Saliva and Oral Health

By Michael Edgar, Colin Dawes & Denis O’Mullane

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The presence of saliva is vital to the maintenance of healthy hard (teeth) and soft (mucosa) oral tissues. Severe reduction of 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 awareness among oral health care professionals of the problems arising when the quantity or quality of saliva is 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 as a diagnostic fluid. It has been used to indicate an individual’s susceptibility to developing caries; it has also been used to reflect systemic physiological and pathological changes which are mirrored in saliva. One of the major benefits of saliva as a diagnostic fluid is that it is easily available for non-invasive collection and analysis. It can be used to monitor the presence and levels of hormones, drugs, antibodies, microorganisms and ions.

Factors Influencing Salivary Flow Rate and Composition

The following article provides an overview of the differences in flow rate and composition between unstimulated saliva (secreted continuously in the absence of exogenous stimulation) and stimulated saliva (secreted usually in response to masticatory or gustatory stimulation), the factors influencing salivary flow rate and composition, and their physiological importance.

Unstimulated saliva

Unstimulated whole saliva is the mixture of secretions found in the mouth in the absence of exogenous stimuli such as tasters or chewing. It is composed of secretions from the parotid, submandibular, sublingual, and minor mucous glands but it also contains gingival crevicular fluid, desquamated epithelial cells, bacteria, leukocytes (mainly from the gingival crevice), and possibly food residues, blood, and viruses.

Several large studies of unstimulated saliva flow rates in healthy individuals have found the average value for whole saliva to be around 0.3-0.4 ml/minute, but the normal range is very large and includes individuals with very low flow rates who do not complain of a dry mouth. Such a broad normal range makes it difficult to say whether or not a particular individual has an abnormally low flow rate. Unless saliva is almost completely absent, patients can be said to have a dry mouth (xerostomia) only on the basis of their subjective symptoms. However, a flow rate of <0.1 ml/min is considered objective evidence of hyposalivation.

Whether the flow rate is high or low is much less important than whether it has changed adversely in a particular individual. Physicians will often take a patient’s blood pressure as a yardstick for future measurements. Dentists, however, do not routinely measure the salivary flow rate, so that when a patient complains of having a dry mouth, it is impossible to judge whether or not a genuine reduction in flow has taken place. It would therefore be very advantageous if dentists included measurement of salivary flow as part of their regular examination. Just as there are individuals with very little saliva but without discomfort, so there are others with flow rates within the normal range who feel that their mouth is drowning in saliva. This problem is often due to difficulty in swallowing, rather than to a genuinely high flow rate.

Factors affecting the unstimulated salivary flow rate

• Degree of hydration – This is potentially the most important factor. When body water content is reduced by 8%, the salivary flow rate decreases to virtually zero.

• Body posture – Flow rate varies with position and a person who is standing or lying will have a higher or lower flow rate, respectively, than when seated.

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• Biological rhythms – Circadian rhythms are rhythms with a period of about 24 hours and include the rhythm in body temperature and in salivary flow. The body temperature and the flow rate of saliva peak during the late afternoon but the flow rate drops to almost zero during sleep. This circadian rhythm also has important clinical implications for the timing of oral hygiene. The most important time to clean the teeth is probably at night before going to sleep, since the presence of plaque and food debris and a greatly reduced salivary flow during sleep provide optimum conditions for progression of dental caries.

• Functional stimulation – Further studies are needed to clarify whether regular stimulation of salivary flow, as by use of chewing gum, leads to an increase in the unstimulated flow rate, although there is evidence that it increases the stimulated flow rate.

Stimulated saliva

This type of saliva is secreted in response to masticatory or gustatory stimulation; several studies of stimulated salivary flow rates have been done in healthy populations and show a wide variation among individuals. Many factors influence the stimulated salivary flow rate which, for whole saliva, has an average maximum value of about 7 ml/minute.

Factors affecting the stimulated salivary flow rate

• Chewing gum – Research shows the flow rate is high initially but after about ten minutes, as the flavour and sweeteners leach out and only the gum-base remains, it falls to the rate obtained by chewing gum-base alone, namely to two to three times the unstimulated rate. This increase in salivary flow during gum chewing can be maintained for as long as two hours and this may be very beneficial to those with a dry mouth. Even after two hours of gum chewing, the salivary glands do not become ‘exhausted’ and introduction of a fresh piece of gum causes a secretory response similar to that initially.

• Mechanical stimuli – The action of chewing, in the absence of any taste, will itself stimulate salivation but to a lesser degree than maximum gustatory stimulation with citric acid.

• Gender, gland size and unilateral stimulation

Most studies have found that females have lower salivary flow rates than males and a recent study showed that in females, the sizes of the major salivary glands are smaller than in males. Additionally, if one habitually chews on one side of the mouth (for instance with chewing gum), most of the saliva will be produced by the glands on that side after the initial tasters in the gum have been leached out.

• Age – Many elderly people receive medication and the greater the number of drugs taken, the greater is the tendency for reduction in salivary flow.

Salivary flow rate and oral health

The unstimulated flow rate is more important than the stimulated flow for oral comfort, since only a small fraction of the day (54 minutes in a group of dental students) is spent eating. However, stimulation of the glands through mastication is beneficial in terms of promoting clearance of food from the mouth and may help by causing an increase in the unstimulated flow rate, although further studies of this are needed. A study has shown that two sugar-free chewing gums, one containing chlorhexidine, used by a group of ‘frail’, elderly, dentate subjects over a one-year period, led to improved oral health and a statistically significant 55-100% increase in their stimulated flow rate. This suggests that if the glands are stimulated regularly, their secretory ability may increase. Unfortunately, unstimulated flow rates were not measured in that study.

Carbohydrate clearance from the oral cavity

One major role of saliva is the clearance of carbohydrate from the mouth. The more rapid the flow, the faster the carbohydrate is cleared. This is true whether the saliva is unstimulated or stimulated, for example by chewing gum. If the gum contains sweeteners such as xylitol or sorbitol, which are minimally metabolised by plaque bacteria, then the increased salivary flow will be very effective in clearance of cariogenic carbohydrates remaining from previously consumed food.

The composition of saliva

The composition of saliva is affected by many factors, such as the type of salivary gland producing the saliva. For example, most of the amylase in saliva is produced by the parotid glands while blood-group substances are derived mainly from the minor mucous glands.

Factors affecting salivary composition

• Flow rate – The main factor affecting the composition of saliva is the flow rate. As the flow rate increases, the pH and concentrations of some constituents rise (e.g. protein, sodium, chloride, bicarbonate), while those of others fall (e.g. magnesium and phosphate).

• Duration of stimulation – When the salivary flow rate is held constant, the composition of the saliva depends on the duration of stimulation.
Clinical and diagnostic advantages of PreXion 3-D imaging system

By Dan McEwen, DDS

For nearly 100 years, dentists have relied on 2-D radiographic imaging for diagnosis and treatment planning. With the 1990 introduction of cone-beam computed tomography (CBCT), all dentists now have tools available for more accurate diagnosis and treatment.1

The ability to look at a tooth in any direction and orientation, as well as in 5-D, eliminates much of the guesswork commonly experienced with 2-D radiographs.

We have been limited in most cases to only a buccal-lingual view provided by periapicals, bitewings and panoramic radiographs with the occasional axial view of an occlusal film. Medical CT scans and images began in the early 1970s and were sometimes used by dentists during our first multiplanar views.2

The adoption of 3-D cone-beam imaging is appropriate and has important advantages for all modalities of dentistry. From every specialist to the general dentist, the increased amount of radiographic information as well as increased accuracy will aid in the most sound diagnostic possibilities.

CBCT description

CBCT is a single or partial rotation of an X-ray source around the head, capturing X-rays on various flat panel arrays and sensors. The information is converted to a series of axial slices by computer tomography and stored as virtual anatomy in the computer.

With the use of sophisticated software, the dentist is able to view information in several different views, including: axial slices (head-to-toe orientation), coronal slices (front-to-back orientation), sagittal slices (side-to-side orientation) all known as multiplanar reconstructions (MPR). The thickness of each slice can be varied to include more or less information.

Because the voxels (volumetric pixels 3-D) are isotropic, other MP images can be generated by slices drawn at an angle, curve of thickness through the scan to view areas critical to the final diagnosis.5,6

The final view offered by CBCT is a 3-D view that can be rotated and viewed in any direction.

Once again through software manipulation, 3-D images can be viewed as conventional radiographs, maximum intensity projections (MIP), soft-tissue projections and a variety other views.

This nearly endless ability to manipulate the data aids in the diagnosis and identification of disease, nerve canals, sinus morphology, dental carries, bone density, fractures, endodontic pathology, implant placement criteria, periodontal defects, bone pathology, fractured teeth, iatrogenic trauma, TMJ morphology and disease, third-molar position and many more healthy or diseased conditions.

Early CBCT adoption with implants

The first and primary use of CBCT for early adopters was implant placement. As the scope and the value of the information became better known, dentists of all branches began to see the value of MPJBs and 3-D renderings including periodontics, endodontics, oral surgery, treatment of TMJ, orthodontics, implantology and general dentistry.7,8

Clinical peripical and panoramic radiographs for the placement of implants can be misleading with elongation, foreshortening, superimposition and geometrically incorrect data.9 A look at the implant in the periapical shows no obvious disease to an existing integrated implant. Clinically, a buccal fistula was present with exudate and slight pain. The CBCT scan (Fig. 1) reveals a more accurate view showing a buccal defect on a sagittal MPR. A surgical flap revealed a dehiscence of the coating of the implant. Removal of the foreign body resulted in an asymptomatic and healthy patient.

The evaluation of the available bone for the initial implant placement can be crucial for the long-term success of the case. If there is inadequate bone available, grafting may be a necessity. CBCT studies render the most accurate information available at a low radiation dose. The periapical shows an obvious lack of bone height, but does not show the buccal-lingual dimensions or an accurate view of the sinus morphology (Fig. 2).

The MP view of the CBCT shows all necessary measurements to perform the sinus lift and grafting with the immediate placement of the implant fixture (Fig. 5). Three-dimensional views show the floor of the sinus and any soft tissue pathologies (Fig. 4). Having accurate measurements in all dimensions is a advantage of CBCT scanning.

CBCT and endodontics

Endodontics is a field that is rapidly adopting the use of CBCT and for good reason. The inherent geometric deficiencies of 2-D radiographs make the CBCT scan a valuable adjunct to identify the root morphology in both 3-D and MPR. The typical peripical will show superimposed canals in the anteriors, bicuspids and molars as well as unwanted bone densitis both buccal and lingual to the affected tooth making the image quality poor.

The ability to view MPR slices in cross-section, long axis and oblique directions gives the ability to follow all canals in any direction and show their relationship and measurements to other known structures. This virtual tour of the root morphology is a great benefit to the final treatment outcome (Fig. 5).

Post root-canal infection can be difficult to diagnose with the standard periapical. The endodontic fills may appear to be normal even though other clinical findings and symptoms are abnormal. The patient presents several months post root-canal treatment with pain on palpation and pressure and avoids this side of the mouth.

A periapical radiograph shows minimal pathology (Fig. 6). The roots appear to be filled and a small puff of sealer extends through the apex of the mesial roots. The distal root structure and fill appear normal. There is little indication of periapical radiolucency or loosening of the periodontal ligaments of the mesial roots.

A CBCT scan reveals a completely different picture. The coronal MPR reveals a short fill near the apex of the mesial root lingual and a large radiolucency (Fig. 7, 9) not visible on the periapical radiograph (Fig. 6).

Missed canals are difficult to see in a buccal-lingual projection of the periapical radiograph as one canal is superimposed on the other (Fig. 9). Often, as viewed in this radiograph, we see periodontal pathology with an apparent normally filled canal. CBCT scans allow dentists to look for pathology in MPR planes to identify the actual problem before invasive procedures are performed on the patient. The axial view shows a lingual canal exists and is untreated. The coronal view confirms the diagnosis and treatment can be completed (Fig. 10).

Today’s endodontists, as well as general dentists, are benefiting from the diagnostic capabilities of the high-resolution CBCT scanners available over conventional 2-D peripical.14

Oral surgery

Oral surgery, with its inherent invasive nature, can be better served using CBCT with MPR as well as 5-D images. The ability to perform virtual surgery is a benefit to both the doctor and the patient. Doctors have the advantage of seeing morphological and landmarks in real time and space with accurate measurements, using patients will gain a better understanding of the problems and the solutions their doctors are offering them.

Third-molar extractions can be risky based on 2-D and panoramic radiographs.

Fig. 1: Sagittal CBCT MPR showing bone defect at point of delusiveness of the implant coating.

Fig. 2: Periapical does not show the sinus anatomy or the width of the bone.

Fig. 3: MPR showing post op of sinus graft and implant placement.

Fig. 4: The 3-D CBCT showing anatomy of the maxillary sinuses.

Fig. 5: Axial MPR showing mesial buccal roots in first, second and third molars.

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These radiographs can often superimpose nerves and sinuses over root structures. Dentists using 2-D radiographs may often rely on experience to assess the risks of iatrogenic trauma. The use of CBCT with MPRs and 3-D images reduces any guessing as well as the chance for any permanent damage to the patient. With the adoption of CBCT, the judgment is based on solid evidence and the risk will decrease.

A panoramic of the superimposed third molars gave no solid evidence the canal lies between the roots. It is only with the use of CBCT and the MPRs that the nerve can accurately be seen traversing between the mesial buccal and mesial lingual root (Fig. 11).

Other surgical advantages include the comfort and position of supernumerary or impacted teeth. The panoramic images and the MPRs can aid in surgical planning for periodontists and orthodontists. As you review radiographs, doctors are able to get a sense of the anatomy that will aid in surgical planning. The images are a picture of the problem that is owned by that patient and much easier to understand by the layperson. Illustrating periodontal defects and pockets allows the patient to better participate in the process (Fig. 15).

