FDA investigates handheld dental X-ray devices

Daniel Zimmermann
DTI

SILVER SPRING, Md., USA: The Food and Drug Administration is advising dental professionals and veterinary professionals in the US to stay away from handheld X-ray devices that are being offered by online sellers and shipped from abroad. At least one of these devices was recently found not to comply with safety standards and therefore to be potentially hazardous for dentists and patients, the organisation said.

FDA officials told Dental Tribune Asia Pacific that they are currently monitoring handheld dental X-ray units throughout the United States. Information about the device in question were recently sent to the organisation by the Washington State Department of Health in Tumwater, Washington, which found during an inspection that a device purchased from a seller outside the country did not fulfil the FDA’s X-ray performance standards.

The organisation said to have notified state regulators as well as dental and other health organisations about the potential health risks. Dentists will be advised to verify whether the devices they are using have the required labelling and to contact state officials in case they are unsure if their device is safe.

The organisation refused to disclose further information about the extent of the problem or when and where these devices could have entered the country. However, this newspaper found that several devices produced in Asia are currently available via internet to customers in the United States. Information from the organisation was due to the extend of the problem they are currently monitoring handheld dental X-ray units throughout the United States.

Waiting times accumulate

People living in Morley, Western Australia, should better take their dental hygiene seriously. Latest statistics by the Government of Western Australia Department of Health have revealed that getting an appointment for a non-emergency dental procedure in the small suburb near the city of Perth can toll up to three years.

According to figures of the latest Western Australia Health Performance report, similar waiting times have recently been observed throughout the state ranging between one and a half and two years on average. Besides Morley, patients from Amadale and Fremantle also had to wait 18 months for a dental appointment. Overall, more than 24,000 patients are waiting for treatment in public dental clinics.

Health officials said that the latest increase in dental appointments was due to rising awareness of people that are eligible for subsidised dental treatment including low-income families and pensioners. More than 400,000 people or one fifth of the population are currently estimated to fall into that category.

Rapist gets 40 years in prison

A judge in the Philippines has sentenced a 52-year-old man to a maximum of 40 years in prison and a P180,000 (US$4,200) fine for raping and robbing two female dentists in the capital Manila last May. The man is also facing charges for having committed sexual crimes against 23 other dentists.

Morita receives design awards

Morita has been awarded the renowned if Design Gold Award for Product Design for its Soarit dental treatment unit. The Japan-based provider of dental equipment also received two Communication Design Awards for Soarit’s user interface and for the Soarit catalogue, advertising and printed media design.

Poor oral health among trekkers

German researchers have evaluated the mouth and tooth hygiene of trekkers in the Himalaya and discovered that their oral flora changes significantly while travelling. Among others, they found elevated levels of the bacteria typically responsible for dental infections, such as periodontitis and gingivitis.

Their study also found that trekkers who had had a dental check-up within the previous six months were less likely to have dental problems and bleeding gums in particular. In addition, they determined that 16.5 per cent of the trekkers reported problems that could have been treated with a dental emergency kit. Although thousands of tourists go on trekking vacations every year, there is no information regarding the procedure to follow in case of dental emergencies or no systematic guidelines for prevention.
Bad breath gas used to make liver cells from teeth

TOKYO, Japan: A team of Japanese researchers has demonstrated that hydrogen sulphide, one of the main causes of bad breath, could be a key component in developing future medical therapies. In a recent study conducted at the Nippon Dental University in Tokyo, they reported that stem cells isolated from dental pulp transformed into liver cells after being incubated with the characteristically foul-smelling gas for at least three days.

While dental pulp stem cells have been found to have the ability to transform into a number of different cells, including muscle and blood cells, this is the first time that researchers have claimed to have isolated a huge number of cells that were able to store glycogen and collect urea—the two main functions of the liver. They said that although more research might be needed on the possible carcinogenic effects of the method, results indicate that it produced cells with little potential to differentiate, hence limiting the risk of developing tumours after transplantation.

“The hydrogen sulphide did not cause apoptotic changes in the cells,” they stated in the report.

Common methods of producing hepatic cells for human transplantation include the use of foetal liver tissue, which is heavily regulated worldwide. The researchers however extracted stem cells for their study from patients undergoing regular tooth extractions. These were then divided into two groups, of which one was incubated with hydrogen sulphide and the other with a different medium.

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Indian dental clinic chain aims for expansion

HYDERABAD, India: India’s rising dental health-care sector is expected to be completed by mid-2013. The expansion is intended to serve different market segments, including dental spas, regular dental clinics, as well as express cleaning and whitening spots located in public places like airports and shopping malls.

Alliance Dental Care was founded in 2002 as a subsidiary of Alliance Medcorp, a joint venture between Apollo Hospitals and medical equipment provider Trivitron. Both companies have been reported to seek private investors in order to raise Rs 0.5 trillion (US$810 million) for the first phase of the expansion in 2012. The new clinics, as well as the existing ones, have been re-branded as White Dental Clinics, they said.

