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Functional & Cosmetic Excellence: Revitalization of a Proven Treatment Philosophy

By Dr. Straty Righellis, USA & L. Douglas Knight, USA

Functional and Cosmetic Excellence (FACE Tx™) is an approach to orthodontics treatment that establishes measurable treatment goals for six elements that form the basis of comprehensive, interdisciplinary, high-quality orthodontic care:

- Functional occlusion
- TMJ health
- Facial balance
- Optimal dento-gingival esthetics (smile design)
- Periodontal health
- Stability

For each of these goals, the originators of the FACE Tx™ discipline have defined specific elements that create a framework for the systematic evaluation of the esthetic and functional needs of each patient and a method to assess treatment results. These treatment goals are supported by reputable studies published in well-respected, peer-reviewed journals. Sharing these goals and the means to achieve them with an interdisciplinary team—the orthodontist, the dentist and/or other specialist(s)—provides you, the orthodontist, an opportunity to work with esteemed colleagues to create outstanding results for beauty, health and function.

Building successful practices is an important side benefit of this approach. Developing the skillsets required to manage and function within FACE Tx interdisciplinary treatment teams increases the complexity of cases one can treat. The collaborative interaction with experts in their respective fields (prosthodontists, periodontists, cosmetic and general dentists and surgeons), who ascribe to the same principles of tooth positioning and jaw function, creates a knowledge base to treat to predictable, on-time, optimal results while meeting and/or exceeding patients' expectations. As a result, one's referral net-work expands with resultant practice growth.

Worldwide Program of Instruction

FACE Tx offers one of the world's only postgraduate interdisciplinary continuing educational programs. Offered in numerous countries to university-trained orthodontists, it provides didactic instruction and hands-on experience. Through a series of 5 to 7 one-week sessions, a team of established educators and practitioners convey this unique curriculum. The associated FACE Tx fraternity incorporates a lifetime learning forum for thousands of doctors who have adapted FACE Tx principles to their practices.

The FACE Tx teaching staff builds on each participating clinician's knowl-

edge base. The full-time faculty—Drs. Jorge Ayala (Santiago, Chile), Renato Cocconi (Parma, Italy), L. Douglas Knight (Kentucky, USA), Domingo Martin (San Sebastian, Spain), Jeffrey McClendon (New York, USA), Straty Righellis (California, USA), and Carl Roy (Virginia, USA)—all manage active private practices and have extensive educational and clinical experience. The teaching faculty combines considerable years of skills and knowledge to formulate the FACE Tx approach to diagnosis, treatment planning and execution.

Defining Functional Occlusion, Smile Esthetics and Facial Balance

A number of orthodontic disciplines specify functional occlusion as a primary treatment goal, but few articulate criteria for its measurement or, for that matter, incorporate gnathological measurement protocols. Dr. Domingo Martin defines functional occlusion by what it is as well as what it is not. (See above.)

While functional occlusion serves as the foundation for the FACE Tx approach, the discipline further differentiates itself by integrating facial balance with dento-gingival esthetics for a comprehensive approach to diagnosis, treatment planning and execution. Dr. Renato Cocconi and surgeon, Dr. Micro Raffaini, have analyzed the standards for optimal facial balance and dento-gingival esthetics and have quantified the relationship of the inclination of the upper incisors with the alar base and the pedestal of the nose. These elements are important diagnostic findings for the development of specific treatment goals and metrics to assess the esthetic quality of treatment results. Dr. Jorge Ayala has quantified the range of optimal facial balancing elements of various ethnicities, which is essential to strengthening our ability to apply the highest standards of care across various cultures. From this data, he developed the first VTO- and STO- based orthodontic and orthognathic surgery treatment planning systems that incorporate soft tissue. From this research and these practicing orthodontists, along with the other clinicians in the group, comes a refreshing approach to lifelong learning that is not only didactic, but clinically realistic. It can be readily applied to one's day-to-day practice.

