged 65 years and older.

There are multiple causes of xerostomia and salivary gland hypofunction, the most common being the inability of the salivary glands to produce enough saliva. The prevalence of xerostomia is nearly 100% among patients with Sjögren’s syndrome taking adults 65 years and older.

Estimates of the prevalence of xerostomia in adult ambulatory and nursing home populations range from 16-72%. Comparing the prevalence of xerostomia associated with the percentage of adults with these conditions who complain of xerostomia has not been demonstrated. A mentioned general estimate of approximately 50% xerostomia prevalence among adults 65 years and older.

Approximately 80% of all persons over age 65 have at least one chronic condition and 50% have at least two. Hypertension is the most common chronic condition, followed by diabetes, arthritis and cancer. The presence of diabetes, arthritis and cancer can have a negative impact on salivary gland hypofunction. The dysfunction of salivary gland hypofunction leads to complaints of xerostomia in older adults.

Clinical implications of xerostomia and salivary gland hypofunction

Subjective responses and questionnaires

The establishment of a diagnosis of xerostomia and salivary gland function is often based on patients’ complaints and can be advanced with the use of questionnaires. It should be noted that a patient’s presenting complaint may not be dry mouth in spite of the presence of salivary gland hypofunction. Therefore, lack of complaint should not be perceived as evidence of adequate saliva secretion. Many of the common oral symptoms associated with xerostomia are associated with mealtime: altered taste, difficult eating, chewing, and swallowing, particularly dry foods, and especially without drinking accompanying liquids. Patients complain of impaired denture retention, halitosis, reticulitis, and intolerance to acidic and hot foods. Other symptoms associated with xerostomia is also common, since saliva output normally reaches a peak during waking and may be exacerbating by mouth breathing.

General oral examination

Extraoral findings associated with salivary gland hypofunction may include dry and cracked lips that are frequently moisturised with Candida species (angular cheilitis). Visible and palpable atrophy of the salivary glands may occur secondary to salivary in- fections or obstructions (e.g. bacterial parotitis and Sjögren’s syndrome). A swollen parotid gland may displace the face and extend laterally away from the angle of the mandible, whereas an enlarged submandi- pharyngeal gland is palpated medially to the posterior-inferior border of the mandible.

There are numerous introral complications associated with xerostomia and salivary gland hypofunction. Oral mucosal surfaces become desiccated and easily friable. The tongue loses its lubrication and papillae and will appear dry, erythemic, and raw with an ir- regular toothed surface. Mucosal tissues are susceptible to de- veloping microbial infections, the most common being can- didiasis. This introral fungal infection manifests itself as ery- thematous and hyperplastic salivary and oral mucosal proses and as pseudomembranous candidiasis, which pro- duces white plaques that can be removed from mucosal surfac- es. Clinicians can also observe a white or grey surface at the base of the tongue which is characteristic of Candida in the posterior-inferior area of the mouth. A second frequent problem is dental caries that occurs both on coronal and root surfaces. New carious lesions can develop on hard (teeth) and soft (mucosa) surfaces not normally affected (e.g. incisal edges of anterior teeth). Severe caries is more prevalent on the margins of ex- isting restorations. Edentulous and patients with partial and complete removable prostheses have a high incidence of chewing, swallowing, speech, and nutritional intake. Denture- bearing patients often report ery- thematous candidiasis and trauma- tical and painfull tissues due to trauma or tissue trauma.

Saliva Collection

One of the most common oral conditions that develop as a result of salivary gland hypofunction is xerostomia. The most common symptoms are dry mouth, difficulty eating, drinking, smoking, or performing oral hygiene for at least 5-6 days. The saliva flow rate is less than 0.5 ml/min using standardised techniques, one of the main symptoms for salivary gland hypofunction and presents a problem with patients taking medications.