Alliance Dental Care currently maintains over 20 dental clinics in major Indian cities like Chennai, Bangalore and Hyderabad. In addition to its Indian business, the joint venture is also eyeing potential markets overseas, including South-East and West Asia, Africa and Eastern Europe.

According to the latest financial reports, Apollo boasted revenues of Rs 25 trillion (US$460.4 million) in 2010/2011. Once the expansion has been completed, the company will hold a 70 per cent share in Alliance Dental Care.

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4 Opinion

Dear reader,

When I got the chance to interview Dr Melvin Cheatham for this edition’s article on dentistry in North Korea (page 9), I was impressed with the voluntary work his charity organisation, Samaritan’s Purse, has done and is currently doing in many underprivileged parts of the world.

It remains a sad and not widely known fact that in the DPRK and many other countries in Asia, public health-care systems are heavily dependent on help from outside organisations in order to provide even the most basic level of medical or dental care. Moreover, their assistance has become increasingly essential during widespread emergency situations like natural disasters, which most of these systems, I think we can agree, are not able to handle adequately.

During my work for this newspaper, I have found that dentists are generally very open to using their professional skills for the greater good, for example, by forming part of a temporary dental relief workforce. Without their enthusiasm and willingness to spend a significant amount of their time in far-off places, there would be fewer smiles in the world today.

Yours sincerely,

Daniel Zimmermann
Group Editor
Dental Tribune International

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Not all hand-helds are created equal

These systems look like a large camara that you hold with both hands. There is no shielding provided by these hand-held systems, that is the user’s hand exposure is all of the X-rays scattered from the patient. Consequently, the user’s hands are going to receive a radiation dose that will probably exceed the radiation protection limits for skin and extremities. Therefore, these units should not be hand-held.

We evaluated one hand-held X-ray unit manufactured in the USA (Nomad, Artrex Inc.) and compared staff doses with those for the same staff using conventional wall-mounted systems. The users of the hand-held systems (Gray et al. 2012). This hand-held system uses a proprietary shielding material around the X-ray tube, resulting in leakage radiation levels that are virtually immeasurable. In addition, it has an integral leaded-acrylic shield that protects the user from radiation scattered from the patient. The results of our study indicated that the users of the hand-held X-ray system received lower radiation doses than they did when they were using conventional wall-mounted systems.

Buyers should be aware that not all hand-held X-ray systems are created equal and not all of those being sold on the web have been reviewed by the FDA. Hand-held X-ray units should have sufficient shielding to minimise leakage radiation and an integral shield to protect from radiation scattered from the patient.

Contact Info

Dr Joel Gray
USA

There are two sources of radiation from an X-ray system—leakage radiation from the X-ray tube and scattered radiation from the patient. The leakage radiation is minimised by placing highly absorbing material, such as lead, around the X-ray tube. The major issue with the hand-held X-ray units is the scattered radiation, that is X-rays that are scattered from the patient towards the operator. In fact, about 20 to 50 % of the X-rays are scattered from the patient towards the person holding the device.

The X-ray units from outside the USA, which are under FDA scrutiny, do not provide any protection from X-rays scattered from the patient.

Rajiv Narayan
A researcher for Amnesty International in London.

Relief efforts are laudable as it goes some way towards helping the North Korean government ensure that it meets its obligations to respect, protect and fulfill the right to health of its citizens.

In its report, “The Grimming State of Health Care in North Korea” (ASA 24/001/2010), Amnesty International documented the devastating impact of long-term food insecurity on the population’s health and concluded that the North Korean state bears the responsibility for the country’s de-caying health care infrastructure, failure to provide basic health care, and a lack of public health education and information. Food shortages and a more general economic crisis persist to this day. Health facilities are rundown and operate with frequent power cuts and no heat. Medical personnel often do not receive salaries, and many hospitals function without medicines and other essentials.

To this end, Amnesty Interna-tional has urged the North Korean authorities and its new leader Kim Jong-un to address severe shortages in the healthcare system including through accepting international humanitarian assistance and for providing full cooperation and access (to efforts by organizations like Samaritan Purse) to ensure that care reaches those most in need.
**DENTAL TRIBUNE** Asia Pacific Edition

**World News**

**Dentists patent novel soft-tissue augmentation technique**

Daniel Zimmermann

**DTI**

ALEXANDRIA, Va., USA: An invention from Saudi Arabia that could help more patients to get dental implants is reported to have been granted patent status by the US Patent and Trademark Office. The new method, called the tunneling technique, is claimed to increase the thickness of soft tissue prior to block grafting procedures using an acellular dermal matrix.