What the FACE Tx Course Teaches

During the comprehensive one- to two-year FACE Tx program instruction, participants develop a solid foundation of knowledge and skills in the following areas that is clinically practical:

- In-depth evaluation of joint func-



Figure 1a-d. The elements of a mutually protected occlusion: (a) optimal overjet and overbite in centric occlusion; (b) right working excursion; (c) right balancing excursion; (d) right protrusive excursion

tion and occlusion

- Mounting models with the most up-to-date instrumentation in simulating patients' jaw movements
- Latest analytical techniques to assess facial balance and esthetic smile design
- Multidisciplinary case diagnosis and computer assisted treatment planning (VTO)

- Efficient and simple treatment mechanics with self-ligating appliances
- Establishing one's own interdisciplinary treatment team
- Treatment and practice management strategies and marketing techniques to enhance one's interdisciplinary network; and
- Knowledge of the type patients one can treat successfully and language

to use that will offer patients choices. The FACE Tx teaching faculty shares proven techniques about how to adapt course instruction to clinical practice. There are several keys to successful treatment outcomes:

- 1) See everything before you begin

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treating the patient. This tenant mandates a complete and thorough diagnostic evaluation (seeing everything) from temporomandibular joint analysis to occlusal analysis to the elements that comprise a pleasing smile design;

2) Document specific treatment goals with specific assessment measurements, or the visualization of treatment outcomes for tooth and jaw joint positions and key aspects of facial balance and pleasing smile design;

3) Utilize skillfully engineered and exactly manufactured orthodontic appliances and develop efficient mechanical systems—from bracket placement to debonding—that require minimal patient cooperation, foster good hygiene and result in less chairtime (Figure 2);



Figure 2. Because of Ormco's long history of engineering and production excellence, the instructors of the FACE Tx philosophy have partnered with Ormco for the delivery of an appliance system that meets its requirements — Prodigy SL, an active-passive self-ligating appliance.

4) Undertake a never-ending quest for continued improvement in practice efficiency. Finishing on time with predictable outcomes allows one to provide optimal results and meet or exceed patients' expectations.

Conclusion

The FACE Tx philosophy incorporates comprehensive diagnosis and treatment planning, efficient treatment mechanics and the latest orthodontic advancements for treating each patient's dental, facial and gnathological systems. Its aim is a collaboration between the goals of orthodontics and comprehensive dentistry that incorporates interdisciplinary coordination.

This approach expands the network of professionals who share principles of tooth positioning and jaw function. Such collaboration greatly strengthens one's referral base as these colleagues understand the value of the orthodontic specialty and the specific value of FACE Tx. It promotes the viability of the orthodontic specialty through the

development and maintenance of viable practices that combine function with beauty. The ultimate aim of FACE Tx is to foster excellence in orthodontic patient care and treatment through education, research and collaboration. **DT**

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Dr. Righellis graduated from UCLA Dental School and received his orthodontic specialty certification from University of California, San Francisco. He maintains a private practice and serves as an associate clinical professor at the University of the Pacific and University of California, San Francisco. Dr. Righellis is a diplomate of the American Board of Orthodontics, is on the editorial review board for the American Journal of Orthodontics and lectures domestically and internationally on excellence in clinical orthodontics.

L. Douglas Knight, DMD, Louisville, KY

Dr. Knight received his dental degree from the University of Kentucky and was awarded a certificate in orthodontics and dentofacial orthopedics from New York University. Dr. Knight completed a comprehensive two-year clinical program in occlusion and orthodontics at the Roth-Williams Center for Functional Occlusion. In private practice, Dr. Knight is a diplomate of the American Board of Orthodontics, a fellow of the Academy of General Dentistry, an active member of the American Association of Orthodontists, and lectures domestically and internationally on new orthodontic techniques and interdisciplinary dentistry.



Photograph: (Komsan Loonprom/Shutterstock)

Avoiding common problems in tooth extractions

By Dr Kamis Gaballah, UAE

The last two decades have seen significant advances in restorative techniques and materials for dentistry. The latter, along with community-based preventive measures that aim to reduce the incidence of caries, have resulted in many patients living with functional teeth for a longer period. Yet, extraction of teeth forms the considerable bulk of the workload in oral surgeries owing to several factors, including the late presentation of patients with advanced dental disease, the presence of symptomatic impacted teeth, such as third molars, and the need to extract teeth for orthodontic or orthognathic treatment.

The extraction of teeth varies greatly based on the type of patient who is undergoing the procedure. For example, elderly patients with significant co-morbidities and on a complex combination of medications as compared with young healthy individuals render the procedure

complicated and require much more preparation with modifications during and after patient management. Additionally, extractions can range from a single, fully erupted tooth with favourable morphology to multiple misaligned, impacted teeth or teeth with challenging morphology. Local anatomy, such as tooth proximity to the nerve, maxillary sinus and tuberosity, also plays a significant role. These variations usually dictate who is to perform the extraction, as many general practitioners deal with less complicated cases of dental extraction in individuals regarded as healthy patients and may not feel comfortable operating on medically complex patients.