In patients considered to be at risk for developing salivary gland hypofunction, it would be useful to monitor salivary flow rates over time. Most investi- gators consider a diagnosis of salivary gland hypofunction if the saliva flow rate is less than 0.5 ml/min. However, there are probably more indicative of sali-vary gland hypofunction compared- to stimulated salivary secretion. Since saliva is produced under unstimulated conditions during most of the hours a person is awake. The most com- mon collection technique for

CausEsof xerostomia and salivary gland hypofunction

• Medical conditions
• Oral diseases
• Systemic diseases
• Head and neck radiotherapy

Decay. Salivary hypofunction- associated root surface caries is a particular challenge to diagnose and treat and, there- for, identification of patients at risk will need to be taken to preserve the dentition.

With deficient remineralisa- tion, dental erosion is a more frequent occurrence in patients with salivary gland hypofunction. The development of dental erosions in the anterior mandible and especially without drinking occurs. Eccuslal and incisal surfaces are particularly vulnerable and traumatic forces can also undergo greater loss of enamel and dentine when there is insuf- ficient saliva to permit reminer- nalisation.

Gingivitis

The increase in salivary output during and immediately after meals can be substantial. Fluids are used in the lavage of the oral cavity and the removal of food and debris. Conversely, salivary gland hypo- function is frequently associated with oral inflammation, particularly in interproximal re- gions and beneath denture sur- faces, and can cause gingivitis.

Long-standing gingivitis may develop into periodontal disease with attachment loss, so patients with chronic hyposialation are at risk for developing gingival and periodontal problems.

Interestingly, most studies have not demonstrated significant altera- tions in concentrations or swallowing patterns in patients with Sjögren’s syndrome compared with healthy controls, which may be due to greater attention to oral health and more frequent use of professional dental services. In addition, while several studies have demonstrated significantal- tly greater numbers of caries- associated mutants streptococci and lactic streptococci in patients with salivary gland hypofunction compared with healthy controls, similar levels of micro-organis- mous associated with gingival inflammation were detected in both population groups. Therefore, the primary dental problem in patients with salivary gland hy- pofunction is compared with less risk (but greater than that for healthy individuals) for de- veloping gingival and periodon- tal problems.

Impaired quality of life

Many of the oral-pharyngeal sequelae of salivary gland hypo- function and chronic xerostomia lead to an impaired qual- ity of life. Dental and pharyngeal symptoms are often severe and can rapidly lead to systemic disease, particularly in medically com- plex patients. Dry mouth and friable oral mucosal tissues are more likely to develop traumatic ulcerations, particularly in un- wearing older adults, which cause pain and interfere with nutritional intake. Also, dysgenia- (taste function), dysphagia-
Techniques using sugar-free salivary glands, stimulation and the frequent use of fluids during eating, particularly for dry and rough foods. Eating and swallowing problems secondary to salivary gland hypofunction can impaire the intake of fibre-rich foods, restricting some older adults to a primarily soft and easily chewable diet, affecting salivary flow rate, oral microflora and periodontal health.

Maintenance of proper oral hygiene and hydration (water is the drink of choice) are helpful. Several habits, such as smoking, mouth breathing, and consumption of caffeine-containing beverages, have been shown to increase the risk of xerostomia. Limiting or stopping these practices should lessen the severity of dry mouth symptoms. A lowsugar diet, daily topical fluoride use (e.g. fluoride toothpaste and mouth rinses), anti-pseudobacterial mouth rinses, and use of sugar-free gum or candy to stimulate salivary flow, help to prevent dental caries.

Patients should be instructed on the frequent use of fluids during eating, particularly for dry and rough foods. Eating and swallowing difficulties that develop can impair social interactions and may cause some patients to avoid social engagements. Dysphagia increases susceptibility to aspiration pneumonia and coliculosis of the lungs with Gram-negative anaerobes from the gingival sulcus.

Management of xerostomia and salivary gland hypofunction

The initial step in the management of xerostomia is the establishment of a diagnosis. This frequently involves a multidisciplinary team of health care providers who communicate effectively, since many patients have concomitant medical conditions and frequently experience complications of polypharmacy. The second step is scheduling frequent oral health evaluations due to the high prevalence of oral complications.

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Robert Pauley, Jr., DMD

Dr. Pauley has been practicing dentistry in the Atlanta area since graduating from the University of Kentucky College of Dentistry in 1988. Currently enrolled in the Advanced Dental Implant Studies, Dr. Pauley is a Fellow of the American Academy of Implant Dentistry and a Fellow of the International Congress of Oral Implantologists.