Developed by implant specialist Dr Ali Thafeed AlGhamdi, who is also head of the Periodontic-Division at King Abdulaziz University’s Faculty of Dentistry in Jeddah in Saudi Arabia, the technique was first filed for patent application in February last year by a Virginia law firm.

In the application, the researchers explain how to position an acellular dermal matrix over the recipient site and fix it coronally via a tunnel that is formed by making two incisions through the mucosa. Using this method, the researchers detected an increase of 1 to 2 mm in soft-tissue thickness following allografts.

The acellular dermal matrix has been successfully applied in many surgical fields, including cosmetic procedures and regenerative medicine. It has been on the market since the early 1990s.

Al-Ghamdi told the Saudi Press Agency in Riyadh that he started looking into the technique when he noticed rapid healing in dental implant patients who had been treated with allografts for soft-tissue augmentation prior to symphyseal block grafts. He said that his invention could contribute significantly to the improvement of block graft surgery in diseased jaws.

According to the latest research, thin soft-tissue biotypes affect implant success significantly by failing to maintain the required crestal bone level.

**Intraoral device manoeuvres wheelchair**

**DTI**

ATLANTA, Ga., USA: Researchers at the Georgia Institute of Technology have developed the latest version of the intraoral Tongue Drive System, which is embedded into a dental retainer and is worn inside the mouth. The system, which only requires free movement of the tongue, allows people with high-level spinal cord injury to control a powered wheelchair.

The user receives a clinical tongue piercing, with which he can control the magnetic field sensors mounted on the device’s four corners. The sensors track the relative location of the magnetic piercing and transmit the data wirelessly to an iPod or iPhone. Software installed on this computer device interprets the user’s tongue position and moves the wheelchair accordingly.

In earlier versions, the sensors were attached to an externally worn headset. “One of the problems we encountered with this earlier version was that it could shift on a user’s head and would need to be recalibrated,” said Maysam Ghovanloo, associate professor at the institute. The new device sits tightly against the roof of the mouth because it is molded from dental impressions. As it is worn inside the mouth, it is protected against such disturbances and is less conspicuous.

The new device includes a lithium-ion battery and an induction coil to charge the battery. It is covered with an insulating, water-resistant material and vacuum moulded inside standard dental acrylic.

The researchers also created a multifunctional interface, which holds the iPod, resides and delivers the sensor data, charges the iPod and is fitted with a holder for charging the dental retainer at night. The system can be hooked up to any standard electric wheelchair.

Ghovanloo and his team plan to begin testing the usability of the system by able-bodied individuals soon and then move onto clinical trials.

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3Shape releases Dental System 2012

COPENHAGEN, Denmark: 3Shape, a Danish company specialising in 3-D scanners and CAD/CAM software solutions, has released its next-generation Dental System 2012 to the market. For the first time, it offers different scanner models and Standard or Premium software versions in order to provide a flexible and scalable solution that can be matched to labs of any size or business model with upgrade possibilities for future requirements. 3Shape offers a wide range of new digital workflows and communication tools designed to help labs expand their range of services to dentists. 3Shape’s Dental System 2012 introduces a variety of scanner/software combinations so that labs, regardless of their size or business model, can find suitable CAD/CAM tools to match their business needs and ambitions. 3Shape recently declared its new mission, “Helping labs to help their dentists.”

“In today’s competitive climate, labs that shift from production-only to service-provider profiles are winning market share. With Dental System 2012, 3Shape is bringing labs solutions designed to help them build new services and stronger business relationships with their dentists,” stated Tais Clausen, CTO of 3Shape.

The new Dental System 2012 features 3Shape Communicate, which enables labs to send their dentist clients 3-D design visualisations for use in their discussions with the lab and with their patients; ModelBuilder, which allows technicians to design lab models, including implant models, for an extensive range of indications directly from intra-oral scans and conventional impression scans; TRIOS integration, which enables labs to receive TRIOS digital impressions from the clinic directly to their Dental System inbox; Texture Scanning, which enhances visualisation of surface details and allows technicians to incorporate hand-drawn design guidance markings into the digital design (texture scanning is available on D800/810 scanners); and Dynamic Virtual Articulator, which offers support for the market’s most widely recognised articulators, providing the optimal user experience. In addition, with Occlusion Compass functionality, the colours of contact points are mapped to specific occlusal movements.

Furthermore, the Dental System 2012 features Temporaries and Diagnostic Wax-ups, a revolutionary workflow solution for producing temporary crowns and diagnostic wax-ups (including Virtual Prep, Virtual Gingiva, CAD Temporaries and Virtual Diagnostic Wax-up design); Multilayer Design, which enables highly productive bridge design for pressing or combinations of milled glass-ceramics and zirconia, and automatically splits full anatomy designs into two true and entire parts, without undercuts or lost areas; the Improved SmileComposer, which enables optimised auto-placement of crowns and morphing to preparation; as well as Advanced Telescope design, new software for optimised creation of telescopic crowns, including sophisticated primary telescopic modelling and improved edge design.