The MPDs and the 3-D projections aid in surgical planning for periodontists, allowing for more accurate measurements and bone analysis prior to osseous surgery that doctors cannot get using the periapicals or panoramic images. Studies have shown that CBCT images are more accurate than panoramic radiographs. For the periodontist placing implants, the ability to measure bone density and avoid important anatomy is important.  

Orthodontics

Orthodontists are beginning to adopt large field-of-view CBCT. Recent studies show that linear measurements of bony structures are more accurate using CBCT and have less distortion than currently used methods of measurement: lateral cephalometric, posteroanterior (PA) and submentovertex (SMVT). Accurate measurements of tooth volume and tooth position can aid in accelerated treatment times and more precise treatment.

Along with tooth position, density of bone and size of arches, the orthodontist also has an accurate evaluation of the temporomandibular joint and position of the condyles. Impacted teeth are easily identified and position either buccal or lingual can be confirmed prior to movement or removal. Both MPDs and 3-D projections give the clinician a complete picture of the problems and the treatment course.

With a single CBCT scan, orthodontists can produce all of the information they need: panoramic, cephalometric, PA; SMVT, tooth size and volume, crowding evaluation in any plane, TMJ evaluation and airway analysis, all with both soft-tissue and skeletal information.

Conclusion

We treat our patients in 5-D, and now, with conebeam computed tomography, we are changing the way we diagnose from 2-D to 3-D. The addition of this technology will increase your diagnostic skills with better and more complete information at your disposal. As with any type of invasive diagnostic tool, clinicians should weigh the risk to benefit in using CBCT scans.

Judicious use of CBCT and knowledge of patient’s lifetime doses should always be a consideration as well as the availability of other diagnostic tests appropriate for the problems of the patient. When adopting new technology, training is paramount. Along with training comes the responsibility of the doctor to read and diagnose information from CBCT scans. Do not avoid CBCT from lack of knowledge; instead, take this opportunity to become a better diagnostician and radiologist. As you review radiology and pathology, your use of CBCT will aid in making the most accurate diagnosis and the most complete treatment plans.

Editorial note: References are available from the author.
Clinical digital photography. Part 1: Equipment and basic documentation

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By Dr. Eduardo Mahn, DDS, DMD, PhD
Universidad de los Andes
Clínica CÍPO Santiago, Chile

Abstract: The use of photography is becoming a standard in modern dental practice. The sharing of pictures is not only essential for communication between dentist, laboratory technician and patient, but also for communication between professionals, undergraduate and postgraduate students with their teachers and for documenting of clinical procedures in cases you want to show to both patients and work colleagues at scientific meetings. This article will describe the necessary equipment for clinical photography, explain its uses and deliver the foundation for basic documentation and structure for clinical cases. The second part will discuss the step by step documentation and show practical examples to improve your results.

Introduction

The first process of photography was presented to the world by Louis J. M. Daguerre at the Paris Academy of Sciences on January 7, 1839.1 In that same year, Alexander S. Wolcott, a manufacturer of dental instruments, designed and patented the first camera producing images on a silver-coated copper plate.2 Thanks to the graphical documentation that this allowed, it created the first dental journal, the American Journal of Dental Science.3

Due to the advancement in technology, we now have the privilege of having digital photography that allows an immediate view of the results and not having to wait for the processing of films as was the case of old movies, utilising silver halide ions in a gelatine emulsion on a strip of celluloid film to capture latent images. The advantage of digital images is that in addition to instantly seeing them through a viewfinder, there is less cost of developing film negatives and their storage is easy and fast. The power of viewing and saving images in computers also saves space and access to a database is almost immediate. By developing different virtual media files and almost universal use of email, information sharing is almost instantaneous anywhere in the world.

Because many of the procedures performed in dentistry represent established protocols that should be read, learned and then practiced, it becomes clear that photography aids us in teaching or explaining to our patients what we think are common, but to them are complex and mysterious procedures.

Digital Cameras

There are currently hundreds of cameras on the market. If we compare their features and capabilities, we can divide them into 3 groups:

Compact cameras (point and shoot), interchangeable lens cameras (mirrorless system cameras) and reflex cameras, SLRs DSLR (Digital Single Lens Reflex).

Initially, compact cameras (Figure 2) may seem appealing, but they have many limitations. They do not have a consistent image control, the position of the flash is not suitable for intraoral photography, distorted images from utilization of an insufficient macro lens in the wide-angle position, lack of manual exposure and focus problems. One of the biggest problems is the inability to change the lens, which gives its design for a wide angle or middle distance, causes distortion of perspective, as the clinician would have to stand close to the patient. This has another negative effect of poor lighting.4,5

The second group seems promising, but is still in development, and the third group, DSLR cameras (Figure 5), are those with greater advantages for clinical use, thanks to the sensor size and the many options in manual mode, lenses and flashes.

These cameras use a lens for both its composition and image capture. This design, which allows direct viewing and focusing without parallax error, is ideal for dental photography.4,6,7 One of the biggest advantages is the ability to exchange lenses. For example, you can take pictures of landscapes, portraits, and all dental treatments with the same camera, by just changing the lens. The same applies with changing the flash. All professional cameras more than meet the requirements. Semiprofessional cameras (with a more affordable price) that meet these requirements are for example Nikon D7000, D3000, D5200, Canon EOS SL4, 60D, 550D or other similar brands.

Flash

The discussion with which flash, macro lateral or twin flash light (Figure 4) or ring flash (Figure 5), is most suitable for intraoral photography, and has been a quite discussed topic for many years8.9

The ring flash light is the favourite amongst inexperienced dental photographers and it is considered the universal flash system for general macro photography.10,11 On the one hand, it is true that the greater the distance between the ring flash and the subject, the flatter, less texturised and refined the photos are, while a twin flash generates pictures with more texture, contrast and that look more alive.12

The macro lateral flash shows more variability in light direction, allowing certain details to be highlighted. The overall hue of colour, cracks and also transitions are best captured with the macro lateral flash.13 Probably the only drawback, besides its higher cost, is when photographing posterior regions, where access and space is limited. In these cases, the homogeneous light and easy handling of the ring flash has an advantage. In the author’s experience, when a clinician decides to begin clinical photography, a ring flash is more
than adequate; the extra cost of the macro lateral flash is not justifiable, since differences in the early stages of the learning curve will not be substantial. Then since they handle certain techniques, the macro lateral flash is a great contribution.

Lenses

Basically, macro lenses from 50 to 200mm in focal length are used for clinical photography. In the author’s experience, macro lenses of about 100 mm in focal length provide the ideal combination of magnification ability and convenience working distance for dental purposes. Teleconverters or zoom lenses can be used, but not recommended. The same goes for lenses with autofocus mode. If this is the case, the automatic mode must be switched off and put on manual. Focusing is done manually and moving the ring lens near a sharp image, and with small movements to and fro, achieves perfect focus. A high-quality lens is paramount to capturing crisp and bright photos. This aspect should not be compromised. It is ideal to have a magnification ratio of 1:1. In the author’s experience a good lens to start off with at a reasonable cost is the Sigma 105/1.2 EX DG macro (Figure 6), which is compatible with different brands of cameras. On the other hand, for the seasoned and professional photographer, who does not want to compromise quality, a Nikkor macro lens and the AF-S 105mm f 2.8 ED, NC, VR (Fig. 7), would be recommended, though costing more than doubled compared with the aforementioned Sigma.

Accessories

Retractors

To gain better access to the buccal cavity, better visualization of the structures of interest and that they are sufficiently illuminated, it is essential to have good lip retractors. They should neither be very uncomfortable for patients, should avoid reflections and ideally possess a certain capacity to stay in place and avoid having the dental assistant hold them, as is the case with Mirahold type retractors (Figure 8). In the case of a Span-dex type (Figure 9) or soft latex retractors from biocal Vividant OptiZlate (Figure 10), this does not happen and the picture can be taken without external help. Ideally, always choose the largest possible retractor for improved exposure of the structures of interest. The clinician can make the process less cumbersome by using petroleum jelly or cream on the patient’s lips before starting.

Mirrors

When taking pictures in posterior regions, mirrors are invaluable, since the angle of the buccal area doesn’t allow taking of direct photos. To avoid double images and to enhance the sharpness, quality mirrors are needed, ideally h台tonium. It is useful to have mirrors with long firm handles (Figures 11-15), in order to position your hands away from the objects of interest and avoid unwanted shadows. This is of particular importance when showing when showing the use of materials or objects near to the teeth. To prevent the mirror missing up, they must be at a temperature similar to that of the oral cavity. For this effect you can use hot water or any type of air heater. You should also ask the patient not to breathe through their nose. Another option is that the dental assistant gives a gentle stream of air to the triple syringe. It is noteworthy that these mirrors are very sensitive to fractures, blemishes, scratches or cracks, so they must be treated with great care by the staff.

Black background or contrasts

The second aspect to show in most of the most important in a buccal cavity overview of the oral cavity, starting from the anterior teeth. In the Figure 18 and 19, you can see two examples of a photo, the first badly taken and second well taken. In this case, interest should focus on the anterior teeth that need treatment. Therefore, there is no point taking a picture showing lips, facial hair such as moustache’s, lip retractors and excessively showing gingiva. These structures only distract from what is really important.

It is also easy to make errors in later rows and photos, an example of this is Figure 20, which shows that, in addition to an undereexposed area, the light is the picture dark, the angle is not right, you see the lips and the tip of the mirror. On the contrary Figure 21 is a better photo, having the proper exposure and no distracting elements and the correct angle was taken.

In the occclusal view, both mandibular and maxillary, one must keep two main points in mind. A good mandibular occlusal photo is far more difficult than the maxilla with several factors. Firstly, the tongue needs to be retracted, secondly, the range of movements is limited, the patient makes the clinician act quickly and without hesitation; thirdly, the angle of the photo.

In Figure 22 you notice, in addition to being inadequately illuminated, the axis of the arch is not centered with the photo, we can see the jaws and teeth as well as the edges of the mirror. In contrast, Figure 23 shows an image best achieved where the picture is centered, well lit, and without any other distracting structures.

Case report

One of the main objectives of the documentation process, is to express the treatment results to patients or students what steps were performed to reach certain results. It is also beneficial to graphically present and compare new and already established techniques. The following is simple case of two composite restorations with sectional matrices and a centripetal layering technique using an ex-tastor. It is an easy example of the detailed documentation and standardization that images should demonstrate.

Another objective of a systematic and thorough documentation is to have graphic material, either for patients to understand or for treatment results objectively, so they have no obscure treatment expectations. These types of aesthetically documented treatments will be discussed and presented with documented cases in a step by step manner in the next chapter of this series, in addition to discussing common mistakes and how to solve them.

Editorial note:

References are available from the author.

About the author

Dr. Muhm is a graduate from the University of Chile, School of Dentistry. He received the German DMZ in Munster, Westfalen Lippe five years later. The University College of Dentistry certified him as Implantologist in 2007. In 2008, he published his doctorate thesis in 2008 titled “Osteointegration of zirconia implants, an in vivo study” and got his doctorate degree in 2009.
Using Cone Beam (CBCT) in Implantology

By Dr. Alexander Luke

Abstract: Cone beam computed tomography (CBCT) is a diagnostic imaging technology that has changed the way in which dental practitioners view the oral and maxillofacial region, teeth and the surrounding structures. CBCT is designed in such a way that 3D images are seen without distortion and superimposition which is similar to CT imaging. The advantages of CBCT are: simpler image acquisition, lower capital cost and less radiation dose to the patient.

Introduction
Radiographic examination is an important diagnostic tool in dental implants treatment planning. Information obtained from a conventional or a digital radiography is limited by the fact that the 3D anatomy of the area being imaged is compressed to a 2D image. The superimposition of structures is again a major limitation of the 2D image.

Cone Beam Computed Tomography (CBCT / CBVT) is a 3D x-ray imaging technology that exposes the patient to an x-ray beam in the form of a cone which is revolved around the patient. The benefit that this has over a CT scan is that a CBCT scan requires significantly reduced exposure times and so exposes the patient to significantly less x-ray radiation. However compared to a 2D x-ray there is still an increase in dose and so consideration is still required when recommending a 3D view. The European association of osseointegration (EAO) have given guidelines which states that cross sectional imaging is beneficial in preoperative assessment and treatment planning of dental implants and that should not be a regular protocol post operatively unless needed.

A CBCT scan captures multiple images (ranging from 150 to more than 600) in a single scan with fewer artifacts when compared to panoramic radiography. 3D Images are ideal for planning the placement of implants. As with all x-ray procedures CBCT carries a radiation exposure risk to the patient and so it is necessary to ensure that the dose is kept to a minimum and will provided optimum diagnostic information resulting in improved patient care.

CBCT collimates the x-ray beam to focus on the area of interest known as the field of view (FOV). It is advisable not to radiate outside of the area of interest so it is very important that the CBCT system offers a choice of FOVs ranging from small to medium to large allowing the user to select the optimum FOV for the treatment. This function may not be available in all CBCT units however it is essential so that the user can select the correct FOV for the treatment and more important has available a small Field of View (for example 5.5 x 5cm) which is in fact suitable for...
the majority of dental examinations. At this level the effective dose is small enough to increases those examinations that can be justified to have a CBCT scan.

CBCT images are isotropic with ranges from as low as 0.076 mm to 0.4 mm. The images in different planes and the multiplanar reformatted images had led to achieve the level of spatial resolution accurate in measurements such as in implants site assessment.