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The bone pattern and periodontal ligament space surrounding the damaged tooth. In addition, the 3D scan, taken at a 5 cm x 5 cm field of view and 300 voxels, allowed us to rule out buccal or palatal plate fractures before finalizing the treatment plan. The various voxel settings let us select the best exposure time to image the structures we desire to view. This would not have been possible in the past with a panorex or digital 2D radiograph system.

The fact that we were able to provide the patient and her parents with a three-dimensional CBCT of tooth #9 gave them the opportunity to see and understand what was going on under the surface; ultimately resulting in positive acceptance of the treatment plan. I find that the CS 8100 3D unit gives me an incredible level of detail with actual size images that I can view from any angle or cross-section to get the best possible diagnostic image. CS Solutions (CS 5900 intraoral scanner, CS Restore software and CS 5000 milling unit) allows my office the opportunity to fabricate same-day permanent restorations. My patients appreciate the fact that our office is staying up to date with new available technology and giving them a safer environment with less radiation.

clar Vivadent e.max shade A1 size 12 ceramic block. We tried in the crown and took a digital PA radiograph to verify the margination, and made a slight occlusal adjustment on the lingual surface. The patient and parents were pleased with the appearance of the unglazed product. We polished, glazed, and added a slight white line on the buccal of #9 to mimic natural tooth #8. The crown was fired in the Ivoclar Programat Oven on e.max glazing setting. After a final try-in, the crown was cemented in place using variolink translucent base and catalyst. We cleaned off the excess cement, verified the final occlusal scheme, and captured a final periapical image verifying cement removal (Fig. 8).

Post-operative instructions were given. The patient and parents were advised to call immediately if there was sensitivity, swelling, questions or concerns. I spoke with the parents and checked on the patient one day and one week postoperatively. She was proud of her new tooth and said it felt “awesome” (Fig. 9).

Testimonial
Carestream Dental products helped me gather valuable clinical information, diagnose, monitor treatment status, and provide better care for this patient. The digital radiographs initially captured by the CS 8100 3D to evaluate the tooth were clear and beneficial to determine fracture and position of nerve tissue. This clarity allowed us to see

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9
New 3Shape advisory board develops plan to improve patient care

By Dental Tribune International

COPENHAGEN, Denmark: 3Shape, a global provider of digital 3-D solutions for dental laboratories and dental clinics, has formed a dental advisory board made up of 12 prominent dental professionals from around the world. The new board will provide the company with insight and direction in digital technology and product development, as well as help the company move towards its goal of improving dental patient care.

“The 3Shape Dental Advisory Board provides 3Shape with a unique opportunity to work with the dental industry’s top digital experts to develop our technology and solutions and better answer real needs for dentists. Our goal is to improve patient care. Working alongside these industry leaders brings us one step closer to this,” said Flemming Thorup, President and CEO of 3Shape.

The group met for the first time earlier this month in Copenhagen. Leading digital dentistry advocate and practitioner Dr Jonathan Ferencz from the US chaired the two-day meeting. The advisory board developed a four-point plan to achieve the following objectives: (1) to share best practices in the use of digital technologies; (2) to define actual needs for better dentistry based on cases and experience; (3) to support the research and development of and innovation in dental technologies; and (4) to promote education and awareness of digital dentistry.

All board members are respected leaders in the use of digital dental solutions and intra-oral scanning. Members work with a variety of the digital dental systems available on the market and not necessarily 3Shape’s own 3-D scanners and CAD/CAM software.

“The way dentists care for patients has changed dramatically over the past few years, with digital technology driving much of this change. Digital workflows enable dental professionals to work more efficiently and accurately, with digital case handling now in many cases surpassing analogue treatment in quality. The creation of the board will serve to improve patient care even further and strengthen 3Shape’s reputation as an industry leader. At the two-day meeting we got a sense of 3Shape’s passion not only from their willingness to listen to the expertise and insight of the professionals gathered, but also from their commitment to taking action and applying our recommendations to create better solutions and improve patient care,” said Ferencz.