3Shape has also introduced a new scanner: the new D500 model and impression scanner, which was developed based on 3Shape’s advanced scanning technologies for full and accurate capture. The D500 was designed specifically to fulfill the needs of labs seeking to enter CAD/CAM manufacturing equipped with the latest and best technologies. Additionally, 3Shape offers 5.0 MP D700 and D800 scanners with extensive indications and texture-scanning capabilities for medium to large labs.

According to 3Shape, its solutions are timeless because the company ever strives for innovation and continues to provide major feature-packed upgrades for its users every year. 3Shape backs its Dental System users with an extensive support network and comprehensive training package.
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“Units are considered a national treasure by the North Koreans”

An interview with Samaritan’s Purse’s Dr Melvin Cheatham, USA

Through its World Medical Mission programme, the US-based Christian charity Samaritan’s Purse provides health care by means of medical and dental volunteers in developing countries around the world. It is also one of few organisations that maintain relations with the Democratic People’s Republic of Korea, also known as North Korea.

DTI’s Group Editor Daniel Zimmermann spoke with Dr Melvin Cheatham, member of the advisory board, about the organisation’s projects there and the state of dental care in the communist state.

Daniel Zimmermann: Dr Cheatham, like many things that concern the Democratic People’s Republic of Korea, very little is officially known about the dental infrastructure there. How would you describe the level of dentistry in the country?

Dr Cheatham: Although I have been to the DPRK more than 20 times and met with people at the highest level, it is very difficult to identify the current depth and availability of dental care and education. Obviously, dentistry there is performed on a much lower level than in Germany, the US or in any other country in the developed world. If you also look to another developing country as an example, there is reason to believe that dental care is being provided by people who do not have the level of education which is normally required to perform dentistry.

Are these units still operational today?

Although these services are still operational, the focus has lately shifted towards developing permanent dental care in the capital. A few years ago, the DPRK’s Ministry of Public Health asked Samaritan’s Purse for assistance in equipping a dental centre in Pyongyang that would not only serve as a place where dental care was given but also where dentists could obtain continuing education on the newest dental procedures and techniques with the goal of improving oral health care throughout the country.

Your organisation, led by Reverend Franklin Graham, is supporting the country through a number of dental care-related projects. When did these start?

The relationship between the Graham family and the DPRK dates back to the 1950s when Franklin Graham’s mother Ruth Belle Graham, who was born in China, attended a missionary school in Pyongyang, which was then under Japanese occupation. Wanting to go home himself, her husband Billy Graham, a world renowned religious leader and founder of the Billy Graham Evangelistic Association, first met with the DPRK’s leader Kim Il-sung before his passing in 1994.

During this visit, the organisation equipped the first mobile dental vehicle, which was intended to provide dental care to those people who weren’t able to get it, for example, in North Korea’s countryside. A second mobile dental unit was equipped years later by Samaritan’s Purse, led by Billy Gra-
Dental occlusion/temporomandibular joint and general body health

Clinical evidence and mechanism of an underestimated relationship

Drs Yong-Keun Lee
& Hyung-Joo Moon

South Korea

During the treatment of symptoms originating from disorders of the temporomandibular joint (TMJ) and occlusion, it was found that restoring the TMJ to its normal condition resulted in a change of general body health. In most cases, the change of health was for the better. Owing to similar reports, a connection between TMJ status and general body health was therefore hypothesised. However, the mechanism of this relationship remains unclear.

In this article, the relationships between dental occlusion/TMJ status and general body health are reviewed with reference to peer-reviewed papers. A conceptual theory is proposed that may explain this mechanism.

TMJ and myofascial pain

Dental occlusion, or the relationship between the maxillary and mandibular teeth when they approach each other,7 The TMJ is the joint of the jaw, which is unique in that it is the only bony joint that crosses the midline.8 As the treatment of dental diseases aims to achieve harmony within the entire stomatognathic system, teeth could be literally considered as a set of gears anchored in bone, while the upper and lower jaws are attached to each other by the TMJ.9

The causes of TMJ disorders can be divided into five categories: dental, trauma, lifestyle habits, stressful social situations and emotional factors.10 Trauma can be in the form of whiplash, traction appliances and blows to the head, face or jaw. Evidence of significant trauma to the TMJ has also been linked with hypertension in the cervical spine.11 With regard to habits, bad posture and ergonomics at work, oral and childhood habits, as well as poor diet and strenuous activities such as heavy lifting, have been cited.12

Myofascial pain, deriving from the hyperalgesic trigger points located in skeletal muscle and fascia, is commonly characterised by persistent regional pain.13 The myofascial component has generally been considered to be part of pain syndromes that involve TMJ. Trigger points in masticatory muscles are presumably caused by malocclusion, misalignment and habitual parafunction of the jaws, abnormal head and neck postures, or trauma.14