Complex extraction cases have been linked to a higher rate of postoperative complications; therefore, a cautious and systematic approach should be adopted that includes a detailed preoperative assessment to predict the potential difficulties that might arise during extraction. The documentation of all complicat-

Risk factors for IDN injury during LM3 extraction

Overall risk factors for IDN injury	Radiographic signs of increased risk of IDN injury
Full bony impactions	Apices of the LM3 located inferior to the lower border of the IDC
Horizontal impactions	Darkening of the root
Use of burs for extraction	Abrupt narrowing of the root
Radiographic risk markers	Interruption and loss of the white line representing the IDC
Clinical observation of the bundle during surgery	Displacement of the IDC by the roots
Excessive bleeding into the socket during surgery	Abrupt narrowing of one or both of the white lines
Patient's age	Representing the IDC most of dentists and surgeons

Table 1

ing risk factors along with their potential postoperative morbidities is crucial and should be included in the informed consent. In the following article, other useful tips will be provided that are not usually included in traditional textbooks or lecture notes to help general practitioners to perform safer extractions.

During clinical examination, it has been proven useful to observe the patient's build. Tall and muscular individuals tend to have a long ramus with a higher mandibular foramen, and this increases the possibility of failure of the inferior dental nerve block procedure if the former is not taken into account when determin-

ing the height of the injection site. This can be aided by tracing the inferior dental canal (IDC) to the mandibular foramen in the preoperative panoramic radiograph. The teeth of such individuals may also have

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longer and more curved roots and be embedded in highly dense, compact alveolar bone, and thus sectioning of the teeth may be required to ease the resistance. Racial differences should also be taken into account, as extractions of teeth from individuals of Afro-Caribbean descent tend to be more challenging owing to the hardness of their bone and divergence of roots in their molars.

The resistance of hard tissue should be expected, particularly if maxillary second and third molars are being extracted, as the potential for fracture of both the buccal plate and the tuberosity is relatively common when excessive force is applied with dental forceps. Fracture of the tuberosity may produce irregular sharp bony boundaries, significant soft-tissue laceration and potentially an oroantral fistula. If such risk factors are identified, tooth sectioning should be followed by elevation of roots with dental luxatomes instead of traditional elevators or forceps, which are known to deliver much higher force to the alveolar bone.

The indications for the extraction of impacted lower third molars (LM3) have been the subject of long-standing debate. Surgical procedures for the extraction of unerupted LM3 are associated with significant morbidity. This includes pain, swelling and the possibility of temporary or permanent nerve damage, resulting in altered sensation of the lip, chin, gingiva or tongue. Damage to the inferior dental nerve (IDN) is a well-known complication of surgical extraction of deeply impacted LM3. It should be acknowledged that this is not simply a loss of sensation; the damaged nerve can be responsible for a number of abnormal sensations, including sharp pain and abnormal response to stimuli, such as the perception of a light touch as a sharp stab. This can have a significant impact on quality of life for many patients.

Injury to the IDN may occur from compression of the nerve, either indirectly by forces transmitted by the root and surrounding bone during elevation or directly by surgical instruments, such as elevators. The nerve may also become transected by rotary instruments or during extraction of a tooth whose roots are notched or perforated by the IDN. The risk factors for IDN injury during extraction of LM3 are shown in Table I.

Preoperative radiographic investigations may include intra-oral images, such as occlusal radiographs; panoramic views of the jaws; and conventional CT or CBCT scans. It should be noted that risk-predicting signs in radiographs only indicate that there is an increased risk of nerve damage associated with the extraction of the corresponding third molar. However, they cannot actually prevent the nerve injury if the tooth is to be extracted. The effective strategies that may avoid or minimise the risk of injury to the IDN can be collectively categorised into two main sets. The first is the preoperative workup, which should include critical assessment of the need to extract the third molar, clinical examination and radiographic investigation, and the second is intra-operative measures, including proper selection of local anaesthetic agent, the injection technique, modification of the surgical procedure and measures to reduce the degree of potential injury to the nerve.

Most literature published in the last decade has given us sufficient evidence to suggest a significant risk of

damage to both the inferior dental and the lingual nerve owing to the nerve block procedure.

This injury may be related to the pharmacological properties of the agent itself or the injection technique. Studies have shown that the lingual nerve is affected approximately twice as often as the IDN, and one reason for this may be the fascicular pattern in the region where the injection is given. It also appears that about half of patients feel an electric shock sensation during injection.