The 3Shape Dental Advisory Board comprises 11 dentists and one dental laboratory owner. Board members are from Australia, Brazil, Denmark, France, South Korea, Spain, Switzerland and the US. Plans for the board include biannual meetings to ensure the success of the four-point plan, as well as to assess both the industry and 3Shape product development.

Ferencz likened support for 3Shape in the industry to that of IT giant Apple: “I think there is a passion that users have for 3Shape that is analogous to the passion that Apple users have for their products. 3Shape is driven by innovation much the same as Apple. And like Apple, they make products that are more useful, beneficial and incidentally, look cool too.”
Interview: “The Emirates Clinic is unique”

By Dental Tribune MEA

Dubai, UAE: The Emirates Group provides in-house medical and dental services for eligible staff members and their families via its own Emirates Clinic, located at the famous Sheikh Zayed Road in Dubai, UAE.

Dental Tribune MEA had the pleasure of interviewing the Vice President of the Dental Clinic Services, Dr. Brendan James Carr to find out more about the Emirates Dental Clinic Services and its uniqueness. The dental team comprises of dentists, dental hygienists and dental nurses who provide the highest standards of dental care for company staff and their dependents on a routine and emergency basis. Supported by dental hygienists and surgery assistants, dentists not only monitor dental health across the Group, but also participate in preventative dental programs and/or education for employees.

Dental Tribune MEA: Dr. Brendan Carr, thank you for your time. Could you share with us your background and the road to becoming VP at the Dental Clinic Services in Dubai?

Dr. Brendan Carr: I graduated from Glasgow University in 1988 and worked in the NHS for 5 years before accepting a position in a large private practice in the Gold Coast Australia. After working and living in Australia for 4 years I took up a position in a private practice in West London for a further 5 years. I moved to Dubai in 2009 having been very fortunate to be selected for a position in the Emirates Airline dental clinic which has been a great move and a clinic I thoroughly enjoy working in. I took on the role as VP of the clinic in March 2015 and am very fortunate to have an excellent team working with me to provide high quality dental care to our eligible patient base.

What makes the Emirates Dental Clinic Services so unique in comparison with the hundreds of clinics in UAE?

The Emirates Clinic is unique in the way that we solely look after eligible staff and their dependents of the Emirates Group and no one else. This includes our team of over 5000 pilots. We need to ensure that this important group are dentally fit and most importantly, fit to fly. The dental treatment for all our patients is covered under the company’s generous insurance scheme. In addition to this, the dentists are all salaried and as a result patients have the confidence that whatever treatment we recommend is done so with their best interests at heart and with no commercial motivation. The clinic has been open now for 19 years and in that time has grown from 2 dentists and 7 hygienists in order to support the expansion of the airline over the years with the aim of providing ethical, quality dental care in a safe environment as its core philosophy. Our clinic has also been internationally accredited by the Australian Council on Health Care Standards, which assesses the quality and safety of health care provided by clinics and hospitals. This is an award which we are all very proud of within the team and the Emirates Group as a whole.

How do you assess the level of dental medical services and awareness in UAE?

There is no doubt that the awareness of the importance of dental health is improving in the UAE and that the regulatory bodies such as the FDA are striving to ensure that all dental professionals within the UAE are following required standards. In the 5 years I have lived in Dubai, I am more aware of dental health promotions taking place and products being advertised. I believe much work is still required to make people aware of the links between smoking, diabetes and heart disease have with dental health.

What is your impression of the Dental Industry Market in its fast development especially in Digital Dentistry?

In the past 10 years there has been a dramatic increase in the amount of new products and technologies coming into the market and it can often be a challenge keeping up with all of these developments. I am of the opinion that as with all industries, we should embrace new technologies that will improve the service we provide for our patients and the working environment we work in. The digitalization of equipment whether it be with radiographs systems or CAD/CAM scanners is becoming more and more an integral part of the dental surgery. It is clear that when feedback has been provided to the manufacturers of problems being faced with new technology, this feedback is being listened to so as to improve the functionality of this technology. I am of the belief that the digital technology available nowadays justifies the investment required by dental clinics.

How do you and your staff keep up to date with the latest developments in Dentistry?