Relationship between TMJ and general body health

There have been several studies on the relationship between occlusion/TMJ and general body health. Among other findings, it has been found that lesions in the masticatory muscles or dento-alveolar ligaments can perturb visual stability.15 The functional coupling of the stomatognathic system with the cervical column is well known. Patients suffering from occlusal or TMJ disorders have frequently reported dysfunction and pain in their neck muscles.16 17 An imbalance of sternocleidomastoid muscle activity, often leading to neck pain, can be induced by a unilateral loss of occlusal support.18

The biomechanical impact on cervical vertebrae during mastication from the ocular region, the three semicircular canals and anti-gravity muscles.19 It has been suggested that occlusion and head position affect the centre of gravity, resulting in an increased risk of falling when abnormal.20 Poor or absent dental occlusion may decrease proprioception in this area, interfering with the proper stability of the head posture.21 It is thought that tooth loss is a risk factor for postural instability.22 Physiologically, instabilities between occlusion/TMJ and general body health were for the better. During the treatment of TMJ conditions can influence the cervical column.23 Possible associations between trunk and cervical asymmetry and facial symmetry have been reported.24 For example, it has been found that visual perception control is most important in orienting the head in the frontal plane.25 A relationship between dental occlusion and postural control has also been postulated.26

In this article that TMJ and general body health are reviewed with reference to peer-reviewed papers. A conceptual theory is proposed that may explain this mechanism.

Mechanism of relationship between TMJ and general body health based on the myofascial aspect

It is the hypothesis of this article that TMJ and general body health are connected through fasciae, which is a connective element between various anatomical structures,27 very similar to a three-dimensional network extending throughout the whole body.28 29 This network can be stretched by the contraction of underlying muscles and transmit tension over a distance.30

The fascial tissues are arranged vertically, from head to toe, and interconnected transverse fascial planes crisscross the body. Therefore, should an injury occur in one part of the body, pain and dysfunction may occur throughout the body.31

Mechanism based on qi and the meridian aspect

The second hypothesis is that the TMJ and other parts of the body are connected through the meridian system, which is constituted of the fasciae.32 Traditionally, acupuncture meridians are believed to form a network throughout the body, connecting peripheral tissues to each other.33 Studies that further understood the acupuncture point/meridian systems from a Western perspective have mainly focused on identifying distinct histological features that differentiate acupuncture points from surrounding tissue.34 One of the histological and anatomical associations with the meridians is intramuscular or intratendinous loose connective tissue (fascia). Ancient acupuncture texts contain several references to “fat, greasy membranes, fасiae and systems of connective membranes” through which...
the qi is believed to flow.\textsuperscript{33} In terms of connective tissue associations, several authors have suggested that a connection may exist between the acupuncture meridians, which tend to be located along the fascial planes between muscles or between a muscle and bone or tendon, and the connective tissue.\textsuperscript{34, 35}

In view of experimental evidence, it has been hypothesised that the network of the meridians can be viewed as a representation of a network of interstitial connective tissues. These findings are supported by ultrasound images showing connective tissue cleavage planes at the acupuncture points in human beings.\textsuperscript{36} Rather than viewing acupuncture points as discrete entities, it has been proposed that these points might correspond to sites of convergence in a network of connective tissue permeating the entire body, similar to highway intersections in a network of primary and secondary roads.\textsuperscript{37}

\textbf{Correlation between trigger points and acupuncture points}

Although separated by two millennia, the traditions of acupuncture and myofascial pain therapies share fundamental similarities in the treatment of pain disorders.\textsuperscript{38} Recent reports have suggested substantial anatomic, clinical and physiological overlap of the myofascial trigger points and acupuncture points.\textsuperscript{34} The analogy between the trigger points and acupuncture points has been discussed since 1877,\textsuperscript{36} when 100% anatomic and 71% clinical pain correspondences for the myofascial trigger points and acupuncture points in the treatment of pain disorders were reported.

A number of similarities between them were also suggested. The two structures have similar locations and needles are used at either point to treat pain. The pain associated with the local twitch response at trigger points is similar to the de qi sensation, and the referred pain generated by needling trigger points is similar to the propagated sensation along the meridians.

It was pointed out, however, that the acupuncture points located at the trigger points are not frequently used by acupuncturists, and do not share the same clinical indications as the trigger point therapy.\textsuperscript{39} It was further argued that the claim of 71% correspondence between the acupuncture points and the trigger points\textsuperscript{36} is conceptually impossible.