Indications for CBCT in implants
1. To assess the quantity and quality of the bone in the edentulous area.
2. The relationship of the implants to the neighbouring areas.
3. For the placement of implants in the desired area.
4. In designing a surgical guidance template.

Limitations of CBCT in Implant planning
Crowns or metallic appliances in the mouth can cause artifacts of the 3D image. The metals causing artifacts can range from minimum to the extent that the image interpretation is difficult.

Conclusion
2D imaging has been serving the dental fraternity in their diagnosis and will continue to do in the future. The recent availability of 3D imaging using CBCT systems for treatment diagnosis and planning implant positioning gives the dentist more accurate information and improved patient care.

The Carestream CS 9000 3D has a FOV of 5 x 3.7 cm creating images with a resolution of 0.076mm. This resolution is beneficial for accurately planning implants and overall improved treatment.

CBCT images are isotropic with ranges from as low as 0.076 mm to 0.4 mm. The images in different planes and the multiplanar reformatted images had led to achieve the level of spatial resolution accurate in measurements such as in implants site assessment.

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Interview: Vanik Kaufmann explains the advantages of KaVo’s new ARCTICA CAD/CAM system

Not only has the proprietor of the dental laboratory CeraTech in Liestal near Basel been a CAD/CAM user from the very beginning but he also has provided valuable input into the technology’s development through his active participation in it. Recently he has become the owner of KaVo’s new ARCTICA system. We wanted get his first impressions from working with the system.

Kalvo Mr. Kaufmann, you recently started using KaVo’s ARCTICA CAD/CAM system. You have extensive experience with CAD/CAM systems. What do you consider to be ARCTICA’s particular advantages?

Mr. Vanik Kaufmann. First of all there is the stripped light scanner. I particularly like that it is a semi-automatic design. With fully automated systems I often encounter problems with cumbersome re-scans when the first scan was incomplete. Scans that require essentially no corrective work can be achieved with very little experience. In addition, it works extremely fast. And even in cases where the scan shows gaps the model can be repositioned accordingly, perhaps by tilting, and the software applies any subsequent corrections automatically.

And what are your experiences with the scanning unit? I really appreciate that it is a compact 5-axis system that not only uses blanks very economically but also that I am finally able to process metal, something that up until now was not possible with small systems.

Is zirconium dioxide still important nowadays? There are still dentists who request metal frameworks. When CrCo alloys are required, we have then externally made by selective laser sintering. When biocompatibility is required, it has to be titanium. We process a large number of titanium connecting bar and up until now had to have them fabricated externally.

Now we are able to do this in-house and the design is simple and fast by means of the software provided. How practical is the software? It is fantastically simple. E.g., during the design of an anterior bridge, the automatically proposed crown can be moved and rotated through key combinations which are considerably faster and simpler than with other solutions that require multiple key clicks. And its operation is intuitive to learn. Within half an hour of receiving it I was able to do a bar design without a hitch and without receiving any training. KaVo’s hotline with remote support is equally fantastic and useful especially in the early stages when one might have the occasional problem: These consultants are highly competent, they can log in remotely and point out mistakes on your own screen or give hints on how to do things even faster.

The multiCAD Software is equipped with open interfaces, but not every scanner supplier offers open interfaces. How much data transfer can you utilise? We are not only able to do this with manufacturers that provide STL files but also with others who still believe in the advantages of proprietary systems. We are using Rhino’s dental shaper for this purpose; it can convert all relevant data sets to compatible STL files. You also use a printer (Solidscope).

Are you using ARCTICA data in there as well? Yes. We have decided to do no longer do the wax coating for precious metal castings by hand as this is very simple and fast done in the KaVo software. We design the framework on the PC and transfer the STL data directly to the printer. The printer is very accurate and saves us a lot of work.

Besides KaVo’s blocks of titanium, zirconium, glass-infused ceramics and plastic, there is the option of using other materials. Do you use them? We have the open system and do both. Alongside KaVo’s materials we use blocks by Real-Life and Cad-Temp blocks by Vita. We fabricate our own plastic and wax blocks that we can use via the exchangeable holder.

Could you share your experience with the implant module? We fabricate connecting bars from titanium with bonded bases. We also use titanium bonded bases for our zirconium abutments since we have bad experiences with whole zirconium abutments with screw connection - they loosened over time. For lateral applications we also fabricate titanium abutments which we weld to the bonding base. The design of these abutments too is amazingly simple: One draws what one thinks.

Mr. Kaufmann, many thanks for this interview.

Contact Information
KaVo Dental GmbH
Alexia Valera
14th Floor Butana Ariaan Tower
Dubai Media City, UAE
Tel. +971 4 4332186
Mob. +971 50 1571411
E-Mail: alexia.valera@kavo.com
www.kavo.com/MEA
NEW: Philips Sonicare FlexCare Platinum
For outstanding cleaning, even deep between the teeth

Philips has the right sonic toothbrush for every cleaning need. The latest innovation is called Philips Sonicare FlexCare Platinum. Its innovative pressure sensor gives immediate feedback in a simple manner if too much pressure on the brush head minimizes the vibrations. This makes the Philips Sonicare FlexCare Platinum ideal for those of your patients who are worried about using too much pressure when cleaning with an electronic toothbrush. Nine individual settings and intensity levels thereby make adaptation to the individual cleaning requirements possible.

Pressure sensor
This innovative sensor gives simple and intuitive feedback if the brush head is pressed down too hard.

3 cleaning settings
- Clean – ensures optimal plaque removal (standard)
- White – removes discoloration of the tooth surface in 2 minutes, and the front teeth are whitened and polished in a further 30 seconds.
- GumCare – combines 2 minutes in the Clean setting with 1 minute of gentle gum massage for healthy gums.

3 intensity levels
Maximum comfort with the 3 adjustable intensity levels: low (for sensitive areas), medium and high. Each of the 3 intensity levels can be combined with each of the 3 cleaning settings.

Philips Sonicare InterCare brush head
Extra long filaments reach deep into the spaces between teeth and ensure an excellent plaque removal there compared to a manual toothbrush. For better tooth and gum health.

UV-Sanitizer
With the UV light technology from Philips, up to 99% of the bacteria and viruses¹ on the brush head are rendered harmless – in only 10 minutes.

Lithium-ion rechargeable battery
With 3-week working life

¹ E. coli, S. mutans and HSVI, HA
The Inman Aligner: A progressive approach to smile design - Part 2

By Dr Tif Qureshi

The following article is Part 2 in a series discussing the use of the Inman Aligner as a tool for minimally invasive cosmetic dentistry. The first article (published in DTMEA Nov-Dec 2013) demonstrated that standalone treatments offer patients an alternative to both fixed braces, which are unsightly and have long treatment times; and to expensive clear aligner treatments in suitable cases. This article will demonstrate that patients who desire a more traditional smile makeover can achieve beautiful results in a more progressive manner that allows them to make their choices along the way. This often results in virtually no removal of tooth structure and a treatment result with the responsibility of decision-making shared between dentist and patient.

Moreover, the subject matter of this article could potentially start one of the most controversial debates in cosmetic dentistry for years. We are not only discussing a radically different approach to smile makeovers, but critically a sharply different approach to the traditional methods of planning smile design.

What would you choose? Patients entering cosmetic practices are often assessed at the initial consultation. They have digital photographs taken and perhaps study models are made. Normally, dental imaging software is used to show patients what can be achieved. These ingenious programmes (see www.snapdental.com/AUS) can help patients realise what is possible. Naturally, care must always be taken when promising treatment results that are viewed digitally.

While computer imaging can be a very powerful tool to help the patient see the potential in his/her smile, I believe it also can make a patient focus on a certain prescribed goal that may not be the only way of satisfying his/her wishes. Dentists using imaging would ideally create a set of five to ten different outcomes of varying degrees of improvement to allow the patient to make a more informed decision. While ideal, it is not certain that dentists actually present different levels of treatment to their patients digitally. Even if they were able to see various images of their teeth, it can still be difficult for a patient to really see and feel the suggested changes in their mouth. One can question the ethics of allowing patients to commit to a potentially irreversible procedure based on 2-D photographs.

Three-dimensional wax-ups can also be very useful at this stage. If a patient is keen on the image, going to an additive wax-up can sometimes allow for a direct preview try-in using a silicone stent taken from set-up. Temporary material of variable shades can be tried in directly, without any bonding to allow the patient to see the proposed outline, form and overall aesthetics.

Despite this, veneers are often used to treat alignment issues and it is very difficult for patients to appreciate the alignment of their own teeth with wax-up or imaging. By approaching these cases with a different protocol in mind, a dramatically less invasive treatment plan becomes evident.

"We are not only discussing a radically different approach to smile makeovers."

The first step is to look at the patient's tooth alignment. Mis-aligned teeth often cause issues in gum heights, line angles, light reflections, shades and tooth length. Correcting the misalignment first can create a completely different perception of the apparent problems. Next, the teeth should be bleached. This can be done either immediately after the teeth have been aligned or preferably simultaneously. After alignment and bleaching, edge bonding (we term this the ABB concept) should be offered to improve the incisal edge outline.

This combination of treatments also works well because the Inman Aligner is a removable appliance and only needs to be worn 16 to 18 hours a day. This means simultaneous bleaching is very possible and straightforward. A recent study from Sweden indicates a cost-benefit advantage of treating patients with removable appliances in general dental clinics, rather than with fixed appliances at specialist orthodontists. The conclusion of this study is significant, since a popular choice amongst aesthetic dentists in the UK is removable orthodontics.

The cases outlined here highlight patients who, either at the start of treatment or for years, had originally wanted veneers and had a specific result in mind that only veneers could have offered quickly. They were all concerned about the degree of preparation required, so undertook alignment first. Then, part of the way through, started bleaching and very quickly changed their minds about what they wanted once they saw their own teeth improve.

Case 1 (Figures 1-8)
Laura was concerned about her very prominent central incisors. She wanted to have them straightened and had considered veneers. She had ruled out conventional orthodontics and invisible braces because she wanted a quick treatment and did not want anything stuck to her teeth, which is the reason that she had refrained from orthodontic treatment. Several years ago, she may well have had veneers placed.

On viewing her teeth before the occlusal photograph, it was quite clear that this would have involved massive preparation of the upper...
central teeth. Preparation would have been well into dentine and may have involved elective endodontics. Her lateral teeth would have needed little preparation, but the emergence profile would have been poor, creating unrealistic aesthetic and a possible periodontal risk later on. Instead, the alignment was completed with an Inman Aligner in ten weeks. Her treatment sequence is detailed below.

BACD-style digital photographs were taken and the amount of crowding was calculated using an electronic crowding calculator, which can also be done by hand evaluation of the patient’s study models. We measured the ideal curve and subtracted this measurement from the total mesio-distal widths of the teeth being moved. The results showed that there was only 1.6 mm crowding. This seemed less than one would have expected; the reason for this was that because the laterals were being pushed out, the arch was being expanded, thus creating space. It was clear from the photographs that despite the obvious crowding, there was some less obvious irregular wear. It was important to indicate this to the patient, as this would become more evident once the misalignment had been corrected. The patient was quoted for three incisal composite strips. She opted for an Inman Aligner with an incorporated expander. These expanders are a very handy way of creating extra space either to treat cases that are more complex or to use instead of performing interproximal reduction (IPR).

In this case, no IPR was performed. We planned to get nearly all space by using the midline expander. The patient was instructed to turn the midline screw once a week after one week of wear. Each turn is a quarter of a revolution and equates to 0.25 mm. At week six, bleaching was started with soft rubber sealed trays. After nine weeks, the patient had expanded 1.8 mm and her teeth were in alignment (As a rule, less than 2.5 mm expansion with an incorporated expander is easily tolerated).

Looking at her post-alignment result, the golden proportion, gingival heights and axial-inclinations had improved dramatically, all without a handpiece being picked up and in the space of nine weeks. What was very clear to the patient at this point was that she only needed some simple bonding to improve the incisal edge outlines. Without the use of an anaesthetic, the edge outlines were prepared with very slight roughening of the edge, bonding of hybrid composite on the load bearing edge and a microfill on the facial surface. The edges were then polished.

The patient was thrilled with the result we achieved using an Inman Aligner and some simple bonding. She described that when she had once considered having veneers, she had hoped for a similar result. There are still minor imperfections, but, in my opinion, these contribute to her natural beauty. There is a stark contrast between the treatment selected and the potential treatment approaches in this case. Where once a patient, who refused orthodontics, would have consented and received highly aggressive tooth preparations to achieve a correct alignment with veneers, now a removable aligner and some simple bonding were able to achieve a similar and arguably better result in less than three months with not a micrometer of tooth reduction needed.

Interestingly, the patient’s perception of her smile had changed dramatically. Owing to the improved line angles, whiter teeth and aligned gum heights, her eyes were now only drawn to the irregular outline caused by chipping and differential wear.

The patient then enquired about fixing the edges. We offered to bond the incisal edge with virtually no preparation. A hybrid composite (Tetric Flow, Ivoclar Vivadent) was placed palatally and incisally with a microfill on the facial surface. This was done in B0 and B1 shades to match the bleaching. The patient was delighted with the result and a wire retainer was bonded immediately.

Despite some clear deviations from her ideal simulated smile, the patient explained that she felt her smile after alignment was better than she had imagined her veneers would have been. Had veneers been placed, we could perhaps have corrected the golden proportion more fully, balanced the zirconium improved the canine outlines, widened the buccal corridors, etc. However, that was clearly not what the patient desired. Should she later decide that she does need further improvements, she can proceed with already straightened teeth. The ARB smile design is progressive and not sudden or rushed. In this manner, the patient is given the opportunity for decision-making in his/her treatment and the responsibility in choice is shared.
This patient presented with what she described as a “winky smile”. She had previously looked into the possibility of having porcelain veneers placed so understood some of the aims of smile design. However, on studying her teeth, it became clear that there was potential to pre-align first. Her upper right central was mesially rotated by approximately 15° and her laterals were slightly in-standing and mesially inclined. Furthermore, she had fairly stained teeth, with the canines two shades darker than the centrals.