All of our staff are required to meet both the DHA continuing professional development standards and the CPD requirements of their home countries regulatory bodies. In order to achieve these requirements staff attend conferences and seminars both locally and overseas. We also have subscriptions to dental journals from around the world which we share within the group. We also take advantage of online CPD articles and reports.

What would you say is your dental philosophy? The message you would like to give to your patients?

My dental philosophy is to provide high quality, ethical dental care in a caring way that encourages patients to be regular attenders to ensure that all their dental needs are met.

Is there anything else you would like to add?

I would like to take the opportunity to thank you for your interest in our clinic and team and for the work you do in promoting dental education both locally and globally.

Inibsa dental: the specialists in dental anaesthesia

By Inibsa Dental

Inibsa Dental is a pharmaceutical company with over 65 years’ experience in the R&D and production of dental anaesthetics. With a production capacity of over 150 million cartridges a year, Inibsa Dental is positioned in its own right amongst the world’s leading manufacturers.

Inibsa Dental has the right anaesthetic to suit every patient. In their daily practice, dentists face a wide range of pathologies and patients. It is important to choose the appropriate anaesthetic for each treatment and patient considering factors such as the need for postoperative pain control, the required haemostasis, the risk of postoperative self-inflicted injuries and any existing contraindications to the selected local anaesthetic. Inibsa Dental provides a complete range of drugs to deliver safe, convenient and effective anaesthesia for every type of dental procedure and patient.

Inibsa Dental’s local anaesthetics are aseptically manufactured, silicone coated and have latex-free rubber components to ensure a smooth and painless injection.

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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 orthodontic surgery, but orthodontics itself.

Concept No. 1: You need to start with a seated conjugal position.

You will need to learn techniques to know when you have a seatable 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’ve 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 flaw it is impossible to establish a functional 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 orthodontic 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 axis-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 circumferential 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 11 shows a true hinges axis mounting. We have the true hinge axis, we have the axis-horizontal plane and we have the tooth 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. Figure 12

Diagnostic setup

The diagnostic setup setup we’ve been discussing is based on the VTO, 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. 15).

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 surgery itself.

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

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 genioplasty. Again, this is based on the axis horizontal and the true vertical line.

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 GABA is from YX. We then do our axis transfer and place the markers. Then we double check that we have the natural head position (Fig. 14).

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 15 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 setup (lateral to lateral) and two posterior segments (cuspids to second molars) 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 Figures 16a & b. 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 maxilla without causing the maxillary or mandibular dislocations. 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 centripetal stops, according to the axis position. That's why in Figures 17a & b 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 burger and find out that the patient has trouble finding a surgeon, or a maxillo-mandibular intercuspation with the joint seized.

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. 18), the facial changes include a shortening of the lower facial third. An adquate overbite has been established so a mutually protected occlusion can seen. The proper direction, where the back teeth separate by at least 2 to 3 mm has been established.

If we apply the second concept the surgeon can see in the mouth, we need to go to post treatment hinge-axis mounted models. Figure 19 shows the cone-beam data, both pre- and post-treatment. Note the double plates are intended to establish a stable platform to position the maxilla.

Surgery

One of the most important take-home 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 postsurgical orthodontics until 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 the steps sequentially. Figure 21 includes the pre-treatment surgical orthodontics.

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 in 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 intercuspation because of the incorrect torque of the anterior. The setup part of the procedure will give you this information.

Age

If an adolescent patient, you can do the presurgical 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 able 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 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 axis-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 you have to 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 workout 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 same dentist because it's the restorative dentist who obtains the final outcome. That's why we need to finish the case from where you left it.

It takes some time and it takes some effort to learn these procedures. But once you do learn them, and you have the technique, your surgical cases will be more stable. You have to focus 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 surgery encounters. Then you need to spend time in the diagnoses and workout.

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

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About the Author

Dr Theodore D. Freeland, DDS, MS, is a board-certified orthodontist in Garwood, N.J. After graduating from Algonquin College in 1987, he attended the University of Detroit Mercy, earning a dental degree in 1971 and his dental degree 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 Mercy as an assistant professor in 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.