Furthermore, even putting this conceptual problem aside, no more than 40% of the acupuncture points correlated with the treatment for pain and, more likely, only approximately 18 to 19% of the points are actually correlated.\textsuperscript{35} The correlation between the trigger points and the acupuncture points clearly need to be further investigated in the future. The fascial connection theory we propose can explain the functional connection between dental occlusion/TMJ and other parts of the body based on either myofascial release or the qi and meridian system, or a combination of the two. Therefore, dental occlusion should be built up and maintained in a normal natural condition, while causes for deterioration of the TMJ status should be treated in an effort to restore the natural condition.\textsuperscript{10}

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Aesthetic reconstruction of a transplanted premolar tooth

Several therapeutic approaches are available for restoring missing anterior teeth. The most commonly used involve the placement of implants or the fabrication of resin bonded bridges. Another option is tooth transplantation. In this article, an alternative approach will be presented to provide a suitable restorative solution for a young female patient who had lost an anterior tooth by using a rather unconventional concept.

Restoring upper anterior teeth has proven to be a challenging task for the dental team. Criteria such as aesthetics, function and strength have to be individually assessed in each case. Owing to the advancements in the field of dental materials, however, dental teams nowadays have many all-ceramic restorative options at hand, ranging from zirconium oxide-based framework materials to press ceramics and layer ceramics for individualised layering materials. The individual build-up of the veneers with layering materials from the IPS e.max Ceram range on refractory dies is a more time-consuming and demanding option. However, the outcome makes the effort worthwhile.

The female patient discussed here lost tooth #11 (FDI) owing to an endodontic complication. When this tooth was extracted, tooth #15 was transplanted into the space left by tooth #11 and the gap was preserved by means of orthodontics (Fig. 1). Following successful healing, the 12-year-old expressed her wish to have the transplanted tooth modified for obtaining an impeccable aesthetic appearance. We relied on preoperative models to visualise the case and discussed the various options on the basis of a wax-up. As shown in Figure 2, the transplanted premolar had a strong vestibular inclination as a result of its specific anatomy. This was a factor that made the goal of achieving a harmonious outcome more complicated. When the preoperative model was evaluated, the orthodontically modified gap was identified to be somewhat too large in relation to the width of tooth #21. The immediate solution considered by the restorative team was to build up the incisal aspect of tooth #12 with the help of composite in order to restore the harmonious relationship between the central incisors.

Unfortunately, this procedure would have caused the lateral incisors to be disharmonious. Another criterion was the length/width ratio of the anterior teeth (odontometricts). In order to achieve a harmonious appearance that matched the age of the patient, the incisal areas of the anteriors would have had to be lengthened by 1 to 1.5 mm. These aspects were discussed with the patient and visualised with the help of various models and the wax-up. A treatment goal was agreed upon with the patient, and it was decided that one crown (tooth #11) and three veneers (teeth #12, 22 and 21) were required. The wax-up was optimised accordingly and an aesthetically pleasing outcome was created (Figs. 3 & 4). In order to provide a better preview of the restoration, the final wax-up was transferred to a mock-up by means of a template. The patient was thus able to gain a more detailed idea of the planned outcome before treatment commenced (Fig. 1). She agreed to have the final restorations fabricated on the basis of this mock-up.

When a restoration has to be made in a largely harmonious state it is necessary to decide on the question of how it should be fabricated remains. Whenever possible, an adhesive cemented, conservative, all-ceramic solution should be the first choice. Veneers made by layering ceramic, such as the nano-fluorapatite glass-ceramic IPS e.max Ceram, on refractory dies can be fabricated with very thin wall thicknesses and with pleasing optical effects. If a non-invasive approach is pursued, this type of restoration allows clinicians to make use of its full potential in terms of aesthetics and function. In this case, tooth #11 was prepared accordingly to morphological guidelines and conditioned for the placement of an all-ceramic crown, which was individually layered in the incisal area.

After the preparation and impression taking, the restorations were fabricated on the model. As refractory dies were needed to complete the individually layered veneers, a model with removable dies was prepared (Fig. 1). As a result, it was possible to reposition the duplicated dies in the model of the initial situation precisely when the materials were fired. It is crucial, however, that the dies are fabricated with utmost precision and undercutting has to be prevented at all costs. For an optimal fit of the dies on the model, parallel surfaces that do not allow for any torsion movement of the dies were created. A guidance groove was therefore not necessary (Fig. 7). If the work is carried out precisely, this method allows a high accuracy of fit to be achieved. After the glaze firing, the completed restorations showed an accurate fit in the vertical dimension almost too small from the beginning.

The information gathered in the previously completed wax-up was transferred to the working model through a silicone template, which was additionally adjusted to the situation. Then, another silicone template was prepared, which served as a reference for the subsequent ceramic layering.

Depending on the material used, the refractory dies are left to dry without additional heat for one day after firing. If required, they may be degassed. It is important that the dies are immediately removed from the silicone matrix after a setting time of 45 minutes, as...
the material may start to dissolve the silicone. Subsequently, the prepara-
tion margin of the veneers is marked on the dies with a refractory pencil and wash firing is conducted (Fig. 8).