On examining the occlusal view, the patient became aware of the extent of aggressive tooth preparation that would be required to place a veneer. She understood that her teeth needed to be aligned before the final decision on the next step in design.

An Inman Aligner was used over the period of eleven weeks to de-rotate the frontal tooth and to tip out the laterals. At week eight, bleaching was begun using 5% to 45-minute a day H2O2 gels. Simultaneous whitening is a very attractive part of aligner treatment, as it helps with patient motivation. After alignment, the case was re-examined. Once her teeth had been straightened, it became evident to the patient that her problem concerned edge shape, which had actually worsened with alignment owing to dif-ferential wear. In fact, the left central was 2.3 mm shorter than the right. It was very clear to the patient that only these incisal edges needed building in order to achieve the smile she desired.

For placement of the incisal edges at week twelve, no local anaesthetic was admin-istered. Other than slight roughening of the worn inci-sal edges of the upper left 1 and 2, no other preparations were needed. A tetric hy-brid composite (Tetric Flow, Ivoclar Vivadent) was built up free-hand on the incisal edge and palatal surface to match the outline of the other. A small amount of white opaque former was dotted to match the facial surface and was simply filled with a nano-hybrid composite (Ve-nus Diamond, Heraeus) for high polish. The compos-ite was placed vertically using rubber sticks (Potol, DENTALSMART DeTrey) to try to blend in with surface anat-omy to mask the join. The process was repeated on the lateral.

The patient was held in re-tention using her aligner and an impression was taken for a wire retainer to be fit-ten two weeks later. It was especially nice to retain the natural aesthetic charac-terisation of this patient. Cer-amic work, as beautiful as it can be, would certainly have changed her appearance more – some may say for the better, but that was not what the patient actually wanted. She wanted her own teeth to have correct length and look straighter and whiter.

Shared responsibility of treatment
The ABB concept can truly be described as minimally invasive. At the same time, it actively involves the pa-tient in the treatment, giving him/her a feeling of being in control and taking responsi-bility for his/her treatment. This has been proven to be of great significance when measuring patient satisfac-tion of treatment results.

There are many anecdotal stories about patients who had technically beautiful veneers placed but found that they simply did not meet their desires. The problem is that even with no-prepara-tion veneers, an irreversible procedure has been under-taken and this has been done mainly based upon the treat-ing dentist’s opinion, with the patient having very little input.

In my experience, every pa-tient that I have treated ac-cording to the ABB concept has accepted the result hap-pily, even though technically it might not be perfect from a smile design point of view. Nowadays, with rising levels of litigation, one would have to question the wisdom of selecting a treatment path that could result in conflict over one in which the patient participates in key decisions and sees his/her own teeth improve.

I believe this approach firm-ly sits alongside minimally invasive cosmetic dentistry core principles, which rec-ommend a more minimal invasive and patient-led ap-proach.

Conclusion
I understand the controversy in challenging the tradition-al approach to smile design, but new wave of minimally invasive smile design is vital when we are looking to give our patients what they actu-ally want. Preven-tively, if we can be, would certainly have eight to ten veneers, four times the cost and signifi-cant tooth preparation. Thus, a dramatic contrast in pathways has been created. If a patient is happy after alignment, whitening and minimal bonding, then this has to be viewed as a success. This UK tech-nique is now a significant new treatment discipline in itself and cosmetic dentistry will be better for it. After all, what would you choose to have?

Philips Sonicare FlexCare Platinum

By Philips

Philips Sonicare FlexCare Platinum is the latest innovation from the number one sonic toothbrush brand recom-mended by dental profession-als worldwide. The new Philips Sonicare FlexCare Platinum is uniquely designed to give patients an even deeper clean between the teeth, removing up to six times more plaque between teeth than a manual toothbrush.

Sonic technology
The innovative Philips Sonic-are FlexCare Platinum power toothbrush uses Philips Sonicare’s patented sonic technology to deliver an exceptional, deep clean between the teeth. Using a unique combination of high frequency and high amplitude, the Sonicflex Care Platinum produces over 30,000 brushstrokes a minute to create a dynamic yet gen-tle cleaning action. Its brush head moves with a side-to-side sweeping motion and a high filament tip velocity to gently drive fluid deep between the teeth and along the gum line.

InterCare – the innovative interdental brush head
The Philips Sonicare FlexCare Platinum features a new brush head with innovative anchor-free tufting technology and extra-long filaments designed to reach deep between teeth and remove more interdental plaque biofilm than a manual toothbrush.

The Philips FlexCare Plati-num’s brush head filaments are molded directly in the plastic housing allowing for a unique filament pattern and lengths designed to deliver an optimal and complete clean. As opposed to other brush heads that wrap filaments in metal loops implanted in the brush head before being cut to size from above, anchor-free tufting technology pulls filaments through the brush head until they are the right length and are then cut from below. This ensures that the filaments remain uniform in shape and can be rounded for a gentle yet effective clean.

Anchor-free tufting technology also allows for the brush head to be fitted with more filaments than traditional brush heads which can be arranged in various patterns to perform specific tasks:
- Reminder filaments – fade to remind the user to change the brush head after approximate-ly three months
- Along-the-gum-line fila-ments – remove plaque along the gum line
- Elongated filaments – reach deep in between teeth
- White filaments – polish and clean the surface of the teeth

The InterCare brush head is available in standard and com-pact sizes. The InterCare brush head is available in standard and compact sizes.

Brushing modes – an individ-ual brushing experience
Philips Sonicare FlexCare Platinum has three individual brushing modes and three intensity settings to give pa-tients greater control over their brushing experience and to deliver a cleaning action suit-ed to their specific needs. The toothbrush has three cleaning settings:
- Clean – standard cleaning for the whole mouth
- White – removes stains and helps whiten teeth
- Gum Care – gently stimu-lates and massages the gums

Additionally, three adjustable pressure maxi-mum control and comfort:
- Normal – the standard intensity for normal brushing
- Sensitive – a gentle intensity for sensitive teeth
- Extra soft – an extra-gentle intensity for an even softer brushing experience

Automatic pressure sensor
The new Philips Sonicare Fl-exCare Platinum also features an automatic pressure sensor which provides real time feedback, helping to ensure an optimal clean every time.

UV sanitizer
The Philips Sonicare FlexCare Platinum is also available with a UV sanitizer to help reduce the bacteria build up on tooth-brush heads.
Case presentation: OptiBond™ XTR

By Claude Finelle

This 83-year-old patient, who was in good health, came for a consultation to “improve his smile”.

This was motivated by jokes made by his grandchildren about the condition of his teeth. Primarily, the 6 anterior maxillary teeth were involved. There was no particular request to lighten the smile.

During the first consultation, the clinical examination revealed the presence of numerous cervical lesions, as well as fractures of the incisive edges of 11 and 21.

The above-mentioned fractures of the free edges of the central incisors, the presence of a carious lesion on the mesial surface of 11, an old composite on the mesial surface of 21 and the patient’s complaint about the elongation of the two centrals led us to opt for two all-ceramic e.max crowns made of feldspathic ceramic reinforced with lithium disilicate. Taking into account the patient’s age, this therapeutic choice was not hindered by the proximity of a high volume of pulp.

We selected e.max in the hope of achieving better aesthetic integration, with its translucence allowing the saturated and natural appearance of the underlying preparations to show through.

This type of all-ceramic restoration allows us to take advantage of bonding, which appeared to us to be the best solution on the vital teeth. (We used the bonding agent to seal the dentinal tubules and improve the sealing of the cervical limits.)

We remedied the cervical wear on all of the teeth, including the central incisors (from 14 to 25). For this treatment, we used OptiBond™ XTR, a two-step, self-etching adhesive system (SAM2), and Miris composite in shade S6.

The central incisors were then prepared by cutting back the marginal limits inside the vestibular composite itself, in the manner described above.

We used the green-ringed tip (Komet) followed by the red tip bar for polishing, under heavy irrigation. The preparations were carried out with optical assistance (magnification X 2.5) and the limits were just gingival.

An impression of the 2 preparations was made during the same appointment. One week later, the two crowns, made by LNT laboratory in Paris, were delivered to the practice. They were tried in and then etched with 5% hydrofluoric acid for 20 seconds. Once the acid had been neutralised and the surface carefully dried, a layer of OptiBond XTR universal adhesive (bottle no. 2) was applied to the restorations’ internal surface shortly before application of the adhesive.

The advantage of OptiBond XTR is its ability to adhere to all types of prosthetic substrates without preparation or initial priming. This allowed us to perform our bonding procedures more efficiently, dealing with both restorations at the same time regardless of the prosthetic material. The adhesive treatment of the preparations was carried out with the same OptiBond XTR and, in this case, we applied a first layer of the primer, Optibond XTR Primer (bottle no. 1), which was brushed onto the enamel and the dentine for 20 seconds and then dried for 5 seconds. We were careful to dip the brush in several times during the application process, to ensure fresh acid was being brought into contact with the dentinal surfaces each time and to optimise etching.

Before applying Optibond XTR Adhesive (bottle no. 2), we were careful to shake the bottle lightly to ensure homogeneity.

1. Initial clinical presentation. The patient’s concerns were aesthetic and focused on the upper dentition.
2. Creation of two ceramic crowns in e.max.
3. The crowns were etched with 5% hydrofluoric acid for 20 seconds. Note the white, chalky appearance on the margins.

OptiBond XTR and NX3
The perfect combination

XTR and NX3 are so good, you can use both in total dark cure without any additional self-cure activator. The combination of OptiBond XTR + NX3 Automic cement demonstrated better indirect dentin bond strength to the Multilink Cementation System.

Study performed by State University New York, Buffalo.

OptiBond XTR and NX3 Some things are just meant to be. The powerful chemistry of OptiBond XTR provides high and predictable self-etch bond strengths, while NX3 resin cement brings unmatched aesthetics, and excellent colour stability. Put the two together, and you’ve got the perfect match for all your indirect restorations without self-cure activator and additional primers. Try OptiBond XTR and NX3 in your practice. Great on their own – even better together.

Your practice is our inspiration™

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Two phase treatment of a Class II division 1 patient complicated by traumatic upper incisor intrusion: A Case Report

By Dr. Roelien Stapelberg

A female patient presented at the age of 7 years and 8 months with the complaint that one of her upper teeth were absent. She had a mild thumb sucking habit with a tongue thrust. She had a Class II division 1 incisor relationship on a Class II skeletal base with mildly decreased vertical facial proportions.

Extra-oral examination (Figure 1a-c)

Extra-orally the patient presented with a Class II skeletal pattern convex profile and accentuated labiomental fold. She had acceptable vertical facial proportions. The frontal examination revealed acceptable facial symmetry and balance, with the upper centralincidence with the midfacial axis. Soft tissue examination demonstrated thin upper and lower lips with mild incompetence, as well as an acute nasolabial angle. The lower lip was retrusive to Bickett’s E-line.

Intra-oral examination (Figure 1d-h)

The patient was in the early mixed dentition and had good oral hygiene. There was no history of dental caries, and no active dental caries. Mild generalized extrinsic staining was present. Furthermore there were no restorations present. The maxillary arch was symmetric and tapered, whereas the mandibular arch was square and symmetric. Both arches had no space deficiency and had well aligned buccal segments. The upper right central incisor was missing, and the upper left central incisor was proclined. In occlusion, the overjet measured 10mm, with no overbite present. The molar relationship on the left was full Class II, and the right side was ¼ Class II. The lower centerline was 2mm to the left of the upper centerline, which was coincident with the facial centerline. There was no crossbites or displacements.

The Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN) was 5, and the Aesthetic Component (AC) was 9.

Radiographic examination (Figure 2a,b)

The DPT demonstrated that all second molars were present and developing, as well as the lower third molars. The upper right central incisor seemed to be horizontally impacted. The cephalometric analysis confirmed our clinical findings of a Class II skeletal pattern with an ANB of 7.0°. The Wits appraisal affirmed the Class II skeletal pattern with a measurement of 7.5 mm. The vertical proportions were slightly decreased, demonstrated by the maxillary-mandibular plane angle of 80.7° and face height ratio of 52.1%. The upper incisors were severely proclined at 128.9°, as was the lower incisors at 106.0°. The lower incisors were retruded relative to the A point line with a measurement of 0.8mm.

Problem list

1. Upper horizontal impacted
2. Class II skeletal pattern due to mandibular retrusion
3. Convex profile
4. Increased overjet
5. Lower centerline 2mm to the left of the upper centerline

Aims and Objectives

1. Facilitate eruption of UR1
2. Correct Class II skeletal pattern by encouraging mandibular growth
3. Improve facial profile
4. Decrease overjet to within normal range
5. Establish coincident centers
6. Maintain result until comprehensive orthodontic therapy

Treatment plan

1. Upper hybrid TPA - tongue crib appliance to assist in breaking the thumb sucking habit and relieve the present tongue thrust, while reinforcing the anchorage of the UR6 & UL6.
2. Upper 0.024 pre-adjusted edge wise fixed appliances (0.022* x 0.028 slot) with MFT prescription. Upper utility arch 0.016 SS with an open coil spring to create and maintain adequate space for the UR1.
3. Surgical exposure of the UR1 via the open technique with obturation of a gold chain and orthodontic traction to the archwire to facilitate eruption.
4. Bonded upper fixed retainer UR1 to UL1 to be maintained until comprehensive orthodontic treatment phase.