There is a higher incidence of reports of nerve injury after the use of articaine and prilocaine. Although the reason for this remains unknown, it has been suggested that this may be because they are 4% solutions, whereas the other commonly used local anaesthetics have lower concentrations. Others associate the damage with the neurotoxicity potential of 4% articaine and 3–4% prilocaine. Hence, it is recommended that the use of such anaesthetics be limited to local infiltration. It has been claimed that needle contact with a nerve felt by the patient as an electric shock is related to injection injury. An obvious explanation is that the possibility of mechanical injury to the nerve is more likely in the case of multiple repeated attempts at the inferior dental nerve block procedure. Therefore, it is crucial that the operator achieve optimal pain control with minimal episodes of injection with minimal doses of anaesthetic agent.

The surgery should be planned according to the information obtained from the preoperative assessment process. The procedure itself should aim to minimise the manipulation around the IDC. Both should include the carefully planned access, tooth sectioning and elevation techniques. In many scenarios, the extraction of the whole tooth may carry an unavoidable risk of injury to the nerve, therefore intentional retention of parts of the tooth was proposed via a planned procedure introduced around 20 years ago called coronectomy. This is the removal of the crown of a tooth, leaving the root in situ. It is merely adopted to avoid or minimise damage to the IDN. The rate of complications after coronectomy is comparable to that observed after surgical extraction, except with a significantly low incidence of injury to the IDN.

It should be noted that both sectioning and coronectomy can be performed with a shorter incision, as the amount of bone removal required is minimal, thus minimising the postoperative morbidity. However, it cannot be performed in all cases in which the LM3 is close to the IDC and is certainly contra-indicated when the LM3 is decayed or its roots are associated with a pathology and should be considered with caution in severely inclined mesio-angular and horizontal impaction cases. The author does not recommend distal bone removal or retraction of the lingual flap with the intention of protecting the lingual nerve, as these may increase the risk of damaging the lingual nerve. It should be emphasised that incision may not extend beyond the distobuccal aspect of the tooth.

The other important aspect of the dental extraction procedure is the future replacement of the tooth to be extracted. The current trend of tooth replacement for both functional and aesthetic reasons is the placement of dental implants. The success of this treatment largely depends on the availability of healthy bone in suffi-

cient volume. Therefore, it is crucial for the dental practitioner not to compromise the alveolar bone during extraction of the teeth. Changes in the alveolar bone ridge after an extraction are inevitable. After all dental extractions, bone height and width always undergo dimensional changes. Bone does not regenerate above the level of the alveolar crest, that is, its height will not increase during healing. The buccal plate tends to shrink, shifting the crest of the alveolar ridge lingually, and often forms a concavity. Such changes are proportional to the amount of trauma to the soft- and hard-tissue during the extraction.

An additional unfavourable change that may take place is the slow remodelling of the bone formed to fill up the extraction socket owing to lack of functional stimulation. The presence of poorly remodelled alveolar bone may compromise the stability and function of the future implant. Furthermore, studies show that the stripping and elevation of mucoperiosteal tissue produce a higher number of osteoclasts within the alveolar ridge and hence greater resorption and shrinkage are seen after the classical surgical or the traumatic extraction of teeth.

The preservation of alveolar bone for future implant placement may be achieved by avoiding unnecessary

bone removal and stripping of the periosteum during surgery, as well as performing a surgical alveolar bone preservation procedure. Bone removal can be largely avoided or minimised through modification of the traditional extraction technique.

The first such modification is the use of dental periostomes and luxatomes to gently strip the periodontal ligament fibres and widen the socket without causing cracks or fracture of the cortical plates, as commonly encountered when using dental forceps or the bulky elevators. The use of such gentle instruments also eliminates the need for elevation of mucoperiosteal tissue. However, it should be noted that the safe use of these instruments requires adequate training and should be encouraged during undergraduate clinics. Clot stabilisation through light packing of the socket with collagen sponges may help to minimise clot dislodgement, as well as accelerate the healing process and bone regeneration.

The second strategy is the alveolar bone preservation procedure. This includes packing the extraction socket with different fillers, such as osteoinductive or osteoconductive materials, like autogenous, natural or synthetic bone grafting materials that support the alveolar socket

walls, thus preventing their collapse and shrinkage. It should be noted that this intervention can only slow down the post-extraction changes to improve the success of the dental implant, but cannot stop them altogether.

Finally, post-extraction care should include an explanation of the healing process and potential symptoms encountered after such procedures. The prescription of medications should be limited to non-steroidal anti-inflammatory drugs in most cases and imprudent use of antibiotics or socket dressing should be avoided. [10](#)

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