Thin application of material en-
sures that the ceramic layer is even and homogeneous, which is im-
portant for the fit of the veneers. A clear, transparent material for wash firing, like the IPS e.max Ceram Trunopa clear or IPS e.max Ceram add-on Incisal was used. In order to keep the shrinkage as low or as constant as possible during the main firing cycle, it is possible to create an isthmus with ceramic material. In this case, this structure was cre-
ated in the cervical area (Fig. 9).

Layers of even thicknesses were then applied. Starting in the cervical area, dentine materials were used first. The incisal portion was cre-
ated in accordance with the patien
t situation and supplemented with the appropriate incisal and Trunopa materials (Fig. 10). This procedure was used to create individual char-
acteristics (for example mamelons, opalescent areas) against a trans-
lucent background. The intensity of the materials could be controlled precisely while not being hampered by the opaque effect that is sometimes caused by an underlying layer of dentine material.

The crown on tooth #11 was fabricated using the cut-back tech-
nique. The IPS e.max Press lithium disilicate framework required that the crown be fabricated at the same time as the veneers. Subsequently, the incisal third of the framework was individually layered with IPS e.max Ceram veneering materials. With this procedure, optimum in-
tegration of the restoration into the surrounding tooth structure was achieved, as well as a shade effect that was identical to that of the veneers.

After the dentine firing process, in which the shade was adjusted, the crown and the veneers were fitted on the model. The proximal con-
tacts were designed, and the shape and the surface structure of the restorations were created accord-
ring to the situation using silver powder (Figs. 11–13). With the final glaze firing, the ceramic layering was completed. The investment material was removed using 50-µ glass polishing beads at a pressure of 0.5 bar or 7.25 psi (Fig. 14).

A water-soluble gel that burns out without leaving residue was used to secure the sand-blasted restorations in place on the model. This method allowed us to check

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the laterotrusive and protrusive movements, as well as adjust the restorations with rubber instruments. Taking the functional aspects already incorporated into the wax-up into account, the canines were built-up with composite material. A canine-based dynamic occlusion that relieved the anterior restorations was thus ensured.

Prior to being seated, the veneers were etched with hydrofluoric acid, which was carefully rinsed off after 20 seconds. The restorations were then silanised and seated accurately to the established protocol for adhesive cementation. At the recall appointment after seven days, the teeth were rehydrated, and the soft tissue had recovered from the intervention (Figs. 15 & 16).

Conclusion

The case described in this article demonstrates that complex treatment concepts can be systematically implemented by the dental team with the help of detailed planning. Owing to the intensive counselling of the patient and treatment planning by means of the transfer of the mock-up to the patient’s mouth, a high quality, aesthetically satisfactory outcome was achieved.
“Our growth is definitely driven by innovation and quality.”
An interview with Gilles Pierson, CEO of the Acteon Group

During the 2011 conference of the Association Dentaire Francophone (ADF) in Paris, Gilles Pierson, CEO of the Acteon Group, gave insight into his company’s history, new products and future strategies.

Your business units Satelec, Pierre Rolland and Sopro were unified under the Acteon Group in 2003, followed by your Italian business unit, De Götzen, which joined the group in 2006. At IDS Cologne 2011, you introduced your new corporate identity and the new Acteon logo. What was the main reason for this rebranding?

The change in the group’s name is due to the fact that at the very beginning in 1990, Satelec existed on its own. Pierre Rolland merged with Satelec in 1985 to become Satelec-Pierre Rolland. After 1995, we decided to grow the company through acquisitions, so we acquired different companies like Sopro and De Götzen.

It would not have been feasible to maintain the group Satelec, Pierre Rolland, Sopro, De Götzen and so on. We saw the necessity for a group name while maintaining the companies’ individual names. So the group is now named Acteon but the different companies that we acquired and that merged are identified as companies with their own history and their own products. This is also good for the employees, who remain attached to their original companies while belonging to a large group.

So we have kept the history of each company, but we have grouped them under the umbrella of Acteon. Satelec is still known in countries like France, Pierre Rolland, which is a 60-year-old company, is still famous, so it’s a little bit difficult to introduce the name of Acteon. Eight years on, awareness is growing, although the individual company names of Pierre Rolland and Satelec are, in particular, better known than the umbrella group of Acteon.

In countries where our history is shorter, like the USA, Asia or Australia, Acteon is now known as a company, and the different companies like Satelec, Pierre Rolland and Sopro as division. We fought, in order to keep the identity of each company in the group, while building a brand name that encompasses all of them.

With a turnover of €113 million and a growth rate of 16 % in 2010, last year was another big and successful year with a 16 % increase. In 2011, we expect another 9 % increase in sales, which is good if you consider the economic situation. Europe will account for a stable 2 % and the US for 10 %. But the highest growth we are experiencing is in China, at approximately 20 %. In general, Asia currently accounts for 20 % of our global sales, so if we achieve a 20 % increase, we will be very satisfied. Countries like India in particular have very strong markets for our products, as was Thailand until November, before floods plagued the country.