Treatment progression (Figures 3a,b)

After the manufacture of the upper hybrid TPA- tongue crib appliance, it was inserted and the bonding of the upper with 2x4 fixed appliances with MFT prescription was placed. An 0.016 SS utility arch archwire was placed with elastomeric ties, and the patient was referred for surgical exposure and placement of an adequate space for traction of the UR1. After the surgical exposure, the UR1 & UL2 was ligated together, and an elastic chain tied to the gold chain attached to the UR1. The NIIC open coipping was utilized to obtain an adequate space for the UR1. The eruption encouragement was continued until the UR1 could be bonded and ligated with an elastic chain continuing the eruption process, to the same 0.016 SS.

When the position of the UR1 was at an adequate level, it was engaged on the 0.016 SS with an elastomeric tie. The time period from surgical exposure of the UR1 to alignment with the archwire was 5 months. The case was debonded, and an upper fixed retainer from UR1 – UL1 was placed.

Treatement assessment (Figure 4a-g)

Case one was a 7 years and 8 months old Caucasian female presenting with a Class II division 1 incisor relationship on a Class II skeletal base with mildly decreased vertical facial proportions. The mandible was retrognathic, and the maxilla normal. The maxillary arch was slightly constricted and the lower centerline was 2mm to the left of the upper. The molar relationship was full unit Class II on the left and ¾ unit Class II on the right.

Phase I treatment was deemed appropriate, and consisted of a hybrid TPA-tongue crib appliance with 2x4 upper pre-adjusted edge wise fixed appliances (0.022* x 0.028 slot) with MFT prescription. Surgical

About the author

Claude Finotle
Graduated in 1975 (Paris University V) Former university attaché to the Faculty of Dental Surgery Paris V, prosthesis section.

Creation, in 1992, with Prof. Maurice Mimoun (Head of Plastic and Reconstruc- tive Surgery Service), of the “Smile Consultation”, currently in place in St Louis Hospital, Paris.

Member in 1993, then Fellow of the “American Society for Dental Aesthetics”.

Author of numerous conferences and articles, in France and abroad, and presenta- tions of articles and videos on professional internet sites. Private practice in Paris.

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extraoral view of the UR1 via the open technique with bonding of a gold chain and orthodontic traction to the archwire was done to facilitate eruption. Retention via a bonded upper fixed retainer UR1 to UL1 was placed until Phase II treatment. The patient was kept in retention and followed up frequently to establish the beginning of the adolescent growth spurt, in order to initiated phase II.

Phase II

A female patient presented at 9 years 4 months of age for a retention check of her fixed upper retainer, still in place from her previous orthodontic treatment (Phase I). She had a Class II division 1 malocclusion, on Class II skeletal bases, with decreased vertical proportions, bimaxillary protrusion and a lower lip trap.

Extra-oral examination

Extra-orally the patient had a severe Class II skeletal pattern with a convex profile and acceptable vertical proportions of the face. Frontal examination revealed no transverse asymmetry, and the upper centerline was on with the midfacial axis, with lower centerline being shifted 2mm to the left. Soft tissue examination demonstrated a retruded and incompetent lower lip of normal thickness. A lower lip trap was also present.

Intra-oral examination

The patient was in the late mixed dentition and had good oral hygiene. There were no restorations, and the patient was caries free. The maxillary arch was ovoid and symmetrical with no space discrepancy. The buccal segments were well aligned, with mesial buccal rotation on the UR6 and UL6 present. The mandibular arch with ovoid and symmetrical with no space discrepancy, with a deep curve of Spee present. The buccal segments of the lower arch was well aligned. In occlusion the overjet measured 8.5mm, with an overbite of 3.5mm (50%). The left molar relationship was ¼ unit Class II. The left canine relationship was full unit Class II, and the right was ⅓ unit Class II. No crossbites were present. The dental health component (DHC) of the Index of Orthodontic Treatment Need (IOTN) was 4a, and the aesthetic component (AC) was 9.

Radiographic examination

The DPT demonstrated that all third and second molars were developing. No other abnormalities were found. The cephalometric analysis (Table 1) confirmed a skeletal Class II anterio-posterior discrepancy as demonstrated by an ANB of 3.6° and a Wits appraisal of 6.5mm. Both the upper and the lower incisors were severely proclined (134.7° upper & 104.5° lower), with the lower incisor in a relative normal position in relation to A-Po line (0.6 mm).

Problem list

1. Class II skeletal relationship due to mandibular retrognathia
2. Convex profile with reduced lower lip protrusion
3. Upper incisor proclination
4. Overjet of 8.5 mm
5. Asymmetric Class II molar and canine relationship
6. 2 mm lower centerline discrepancy to the left of the upper dental midline
7. Incompetent lips at rest

Aims and Objectives

1. Utilize favorable mandibular growth for improvement of the Class II skeletal discrepancy
2. Improve facial harmony and increase lower lip protrusion
3. Reduce upper incisor proclination
4. Reduce overjet to normal values
5. Establish optimal buccal segment interdigititation bilaterally
6. Establish coincident centerlines
7. Obtain lip competence at rest
8. Maintain incisor display on smiling
9. Place teeth in a position conducive to favorable facial and dental esthetics and long-term stability
10. Retain corrected result

Treatment plan

1. Upper removable appliance while waiting for eruption of the upper second premolars and the growth spurt to occur. Appliance manufactured with an expansion screw to establish adequate maxillary dento-alveolar width to accomplish mandibular forward posturing without occlusal interferences from a crossbite tendency, with a size spring on the 12 to obtain initial alignment.
2. Andreasson’s Activator appliance for mandibular growth stimulation with wax bite of approximately 5mm was given after the growth spurt was reached as evaluated by clinical examination. Capping of lower incisors was done on the Activator to minimize lower incisor proclination.
3. Full upper and lower pre-adjusted edgewise fixed appliances (0.022” x 0.028” slot) with MBT prescription was placed after Class I canine was achieved with the Activator.
4. Bonded upper fixed retainer individually from UR5 to UL5 and upper vacuum formed retainer to be worn at night time only and a bonded lower fixed retainer individually from LR5 to LL5.

Retention

Retention via a bonded upper retainer UR1 to UL1 was done to facilitate eruption. Intra-oral photographs demonstrated a skeletal relationship at the end of treatment and followed up frequently to establish the beginning of the adolescent growth spurt, in order to initiated phase II.

Retention check of her fixed upper retainer, still in place from her previous orthodontic treatment (Phase I). She had a Class II division 1 malocclusion, on Class II skeletal bases, with decreased vertical proportions, bimaxillary protrusion and a lower lip trap.

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Class I canine relationship bilaterally and a waxbite thickness of 5mm (Figure 5). The compliance with the Activator was excellent, and after 5 months of wear the patient was ready for fixed appliances. A cephalogram after the Activator treatment was taken and analyzed (Figure 6). The cephalometric analysis (Table 2) revealed a skeletal Class I antero-posterior relationship (ANB 3.6°, Wits appraisal 2.8 mm). The SNA reduced during the use of the Activator, which was the cause for the reduction in the ANB angle. The SNB remained almost the same. The vertical proportions indicated a mildly anterior growth rotation. The upper incisors retroclined, and the lower incisors proclined after the Activator use. The upper incisors were severely proclined with 120.0°, and the lower incisors as well with 111.5°. The lower incisors protruded in relation to APo (5.2mm). 0.022 slot preadjusted edgewise fixed appliances were placed, with the leveling and aligning phase initiated with 0.016” heat activated Nickel-Titanium archwires in the upper and lower arches. The archwires progressed to 0.019 x 0.025” heat activated Nickel-Titanium in the upper and lower arch, followed by customized and coordinated 0.019 x 0.025” stainless steel archwires with steel ligatures. At this stage the patient was advised to use Class II intermaxillary elastics (5/16” 3 oz) bilaterally full time to correct our canine relationship after mild relapse occurred during the alignment and leveling phase of the fixed appliances. The intermaxillary elastics were continued for 4 months. During the torque expression of the rectangular steel wires, mild spaces opened in the upper arch, these spaces were closed with friction mechanics utilizing a closed elastomeric chain.
PRECISION CLEAN BRUSH HEAD PROVIDES

UP TO 5x

GREATER REDUCTION
IN PLAQUE BIOFILM ALONG THE GUMLINE

5x

* vs. a regular manual toothbrush

#1 Oral-B, most Dentist Recommended Toothbrush Brand worldwide

continuing the care that starts in your chair
1 COMPLETE SENSITIVITY TOOTHPASTE
SPECIALY DESIGNED WITH 7 BENEFITS*

All-round care for dentine hypersensitivity patients*1-6

We are constantly evolving our specialist range to meet the differing needs of dentine hypersensitivity patients. That's why we developed Sensodyne® Complete Protection.

SENSITIVITY  ENAMEL  CLEAN  GUMS  FRESH  PLAQUE  WHITENING

*With twice daily brushing

Everyday, day after day, your patient’s denture will have to support thousands of tasks. So it’s little wonder that even people with well-fitting dentures will have problems with trapped food, fears their denture will dislodge or a concern about bad breath.

This is where a Daily Denture Care Regime from Corega fits in

Corega adhesive
- Proven to improve bite force by 38% in well-fitting dentures,¹ which improves your patient’s ability to eat difficult foods
- Provides all day hold and helps seal out 74% more food particles compared to no adhesive,² helping to reduce the irritation and pain they cause

Corega cleanser
- Proven to manage denture hygiene effectively*¹
- Reduces plaque build-up with proven¹ bactericidal² and antifungal activity³

¹When used as directed. *In vitro


By recommending a Daily Denture Care Regime to your patients with dentures, you can be assured that you are helping to improve their comfort and confidence every day, day after day
chain from upper right to left first molars.
A cephalogram was taken after correction of the anterior-posterior relationship to check the incisor inclinations and evaluate the patient for the possibility of extractions. The upper incisors were proclined, as was the lower incisors, however the lower incisors did not procline more than the pre-treatment value, and the facial appearance accepted the increased proclination. Therefore no ex-
terptions were done to decrease the incisor proclination.
Finishing and detailing was done on a 0.018 stainless steel wire. The estimated treatment time for Case 1 treatment was 24-50 months. The actual treatment time was 22 months. Retention was initiated with an upper vacuum formed retainer and a lower fixed 3-3 retainer.

Case 1 assessment (Figure 9)
Case 1 presented to the orthodontic clinic at the age of 7 years 8 months, with a Class II division 1 incisor relationship on a Class II skeletal base with mildly decreased vertical facial proportions. The mandible was retrognathic, and the maxilla normal. The malocclusion was complicated by a horizontally impacted UR1. The upper centerline was on the facial midline, and the lower centerline was 2mm to the left of the upper. The molar relationship was full unit Class II on the left and ⅔ unit Class II on the right. The upper and lower incisors were severely proclined, with the lower incisors in normal position relative to the APo line.
Orthodontic camouflage for the underlying Class II skeletal discrepancy was carried out. On initial examination it was clear that the upper and lower incisors were proclined. Lower incisor proclination would indicate the amount of correction that can be attained by orthodontics only. For Case 1, the lower incisors were se-

Table 3 Case 1. Post-treatment cephalometric analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-phase II</th>
<th>MBC</th>
<th>Post-treatment</th>
<th>Pre-fixture</th>
<th>Normal</th>
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<tr>
<td>SNA (°)</td>
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Table 2 Case 1. Post-Activator cephalometric analysis

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*Denotes values greater than 1 standard deviation from the average Caucasian values.
**Denotes values greater than 2 standard deviation from the average Caucasian values.
***Denotes values greater than 3 standard deviation from the average Caucasian values.

Figure 7 (a-c). Case 1. Upper and lower MBT pre-adjusted edgewise appliances with 0.016” heat activated nickel titanium archwires

Figure 8 (a-c). Case 1. Upper and lower 0.019 x 0.025” stainless steel archwires with closed elastomeric chain for space closures from UR4 to U4. Class II intermediate clasps bilaterally full time.

Figure 9 (a-c) Case 1. Post-treatment extra- and intra-oral photographs

Figure 10 Case 1. Mid-treatment to pre-finish superimposition.
Invisalign®: clear benefits for your patients

By Vicki Vaskalion BDSSc MDSc.

Since the launch of the revolutionary Invisalign orthodontic system in 1999, the removable, computer activated, aesthetic Invisalign® aligner has gained popularity world-wide as an alternative to traditional fixed appliances. Invisalign® provides adult and teen patients an aesthetic, non-invasive and precisely activated treatment alternative for improving smile aesthetics and occlusal requirements, from minor alignment to complex malocclusions. Currently Invisalign® is available to patients in over 55 countries, with over 85,000 clinicians trained to use the product and over 2.6 million patients treated or in treatment. (1,2)

Due in part to the digital occlusal data from millions of treated patients, Align Technology Inc. (the manufacturer - ClinCheck® Software) has been able to continuously support rapid innovation. Some improvements include interactive ClinCheck® software features, new FDA approved aligner materials, algorithms based features such as optimized attachments, specifically engineered to the tooth's shape, size and requested movement (Figure 1), hooks and cut outs for applying Class II and Class III mechanics, power ridges for assisting expression of root torque and eruption pontics for treating late mixed dentition patients (3,4) (Figure 1).

In February 2014, the newest series of innovations “Invisalign G5” was launched, including an integrated mechanical system for treatment of dental deep bite cases. Invisalign® mechanics are well suited to dental and mild skeletal Class III cases due to the occlusal coverage and lack of detrimental extrusive vertical side effects. (5,6)

For this patient, the benefits of Invisalign® ClinCheck® software planning (Table 1) with the ability to superimpose and view degree of movement and to have the ability to program small, precise activation in the aligners made treatment predictable in terms of vertical control and preserving periodontal health (7,8). In this case, the patient would not consider a surgical option and there was no obvious functional abnormality for the open bite. Post treatment stability, even of open bite patients and incidence of root resorption have been found to be favorable with the Invisalign system.