2011 and the coming years will definitely be driven by Asia, and especially by China, where we have been doing business since 1987. We now have a team of 40 people there and expect an average growth of 50 % over the next five years. China is definitely a booming market.

When we talk to other European companies that sell on the Chinese market, they mention price sensitivity and the need to adapt to the local price level.

No, I don’t think it’s a question of price—it’s a question of mentality in China. There have been cheap copies of all our products there. Twenty years ago, we sued the copycats. However, we realised that this was not productive because if the company simply closes and reopens in the next garage, you are fighting a lost cause. More importantly, we have realised that the Chinese copies are our best advertisement because the quality is low, so the patient and the design is just ridiculous. Dentists first buy a Chinese copier but then they experience somany problems. As soon as they have the money to buy a European product at a European price, they will have ours. The fake RolleX made in China is sold in Europe, but the real RolleX made in Germany is sold in China. And the proper business-oriented Chinese client with a long-term plan will never buy a fake product.

On the other hand, we are seeing an alarming trend reversal in Europe. There are so many fake copies on products from China imported into Europe with a fake CE number or with a fake ISO 9009. The customs duties in the Shenzhen area do not block these fake products, so any kind of product can enter into Europe. These are healthcare devices to treat patients and they should not put patients in danger.

Do you believe that you will still be able to manufacture in France or in Europe in the future?

Acteon’s policy is to manufacture and conduct research in Western Europe, and not to manufacture in China, South-East Asia, Brazil, India, or anywhere else. Our policy is to produce continuously in Western Europe. Our factories are in France, Italy and Germany. Acteon has established itself in a niche of the health-care market where we are able to offer more or less the complete range of products. Only the panoramic market is sold in China, but the next five to six years, the panoramic might disappear from the market and be replaced by the flat panel instead of the linear panel. We therefore prefer to concentrate on the flat panel, with a 2-D or 5-D reconstruction.

No one can deny any longer that the future of dentistry is digital. For example, at Sopro, we manufacture a camera to detect tooth decay with fluorescence technology. So imaging is one thing, but with imaging you can go to diagnosis. Imaging for a diagnosis is really the key point of imaging, and if you have a good diagnosis, you can have a good treatment.

Your new CBCT System, WhiteFox, received the red dot design award in 2011, which recognises exceptional industrial design. What is the response from the market, and how are the sales figures for the WhiteFox system?

We place a heavy emphasis on design at Acteon for three reasons. The first reason is that the dental clinics are usually well designed because the patient is awake. It is not like a hospital, where the patient is under anaesthesia and asleep and does not care about his environment. In a dental clinic, patients like to have a nice environment to lower the stress of the experience.

Another point is that the dental assistant is participating increasingly in the choice of products. The clinical team likes nice designs and colours, whereas the dentists tend to be more attracted by technical features. But the dental assistant is playing an increasingly important role in decision-making when it comes to new acquisitions.

The WhiteFox was very well received by the market. The design is nice, but the technology is really advanced. For example, WhiteFox is the only scanner of its kind to feature a Hounsfield units calibration. This calibration is used for measuring bone density in order to allow for perfect planning and, if needed, for bone grafting prior to implantations.

Since the introduction of cone-beam technology in general dental and maxillo-facial surgery, ENT surgeons have begun to explore this in this form of technology and are thus becoming a very important market for this kind of product.

The large viewing area for the ear, nose and throat is especially concerning. We have good synergies with our medical division, which is also specialised in this field. There are many bridges between the dental and medical fields, between endoscopy in the medical and imaging in the dental field, between radiology in the dental and imaging in hospitals or ENT.

We are pleased with the cone beam and the figures are within our expectations.

You are Platinum sponsor of the upcoming Europerio Congress in Vienna. What can visitors expect from Acteon there?

Basically, we are very involved in preventive and conservative dentistry. Periodontics has always played a major role in these areas and Europerio is considered to be the leading congress in this specialist worldwide. We have purposefully chosen to become Platinum sponsor of the congress because of the quality of its scientific programme and the excellent standing of the congress in the dental community.

Acteon will stage sponsored sessions on Wednesday, 6 June, from 10.00 to 17.00 (this includes a session hosted by Dr Bennani entitled “A new Gingrich retraction technique for implants”), Thursday, 7 June, from 12.15 to 15.45, there will be a novel procedure for evaluating plaque status and soft-tissue inflammation using an intraoral camera. These sessions will be of interest to dental hygienists, general dentists as well as periodontists. The crème de la crème of international speakers will reveal tips and tricks from their professional lives, and we invite everyone cordially to join us in Vienna.

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