Table 1: Advantages of ClinCheck® Software

3D visualization of each planned treatment, including treatment duration for clinicians and patients.

Accurate crown and genetic root programming and assessment of movement and direction of movement.

Interactive tools to design mechanics such as attachment choice, Class II and Class III correction features.

Clinical tool for treatment monitoring and motivation enhancement.

Tooth movement animation may be used by colleagues in multi-disciplinary planning.

Summary

The Invisalign® system has many unique benefits to offer both patients and clinicians. Its distinct 3D ClinCheck® software not only provides a valuable planning tool but it directly programs the activation of the aligners, offering for the first time, aligners designed with multiple small and precise tooth activations engineered to accomplish predictable and favorable occlusal conclusions. The scope of related research conducted by the manufacturer as well as by the private dental and academic communities is unique to Invisalign®, and offers significant scientific value to users, with over 500 publications and case reports around the globe. As a result, the Invisalign® system has continually evolved to become a predictable orthodontic appliance applicable to all categories of malocclusion, including extraction and surgical treatments (9), depending largely on the treating doctor’s level of experience using Invisalign®.

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About the author
Dr. Vicki Vlaskalic is a practicing orthodontist in Melbourne, Australia and Clinical Instructor at the University of Melbourne, Department of Orthodontics. She has worked with the Invisalign System since the initial feasibility study in 1997 at the University of the Pacific, San Francisco, working as Assistant Professor in the Department of Orthodontics under Professor Robery Boyd.
Periodontal diseases have, for a half of a century, been known to be initiated by the accumulation of bacterial plaque (R). It has however been increasingly apparent in recent years that other factors, both intrinsic and extrinsic risk factors, influence the progression of periodontitis. Of these the most important are Diabetes and Smoking. Since both of these factors are common in the UAE this is of particular importance to UAE dentists. It is the purpose of this paper to review the current association between these risk factors and periodontitis, and to discuss the likely bi-directional relationship between management of periodontitis and these risk factors.

Periodontitis and Diabetes

Diabetes mellitus occurs when the level of sugar (glucose) in the blood becomes higher than normal. There are two main types of diabetes. In type 1 diabetes the body stops making insulin and the blood sugar (glucose) level becomes very high (R). Type 2 diabetes, also called adult-onset diabetes and non-insulin-dependent diabetes, is a chronic condition caused by high levels of glucose (sugar) in the blood. Although some people can overcome the symptoms by losing weight and following a healthy diet and exercise plan, most people with type 2 diabetes will have it for life (R).

Both diabetes and periodontitis are chronic diseases. Diabetes has many adverse effects on the periodontium, and conversely periodontitis may have deleterious effects further aggravating the condition. The potential common pathophysiologic pathways include those associated with inflammation, altered host responses, altered tissue homeostasis, and insulin resistance. A recent study also showed that scaling, polishing and root planning of the periodontium can lower blood sugar levels potentially offering a practical means of reducing the numbers who develop full type 2 diabetes (R).

Diabetes has many adverse effects on the periodontium, including decreased collagen turnover, impaired neutrophil function, and increased potential for periodontal destruction. Neutrophil chemotaxis and phagocytic activities are compromised in diabetic patients, which can lead to reduced bacterial killing and enhanced periodontal destruction. Inflammation is exaggerated in the presence of diabetes, insulin resistance, and hyperglycemia (R).

Neelima et al (R) examined 1500 diabetic patients; the prevalence of periodontal disease in these patients was 98.6%, significantly higher than the general population. By the early 1990's periodontitis was referred to as the "sixth complication of diabetes", and in 2005 the ADA formally acknowledged that periodontal disease is more often found in diabetics (R). Epstein (R) demonstrated that essentially all aspects of bone growth and mineralization are diminished in the absence of insulin i.e. hyperglycemia. Vascular changes also increase with increase in blood glucose levels (Oliver and Tervonen (R)).

Periodontitis and Smoking

Second to bacterial plaque, smoking is the strongest of the modifiable risk factors for periodontal disease. Smokers harbor a higher prevalence of potential periodontal pathogens, and smoking impairs various aspects of immune responses, including neutrophil function, antibody production, fibroblast activities, vascular factors and inflammatory mediator production.

In smokers inflammation in response to plaque accumulation is reduced compared with nonsmokers and smokers have a decreased expression of gingival inflammation and bleeding on probing in the presence of plaque accumulation when compared with smokers (R).

Smoking is a major effect on the protective elements of the immune response, resulting in an increase in the extent and severity of periodontal destruction. Neutrophils obtained from peripheral blood or saliva of smokers, have been shown to demonstrate functional alterations in chemokinesis, phagocytosis, and the oxidative burst. Smoking has been shown to impair the chemokinesis and phagocytosis of neutrophils obtained from the oral cav- ity, and in vitro studies of the effects of tobacco products on neutrophils have shown detrimental effects on cell movement and the oxidative burst (R).

Discussion

Both diabetes and smoking are increasing in the UAE particularly in younger individuals. Since scaling, polishing and root planning have been shown to lower blood sugar levels, and since smoking cessation improves the periodontal condition in many of these patients, it is the responsibility of all dental professionals to provide comprehensive periodontal care for all diabetics and pre-diabetics, and to provide accurate smoking cessation advice with appropriate referrals as indicated. The situation can be compounded when a diabetic also has a smoking habit.

The relationships between Periodontitis, Diabetes and Smoking are major areas of research interest at Dubai School of Dental Medicine.
The International Federation of Dental Hygienists (IFDH) is an organization designed to represent the interests of dental hygienists worldwide. Originally founded in 1975 by the International Liaison Committee on Dental Hygiene, the organization was formalized in 1986 in Oslo, Norway. Since that time, the IFDH has functioned as an international, non-governmental, non-profit organization that unites dental hygiene associations from around the world in the common cause of promoting oral health.

The purposes of the IFDH include the following:

• Safeguard and defend the interests of the profession of dental hygiene, oral health and advance the profession of dental hygiene.
• Promote professional alliances with its association members as well as with other associations, federations and organizations whose objectives are similar.
• Promote and coordinate the exchange of knowledge and information about the profession, its education, and its practice.
• Promote access to quality preventive oral health services.
• Increase public awareness that oral disease can be prevented through proven regimens. The IFDH endeavors to provide online resources for dental hygiene colleagues. Our website, www.ifdh.org, provides information about the process of seeking employment in member countries, research and education, national and international meetings of interest, as well as projects and partnerships designed to improve the oral health of the public.

One of our exciting new partnerships is with the Global Child Dental Fund. We are looking forward to supporting their work together to improve the oral health of disadvantaged children. This volunteer project is designed to recognize, on an international level, dental hygienists and student dental hygienists who participate in a volunteer project which benefits disadvantaged children, mainly, but not exclusively, in low- and middle-income countries. Any dental hygienist who is either an Individual or Student member of the IFDH, or an IFDH Country Member is eligible to apply for the award. Applications are available through www.clubdocfund.org. Projects proposals are due by June 1, 2014 and awards will be announced on September 30, 2014. One winner will receive a cash prize of $5000 to implement the project, two runners-up will receive cash prizes of $1000 for their project.

In addition, the IFDH is investigating a partnership with “Text2Floss”. This program is an innovative way to promote improved oral home care by texting reminder messages to brush and floss daily. Additional educational information is offered concerning oral care including saliva and the pH of the mouth, heart disease and oral health, stress, and diabetes. There is an app for i-phones, iPod minis, and i-phones 5s as well as through iTunes at http://itunes.apple.com/us/app/text2floss/id579790652?mt=8.

Every three years, the IFDH hosts an International Symposium on Dental Hygiene, providing an opportunity to network and learn the latest research and technologies supporting the growth of the profession. The next scientific symposium will be held from June 23 to 25, 2016 in Basel, Switzerland. For more information about this meeting, visit http://indl2016.dentalhygienists.ch.

We hope you will join us as we work together to improve the oral health of the public and support our profession around the globe.

Contact Information
JoAnn R. Gurenlian, RDH, PhD
President of the International Federation of Dental Hygienists and Professor and Graduate Program Director of the Department of Dental Hygiene, Division of Health Sciences, of Idaho State University, jgurenlian@vernon.net

The American Dental Association recommends the cornerstones of proper oral care—brushing and flossing.

Brushing: Brushing the teeth twice a day with a soft-bristled brush is the key to healthy gums and teeth. The size and shape of the brush should fit the mouth to reach all areas easily. Toothbrush should be replaced every four or five months or when the bristles are frayed. A pea-size of fluoride-rich toothpaste may also come in handy.

Flossing: Flossing once a day can help remove plaque from between teeth. It is an important part of the routine as plaque that stays in the mouth can eventually harden into calculus or tartar. Once tartar has formed, professional cleaning may be required for its removal.

A strong body of evidence has shown that brushing and flossing are not effective enough to prevent dental caries and periodontal diseases. A trusted mouth rinse brand is Listerine® rinsing can help reach what the basic routine cannot.

Adding rinsing to the brushing-flossing routine can help reach nearly 100% of the mouth and get rid of bacteria that cause cavities and periodontal diseases. A trusted mouth rinse brand is Listerine®, the first over-the-counter mouth rinse that has been awarded the American Dental Association Council on Scientific Acceptance. It offers different variants that are especially formulated to achieve ultimate cavity prevention. It contains a fixed combination of 4 different oils (i.e., thymol, menthol, eucalyptol, and carvacrol), individually enhancing its antimicrobial properties and flavors, and killing up to 97% of bacteria left behind after brushing and flossing. These oils have been clinically proven to offer superior antiplaque and anti-gingivitis efficacy to other medicated mouthrinses.

Special variants of Listerine are available, with Rapid Fusion Technology, which dramatically boosts fluoride uptake and maintains its efficacy at eliminating plaque-causing bacteria. The latest addition to the oral hygiene arsenal is Listerine® Total Care Zero, which in addition to Rapid Fusion Technology, is fortified with zinc chloride ions that can reduce calculus build-up and keep teeth whiter. There are many options available but make sure to pick the rinse that best meets the patient’s personal care needs to guarantee a healthier mouth, a happier smile.
Launch of Dental Hygienists Supplement in the Dental Tribune Middle East

By Victoria Wilson

Dubai, UAE: It is my pleasure to announce the launch of a new Supplement in the Dental Tribune Middle East targeted completely to Dental Hygienists.

It is an extremely exciting time for Hygienists in this region, as we continue to gain more recognition for our skills and qualifications. Dental professionals are increasingly becoming aware of our key role within the dental practice, both as a valued team member in the delivery of complete dental care, and in the promotion and restoration of our patients’ oral health.

In 1906, Alfred Fones, an American dentist from Bridgeport, Connecticut, who is also the founder of the Dental Hygienist profession, had an important vision. He wanted to create a new paradigm for dentistry that focused on prevention and promotion of oral health instead of simply tooth loss and disease. Alfred’s cousin, Irene New- man, became the first known Dental Hygienist and in 1915 they opened the first dental Hygiene School. After qualifying as a Dental Hygienist & Dental Therapist from the Eastman Dental Hospital in the UK over 10 years ago, I became acutely aware of the public’s lack of knowledge as to what we do within the dental clinic. At that time, a good deal of further education was required to educate people on our role within the community. Ten years has passed and it would now be difficult to find a clinic in the UK without a Hygienist. I can also see that this is the direction that clinics are taking in the UAE. The prevention and education that Hygienists provide is fundamental to all dental treatments.

The question still remains in the Middle East - does every member of the dental team completely understand what the Hygienist can bring to the clinic?

The following list can help provide an insight into our skills and valuable contributions. The Dental Hygienist will:

• Provide dental hygiene care to patients.
• Plan the delivery of care for patients to improve and maintain their periodontal health.
• Obtain and evaluate a detailed dental and medical history from patients.
• Complete periodontal examinations and charting and use indices to screen and monitor periodontal disease.
• Provide preventive oral care to patients and liaise with dentists and patients on the treatment of caries, periodontal disease and tooth wear, as well as replacement of existing deficient restorative treatment.
• Undertake supragingival and subgingival scaling and root debridement using manual and powered instruments and administer appropriate antimicrobial therapy to manage plaque related diseases.
• Apply topical treatments and fissure sealants.
• Offer patients advice on how to quit smoking.
• Take, process and interpret various film views used in general dental practice.
• Take impressions.
• Identify anatomical features, recognize abnormalities and interpret common pathology as well as carry out oral cancer screening.
• Refer patients to other dental professionals and discuss opinions for further dental treatment.
• Perform Tooth Whitening procedures to the prescription.

The number of Dental Hygienists in the region is steadily growing, and thanks to the Dental Tribune Middle East, we now have a platform to reach out and connect further with the dental profession.

Contact Information
Victoria Wilson
Dental Hygienist
Dr. Roze & Associates
Dental Clinic
victoria@dradubai.com

Celebrating World Oral Health Day
20th March 2014

By Dr. Maimuna A. Rahim, DDS

Dubai, UAE: The GCC Oral Health week is the annual celebration of all the efforts during the year to improve Oral Health. This year the celebrations will take place on 20th March 2014 at the Arabian Center – Al Khawanij Road in Dubai starting from 10:30 – 10:00 with the slogan being “Teeth, Health & Beauty". The day will highlight on bad oral health and its prevention.

The Dental Hygienist is ultimately a great communicator within the team. He/she motivates patients and helps them to make the right decisions for long term dental health and acts to build the practice. Successful periodontal therapy, and the maintenance of a healthy periodontium is the basis of all good restorative dentistry.

The Dental Hygienists in the UAE are steadily increasing and thanks to Dental Tribune Middle East, we now have a platform to reach out and connect further with the dental professionals.

All are invited and welcome to celebrate with us World Oral Health Day.
How do you see the relationship between the dentist and laboratory evolving? New digital impression technologies will improve the relationship between the laboratory and the dentist. The proliferation of this technology, as well as advancements in dental materials and equipment, will continue to make open and consistent communication between the dentists and dental technicians absolutely crucial. New software, such as Planmeca’s Romexis, will facilitate this communication through better data management and open architecture, allowing for the easy import and export of digital files to and from any system, and acting as the conduit that brings all the case data together. Additionally, digital impressioning will open new avenues for laboratories to perform more complicated and new restorative treatments, in less time.

What are some of the critical factors that laboratories need to consider when working with their dental partners? Communication is critical to achieving the best results. Today’s technology opens the door to online communication and I would encourage laboratories to use those tools to design and execute solutions in cooperation with their dentists. As these technologies continue to evolve and become more commonplace, the relationship between dentists and dental technicians will allow for increased productivity for both sides.

Are there any scanning systems on the market today that smaller laboratories can afford? Yes, scanning systems continue to become more affordable. This allows everyone equal access to digital technologies and will help laboratories develop new product lines and services for their dentist partners. Modular systems, such as the Planmeca PlanScan digital restorative system, allow that flexibility for growth. You can start with the scan-only module and then move into the scan and design system, or go all in to full production milling.

There has been much debate on open versus closed CAD/CAM systems and whether conversion to a digital workflow requires multiple systems. What are your thoughts on this and how can Planmeca address these concerns? Planmeca has always been a great believer in open platforms. Our imaging software operates on any operating system platform that imports and exports CBCT and panoramic images and data. We will continue this same philosophy within our CAD/CAM strategy. We encourage the market to have open options and develop technologies that communicate with each other.

What is your position on the expanding role of the laboratory as it relates to partnering with dental practitioners in the implant planning process? Digital impressions as they relate to dental implants, although a small piece of the restorative market, are growing 15% to 17% annually. We expect this trend to increase even more as the population base continues to age. The complexity of implants and the communication bridge that digital impressions provide requires an enhanced service level interface between dentists and dental technicians. Our Planmeca Romexis software platform provides tools that enable the dental team to visualize and share three-dimensional images, such as CBCT scan data and implant treatment plans, on any platform. This technology helps laboratories create implant-based restorations faster and better with guidance from oral surgeons. Also, due to increasing regulatory controls, dental laboratories that offer implants and implant abutments are likely to face increased regulatory review. This new level of compliance will require dentists do their due diligence in ensuring that they work with dental laboratories that can attest to having quality systems and good manufacturing practices in place to produce such restorations.

What is your vision on how the dental industry will look in 5 years? CAD/CAM will play an increasingly important role in the dental industry. Digital impressions in combination with 3D imaging will become the standard of care in most practices. The use of combined datasets has opened new avenues that pave the way to new applications and has created new opportunities for laboratories. We have only begun to experience the impact of the digital impression and CAD/CAM revolution. I would like to invite you all to challenge the manufacturing community with your future needs and make the dental profession even more exciting.

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REGISTRATION
Ralph Rmeily
dubai2014@biohorizons.com
Tel #: +1 205-986-1235
Sirona’s international success: Russian clinic buys the 40,000th C8+ treatment center

By Sirona

SALZBURG, Austria: Products “Made in Germany” have long been sought after around the world. This is also reflected in the international sales figures for the Sirona C8+. The treatment center combines high quality with timeless design.

The 40,000th C8+ dental center recently rolled off the production line at Sirona in Bensheim, the world’s largest production site in the dental industry – making this unit, which was designed for the global market, even more successful than the classic M1. The milestone unit and three other C8+ centers were purchased by the Kremlyovskaya Stomatologia dental clinic in Ryazan, Russia. “We have had very good experience with Sirona equipment. The company’s treatment centers are of a very high quality and are known for their reliability, long functional life, and support features for ergonomic patient positioning that prevent back strain while working,” said clinic director Andrey Archipenko, explaining his decision. “Made in Germany” is always a key quality factor around the world – especially in Eastern European, Latin American, Asian, and Arabian markets. The 50,000th C8+ treatment center was sold to a buyer in China in 2011.

Easy operation and timeless design

Because of the wide range of possible applications, the C8+ units can be found in practices, clinics, and universities in over 100 countries. The sturdy construction and intuitive operation make them ideally suited for ongoing use in clinical practice routine as well as for teaching.

In addition to its top quality, the timeless design of the C8+ gives it the high-end look. Users can choose between various finishes and three color schemes for the upholstery – elegant, natural, and active. Director Archipenko chose a premium decor in trendy orchid that blends seamlessly into his newly refurbished clinic. You can use the online C+ configurator to determine which color scheme best matches your facilities before purchasing. Dentists can design their treatment rooms virtually to get some initial assistance in selecting colors.

Optional features

Dentists can configure the C8+ individually depending on their personal preferences and local conditions. The range of optional features has been continually adapted in response to technical developments and sets new trends. For example, optional features include a brushless motor (BL ISO C), LEDview treatment lamp, and an intraoral camera system. Dentists who want to provide their patients with an especially comfortable atmosphere can also have their C8+ treatment center equipped with the new lounge upholstery, which has a premium cushion design, a soft, elegant feel, and an attractive double-seam look.

Exemplary ergonomics

With its serial ErgoMotion system, Sirona also ensures patients’ comfort and gives the treatment team optimal access to the mouth. At the same time, the individual operating elements are arranged to allow the dentist to work without back strain. The many options, the outstanding workmanship, and the timeless design make the C8+ a treatment center that is still very popular today – 40,000 units sold – with dentists all around the world.
AAID president-elect named vice dean at Harvard School of Dental Medicine

NEW YORK, USA: After an extensive nationwide search, AAID President-Elect John Da Silva, DMD, MPH, ScM, AFAAID, has been named vice dean at Harvard School of Dental Medicine. Dean Bruce Donoff stated that Da Silva’s “extensive institutional knowledge and experience in [HSDM’s] three focal areas — research, education and patient care — will be of great value as HSDM continues its strategic planning process.”

Da Silva serves on the board of trustees of the American Academy of Implant Dentistry and is currently the president elect. He is also chair of the Bylaws Committee and serves on the Education Oversight and Nominating committees. He has received widespread recognition during his academic career, including being named an honored fellow of the American Academy of Implant Dentistry and receiving the HSDM Distinguished Junior Faculty Award.

He has published numerous journal articles and lectured nationwide. Da Silva has made major contributions in research and the area of color science. He has also been involved in curricular changes to improve content on substance-abuse screening and brief interventions.

Da Silva was born in New York City and attended Williams College as an undergraduate. He received his dental degree from the Harvard School of Dental Medicine and his MPH degree from the Harvard School of Public Health. He later returned to the School of Public Health and received a ScM in health policy and management.

Da Silva completed specialty training in implant dentistry and prosthodontics at HSDM in 1992. He has been a faculty member there since 1995.
Planmeca makes CAD/CAM easier than ever

By Petri Kajander

Planmeca’s open-inter-face-based CAD/CAM solutions introduce, above all, quality, cost-efficiency and precision to the daily workflow at dental clinics or laboratories. Petri Kajander, Product Manager for Planmeca, explains the revolutionary features of these new products.

State-of-the-art solutions for dentists

Planmeca PlanScan® – super-fast intraoral scanner

The new Planmeca PlanScan® is a digital and powder-free intraoral scanner that scans the patient’s dentition quickly and accurately. The scanner produces real-time digital impressions from one-tooth to full-arch scans. Thanks to the open STL file for data, the scanned files can be sent to any dental laboratory for design work. This is the world’s first dental unit integrated intraoral scanner that can also be connected to a laptop.

“The scanner has only one cable, so it is extremely easy to move from one place to another, for example between different treatment rooms or clinics”, says Product Manager Petri Kajander. “In addition, the scanner is delivered with a laptop, so the device can be flexibly shared between different users. In other words, Planmeca PlanScan offers value for your investment: it is not a device for just one dentist but can be used by the entire clinic.”

The scanner utilises blue laser technology. It projects a pattern on the surface of the teeth and then analyses it from different directions while calculating distances. In this way, the device is able to calculate a model that is extremely accurate. “You can view the result as a real-time video image. The video recording and the dental surface identification algorithm make the device extremely flexible to use. Thanks to these features, you can pause the scanning at any time and continue later on at any point from where the data is already available.”

The scanner includes a range of exchangeable tips in various sizes, the smallest of these facilitating access to the posterior parts, particularly with small children and trauma patients. The tips can be autoclaved for efficient infection control. In addition, the scanner is extremely durable since it has no other moving parts inside except for a fan that removes warm air. “Thus, the device stays calibrated and is not subject to mechanical wear”, explains Kajander.

Planmeca PlanCAD® Easy – efficient design tool for prosthetics

Planmeca also offers dentists a new kind of open software solution for 3D design. Planmeca PlanCAD® Easy is seamlessly integrated in Planmeca Romexis® software and it is a user-friendly design tool for the design of inlays, onlays, veneers, crowns and bridges.

“The software runs on the so-called floating licence basis. This means that it is not tied to just one computer or workstation”, explains Petri Kajander. “In this way, the scanning station can be used only for scanning, while another workstation is used for the actual design work. This is a truly unique feature, which allows work to be continued straight away on another computer, while the scanner is freed for more productive operation”, says Kajander.

Every dentist designing his or her own prosthetic works will also face cases that require assistance from a dental laboatory. For this reason, Planmeca’s system utilises an open STL file format that allows the work to be sent immediately to a partner via the Planmeca Romexis® Cloud service.

Since Planmeca PlanCAD® is integrated in Planmeca Romexis software, soft tissue scans can also be conveniently paired with the patient’s CBCT image. This combined data provides valuable information for...
plant planning, for example, because in addition to the soft tissues, it visualises the crown that is designed for the occlusion. This facilitates the planning of the implant screw’s location.

The Planmeca PlanCAD Easy workflow from preparation to the finished result includes just five easy stages: work description, scanning, marking of the margin line, automatic design, and sending the work to the mill. “Once the work has been sent to the mill, it is transferred there in its entirety and the mill’s computer finishes the work. In this way, the software and scanner are immediately freed for a new assignment.”

The software is very user-friendly. All design phases are saved automatically, and if further impressions are needed, previous phases can be returned to flexibly. The automatic design software automatically takes into account the adjacent tooth’s cusps and marginal ridge in addition to the contact strengths defined by the user. This creates a design that always fits its surroundings.

Planmeca PlanMill® 40 – fast and precise milling unit for dental clinics

Planmeca PlanMill® 40 is an extremely precise four-axis milling unit operating under the control of its own computer. The device is suitable for all the indications of a single tooth, in other words for the milling of crowns, inlays, onlays and veneers. The mill can manage bridges of up to five units to the posterior and three units to the anterior area.

Since the mill handles the milled pieces completely independently, as many as several dozen pieces can be sent to the mill at a time. In addition, the device tells which block size, colour and material should be used, so any member of the staff can place the block in the mill. “This saves everyone’s working time. The dentist does not need add the block himself, but anyone can do it”, says Kajander.

The mill has a six-tool exchange mechanism, and it changes tools independently according to different job requirements. In addition, the device mills different materials according to their properties. For example, it knows how to gently handle delicate ceramics in work phases that require precision. “If you force the material, it may break prematurely. Even the smallest hairline crack in the material can lead to a cemented piece breaking when

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Interview: “Kennedy’s wound was clearly incompatible with life”

By Dental Tribune International

Few people are granted the opportunity to become an active part of historical events. Seventy-six-year-old Dr. Don T. Curtis, a former dentist from Amarillo in Texas, is one of them. As a surgical oral and maxillofacial surgeon at Parkland Memorial Hospital in Dallas, he was one of the first doctors to have performed emergency treatment on U.S. President John F. Kennedy after he was shot on 22 November 1963. Dental Tribune ONLINE had the opportunity to speak with him about that day and the reasoning he believes that there was more to the assassination than a lone gunman.

Were you aware of the president being in Dallas on 22 November 1963?

I was not aware of that and was surprised when they brought him to the hospital. I had a surgery scheduled for later that day and was on my way to have lunch. The way to the lunch-room however, required me to leave the building and walk across the reception area to the emergency room, where I noticed police cars and the presidential limousine, which had blood on it and roses that were given to the first lady, Jacqueline Kennedy, when she arrived at the airport.

When a policeman asked me whether I was a doctor, I said yes. He then replied that the doctor was hurt and escorted me to the trauma room where President Kennedy was.

In what condition was Kennedy when you arrived?

When I got there, it was obvious that the president was in extremis. He tried to breathe but was unable to do so. Dr. Charles James Carrico, a Parkland resident surgeon, had placed an endotracheal tube in an attempt at ventilation. However, that did not work because there was a blockage of the president’s airway, so he decided to do a tracheostomy.

I helped the nurse to undo the president’s tie and remove his shirt to prepare him for the procedure. Then Dr. Malcolm Perry, a senior surgeon, came into the room and it was decided that he should do the tracheostomy. Dr. Carrico assisted Dr. Perry, and I performed a cut down on the left leg to provide for intravenous replacement of blood.

I told my patient that her surgery had been postponed. She understood that. Since there was nothing else for me to do, I then cleared my business and went home. There was no communication with the news service, but I was reassured by the speed with which everything took place. We were relieved that President Lyndon B. Johnson had made it safely back to Washington and that the government was uninterrupted.

Finally on Sunday, we learned that the suspect, Lee Harvey Oswald, had been shot, which indicated that there was something going on in addition to just an lone shooter.

The majority of Americans do not believe that Oswald acted alone but have seen a film about the events at Parkland. However, I believe that all scheduled surgeries were cancelled and all patients had been sent back to the ward. Only a few surgeries were underway at that time, including that of Governor John Bowden Connally, who had also been injured during the shooting.

According to eyewitnesses, discussions broke out about who was authorized to do the autopsy. Did you notice any of that?

I did not because I left the trauma room soon after the president had been pronounced dead and went back to the clinic to see my patient in the operating room. However, I found that all scheduled surgeries for that day had been cancelled and all patients had been sent back to the ward. Only a few surgeries were underway at that time, including that of Governor John Bowden Connally, who had also been injured during the shooting.

“My personal belief is that there were of course multiple shooters and that Oswald did not do it alone.”

What was the atmosphere in the room?

It became very quiet. Nobody said anything.

In your opinion, was there any chance that the president’s life could have been saved?

Nothing that we did made a difference. Kennedy’s wound was clearly incompatible with life.

Where you aware that the president had been the subject of an assassination attempt?

I was unaware of the nature of the injury to the president because his head was on a pillow and I could not see a wound. I remember the chief of neurosurgery, Dr. William Kemp Clark, rotating Kennedy’s head to the left, revealing that the posterior part of his skull had been radically fractured. He then said, “Stop, this injury is incompatible with life.”

What do you believe actually happened that day?

My personal belief is that there were of course multiple shooters and that Oswald did not do it alone. This would indicate however that there was in fact a conspiracy.

After the events, you stayed at Parkland Memorial Hospital for another two years. Were the events still discussed by the staff in the aftermath?

We actually never talked about it. This was something we just did not want to discuss. However, I left Parkland in 1965 for an exchange residency in London and Zurich, where I often discussed the events with my colleagues abroad. Particularly in England, there was much more interest in U.S. politics and the assassination.

You recently went public with your knowledge after 50 years. What were your reasons for doing so?

Everything that I would say is already in the literature about the assassination but I think there needs to be general knowledge of what people who were actually involved knew.

More than six million pages of classified evidence on the Kennedy assassination are going to be released by 2017. Are you interested in this knowledge, or do you consider that chapter of your life closed?

There is a great deal of speculation of what information these documents actually contain. I do not look forward to it but would be interested to know what could be learned from them.

Thank you very much for the interview.

Left: Dr. Don T. Curtis as a dental student in 1962. (Dental Tribune courtesy of Baylor College of Dentistry, USA).—Right: US Secret Service agents and local police examine the presidential limousine outside of Parkland Memorial Hospital in Dallas, Texas, as President John F. Kennedy is treated inside the hospital after being shot. (Dental Tribune courtesy of John F. Kennedy Presidential Library and Museum, USA).
However, just as the Internet has changed the way we view and structure the dentist/laboratory relationship, the dental laboratory’s primary role in restorative dentistry is to facilitate all of the functional and aesthetic parameters that have been defined by the dentist into a restorative solution. Throughout the entire restorative process, from the initial patient consultation, diagnosis and treatment planning to final restoration placement, the communication routes between the dentist and the laboratory technician require a complete transfer of information. Functional components, occlusal parameters, pho netics and aesthetic requirements are just some of the essential types of information that are necessary for the technician to complete the fabrication of successful, functional and aesthetic restorations.

Today, as in the past, the communication tools between the dentist and the technician are photography, written documentation and impressions of the patient’s existing dentition. The clinical models from these impressions are created and mounted on an articulator that simulates the jaw movements of the mandible (Fig. 2).

The digital laboratory
As restorative dentistry evolves into the digital world of image capture, computer design and the creation of dental restorations through robotics, the dental laboratory must evolve as well. To fully understand this concept, a laboratory must be clearly defined.

At first thought, it may seem that a laboratory is the place where a dentist sends his or her patient’s impressions to (Fig. 5) be processed into restorations, which are sent back to the dentist for adjustment and delivery. This definition fits well with the traditional concept of a laboratory/dentist workflow. However, just as the Internet has forever changed the landscape of communication through related computer technology, the possibility to use CAD/CAM technology has provided the catalyst for a significant change in the way we view and structure the dentist/laboratory relationship.

Imagine that the laboratory is not a physical place, but exists within the digital world of image processing. The laboratory is not a physical place, but rather the hands of the technician or both. The laboratory is as flexible as the abilities of the dentist, the technician and the equipment will allow.

The primary decision becomes where the handoff from one partner to another should occur. The dentist, who has the ability to optically scan teeth for impression making and chooses CAD/CAM restorations as the best treatment option for his or her patients, has enhanced freedom as to where the handoff to the technician should occur. As a result, the laboratory is no longer a place, it is rather a great depth, virtual.

Communication is key
The ability to facilitate communication between the dentist and the lab is of utmost importance and what makes the E4D system stand out. Tools such as the E4D Sky network enable E4D clinical operators to communicate and facilitate the transfer of data to technicians whenever laboratory involvement is required. With just a click, the entire case (whether scanned or completely designed) can be sent from chairside to the laboratory for fulfillment of 50 dental professionals with basic knowledge of dental anatomy and occlusion to make modifications to the design, and then sends it through to the automated milling unit.

For the dental lab profession, the introduction of digital technology effectively automated or even eliminated some of the more mechanical and labor-intensive procedures (waxing, investing, burnout, casting, and/or pressing) involved in the conventional fabrication of a dental restoration, allowing the dentist and technician the ability to create functional dental restorations with a consistent, precise method.

Linear versus vertical manufacturing. The successful laboratory of the future will need to focus not just on the quality of the end product, but also more efficient production methods to reduce turnaround time within the laboratory process. Digital technology will allow the laboratory production to become vertical rather than linear.

The current laboratory fabrication process follows a very linear progression: model fabrication, day one; waxing, day two; finishing, day three; ceramics, day four, etc. Average production time for an all-ceramic or porcelain-fused-to-metal restoration is approximately five to seven working days based on this fabrication method.

In the digital laboratory, impressions will still be received from the client. Instead of taking days or weeks to go through several processes, we will be able to accomplish the same process in two to three days.

Once the impression is received at the laboratory, the impression can be scanned and data sent to several digital production stations at the same time. This will potentially allow the model, the restorations (both framework and waxup) and the final ceramic restoration to be completed at the same time (Fig. 6).

Digital diagnostic and treatment planning
The basis for all long-term success in restorative dentistry is a comprehensive diagnosis and treatment plan. The ability to preview a case from start to finish, communicate and co-diagnose with other specialists and specialties about dental patients via the virtual world is the true power and capability of digital dentistry.
Sirona Group receives another Top Employer Award

By Sirona

Since receiving the Top Employer Awards for Germany, Austria and Engineers in 2015, Sirona's excellent human resources policy and very good working conditions have also earned it international recognition in 2014. In an award ceremony in Shanghai, Sirona China was given the “Top Employer China 2014” award in mid-January. The company’s German employees have also been successful at the Chinese site.

In a multi-phase analysis and auditing process, the Top Employer Institute (formerly CRI Institute) designates outstanding employers around the world every year. Some of the key criteria include excellent working conditions, promoting talent, and continuous development of human resources management. Sirona China was given the highest award “Top Employer China 2014” along with 40 other employers. Michael Elling, Vice President Corporate Human Resources of the Sirona Group, expressed his satisfaction: “Our employees are the heart of our company. The Top Employer Award for Sirona China is an acknowledgment of our local and global efforts to support our employees. It is part of our global growth strategy, it increases our attractiveness as employers, and it motivates our employees to work at Sirona in Germany and abroad.”

Growth and development at Sirona China

In 2006, Sirona began to develop the business in China with just 50 employees. Today, eight years later, there are more than 150 employees here – a success story, also with respect to personnel development. “Employee satisfaction is the basis of our success at Sirona China. This is why we find it important to have an excellent team, promote team spirit, and motivate continuing development among our employees. It is rewarding to see how many employees successfully climb the career ladder,” explains Henning Müller, Vice President China and South East Asia. A strong growth that is reflected in the market, Sirona China is the number one company for dental treatment chairs. Dental dentistry and CAD/CAM products have also made significant gains in the past two years.

Employee success stories

Sirona offers many opportunities and promotes young talent among students as well. For example, the German student Verena Schütter spent four months at Sirona in Asia during her International Business studies at Baden-Württemberg Cooperative State University. There she became familiar with the international sector and the Shanghai location, and she helped develop the Singapore office. This was opened in November 2015. A career opportunity open to all employees at Sirona fostered by the Talent Excellence Program encompasses individual advanced training, project assignments across positions and locations, and targeted international and career advancement in one of its worldwide subsidiaries.

Contact Information

Sirona Dental GmbH
Sirona Straße 1
A-5071 Wals bei Salzburg
Austria
P +43 (0) 662 / 2450-0
F +43 (0) 662 / 2450-600980
contact@sirona.com
www.sirona.com

Fig 1: Sirona China is delighted to receive the Top Employer China 2014 award and together with the other 40 winners, it’s difficult to tell who is the happiest.

Fig 2: Michael Elling, Vice President Corporate Human Resources of the Sirona Group (2nd from right), Daisy Zhang, HR Manager China (3rd from right) and Henning Müller, Vice President Sales China, Hong Kong, South East Asia (1st from left), proudly accepted the “Top Employer China 2014” award from the event host (right).

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Pressure is applied on it.

Also, the maintenance of the device is care-free. The mill’s own computer calculates the service life of the tools, monitors wear and reports on them via the user interface. It also calculates the time that milling will take and lets the user know when the tools or water should be replaced. “Similar to a car, a mill requires maintenance at certain intervals and notifies the user of this.”

An ideal solution also for laboratories

For dental laboratories, Planmeca offers a comprehensive solution utilising the open STL file format. Planmeca PlanScan® Lab scanner is an accurate desktop scanner utilising blue light for scanning gypsum models and impressions. The device scans gypsum models fast and effortlessly with an accuracy of 15 micrometres.

Designing takes place in the open Planmeca PlanCAD® Premium laboratory software, which can be used for the design of all prosthetic pieces, ranging from one-tooth units to full-arch structures. The software can also be used to design individual abutments, implant bridges and bars for cemented and screwed solutions. Designing begins with determining the margin line, after which the path of insertion is selected and the structure designed. Several automatic functions assist in the design work, and as the design progresses, the software shows the contact areas, material thickness and distance to the antagonist or adjacent tooth. A diagnostic wax-up made in the laboratory or anatomic models saved in the software can be utilised in the design work.

The software has an Order Manager page that brings efficiency to the workflow by reporting the stage of each work. In this way, several work orders can be entered in the software in one go. The last phase is always saved in memory so working can be continued freely at the most suitable time. In addition, precise values can be set to each work for the cement gap and milling unit’s blade.

An open STL file is created as a result of the design work, and it can be manufactured with all milling units supporting the open file format, including the Planmeca PlanMill® 50. This milling unit can be used for the milling of all most common materials, excluding metals. In addition, the open file can be sent to a milling centre for manufacturing, such as Planmeca’s own PlanEasyMill™ milling centre.
So saliva collected at a constant flow rate for 2 minutes will have a different composition from saliva collected at the same flow rate for 10-15 minutes.

**Nature of the stimulus**  Different stimuli have an effect on salivary composition, mainly because of their effect on the rate of flow. Acid is mainly because of their effect on salivary composition, whereas the most potent stimulus for effect on the rate of flow. Acid is mainly because of their effect on salivary composition.

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**Rate of flow**  Acid is mainly because of their effect on salivary composition.

The buffering ability of saliva bicarbonate is the most important buffering system in saliva but only at high flow rates, when it is an important buffer against acid produced by dental plaque. Its concentration varies from less than 1 mmol/l in unstimulated parotid saliva to almost 60 mmol/l at very high flow rates, with whole saliva elicited by chewing gum having a bicarbonate concentration of about 15 mmol/l. Thus, in unstimulated saliva, the level of bicarbonate ions is too low to be an effective buffer.

Additionally, salivary pH is dependent on the bicarbonate concentration, an increase in which results in an increase in pH. At very low flow rates, the pH of parotid saliva can be as low as 5.5, rising to 7.8 at very high flow rates. Individuals with hyposalivation will thus have a low salivary pH and a low salivary buffering capacity because of the low bicarbonate concentration.

**Conclusion**  Saliva not only plays a pivotal role in the maintenance of a healthy homeostatic condition in the oral cavity, but contributes to one's overall health and wellbeing. Components from saliva interact in different ways with the dentition to protect the teeth. Patients who lack sufficient saliva suffer from many oral diseases, of which caries is only one. To alleviate discomfort they are advised to use saliva stimulants and substitutes which have the function of lubricating the oral surfaces. Chewing gum is increasingly being viewed as a delivery system for active agents that could potentially provide direct oral care benefits, as it promotes a strong flow of stimulated saliva.

The fourth edition of Saliva and Oral Health is available in virtually every dental market and special markets customer. The group includes KaVo, Kerr, Kerr TotalCare, Pentron, Axis, SybronEndo, Orascoptic, Pelton & Crane, Marus, DCI Equipment, Gendex, DEXIS, Instrumentarium Dental, SoreDEX, i-CAT, NOMAD, Implant Direct and Ormco. Their services and products primarily serve the general practitioner, dental specialist, hygienist, institutional and special markets customers in virtually every dental market in the world, including North America, Latin America, Europe, the Middle East, and the Asia Pacific region.

Danaher also stated that each company will continue to market itself under its current brands to local customers and individual markets.

According to Matt Garrett, vice president of marketing for KaVo Kerr Group, it will be presenting 20 new products in celebration of its formation at this year’s Chicago Dental Society Midwinter Meeting, which is being held until tomorrow.

**References**  