Anxiety provoking scale developed

By DTI

HONG KONG: Dental anxiety is a major hindrance in the provision of dental care. Although it is known that fear of the dentist is closely related to patients’ past experiences in the dental setting, only limited scientific research on the actual causes of dental anxiety is available. Now, researchers have developed a Dental Anxiety Provoking Scale (DAPS) that measures the degree to which anxiety is triggered by certain dental stimuli.

For the study, the participants, 460 male and female students recruited from two universities in Hong Kong, answered a questionnaire including a 75-item measure of dental anxiety provoking stimuli. The factor analysis established seven factors for the DAPS, namely, dental check-up, injection, scale and drill, surgery, empathy, perceived lack of control, and clinical environment.

In a sub-group of the 460 participants, injections and surgical treatment, in particular, were identified as anxiety-provoking events. Although it was not statistically significant, female respondents showed relatively higher anxiety regarding injection, surgery, and scale and drill, while male respondents showed relatively higher anxiety regarding perceived lack of control, empathy, and dental check-ups.

In addition, the researchers found that perceived dentist behaviour had an impact on the expression and development of dental fear, indicating that the dentist–patient relationship is strongly related to patients’ feelings of safety and control during treatment.

The researchers concluded that the DAPS covers a broad spectrum of patients’ individual dental anxiety-related anxiety and may also function as a further assessment tool to supplement initial screening. This may allow the identification of patients with higher dental fear so that the causes of their dental fear can then be addressed.

The study, titled ‘Development of a Dental Anxiety Provoking Scale: A pilot study in Hong Kong’, was published in the September issue of the Journal of Dental Sciences.

Extractions cost Australia millions

A new study conducted at the University of Western Australia has shown that prophylactic removal of third molars costs the Australian health system more than half a billion Australian dollar a year. In addition, the researchers found that between A$420 and A$513 million (US$393 and 489 million) is spend annually if Australia adopted guidelines comparable to the UK.

The researchers concluded that third molars contribute to the development of dental decay. This practice is linked to adverse health effects, including pain, nerve damage and infection.

Job prospects

Dentist and orthodontist are among the top ten highest paying jobs in the US, the 2015 Jobs Rated report by CareerCast has revealed.

The profession of dentist was rated the fifth best paid job with a median annual salary of US$129,110. Dentist and orthodontist are followed by orthodontist at No. 7 the fifth best paid job with a median annual salary of US$115,020.
FDI releases second edition of Oral Health Atlas

The Challenge of Oral Disease
A Call for Global Action

By DTI

BANGKOK, Thailand: The FDI World Dental Federation has released the second edition of its Oral Health Atlas at the Annual World Dental Congress (AWDC) in Bangkok in Thailand. Titled The Challenge of Oral Disease — A Call for Global Action, it aims to serve as an advocacy resource for all oral health care professionals and recommends strategies to address the global challenge of oral disease.

At the launch event held at the Bangkok International Trade and Exhibition Centre, Dr Habib Benzian and Prof. David Williams, editors-in-chief, presented the new edition of the Atlas and spoke at DTI group editor Daniel Zimmermann about the contents of the book and the second edition of the Oral Health Atlas and emphasized the extent of the problem of oral disease worldwide. The second edition of the Atlas provides an update of the global health challenge and reflects on policies and strategies that address the burden of oral disease.

The first edition of the Oral Health Atlas, titled Mapping a Neglected Global Health Issue, was released at the FDI 2009 AWDC in Singapore and highlighted the extent of the problem of oral disease worldwide. The challenge of oral disease across all countries, recently confirmed by the Global Burden of Disease Study looking at the burden of 281 diseases and conditions, said Benzian. “Children with severe untreated tooth decay are impacted in their growth, have frequent episodes of pain, miss days in school and have a generally lower quality of life,” he continued. They also usually have the lowest access to oral health care and preventive services, added Williams. Therefore, the two editors-in-chief hope that the second edition of the Oral Health Atlas will be an advocacy tool for institutions, policymakers and dental associations in their effort to improve access to oral health care worldwide.

The compilation of the new edition of the Oral Health Atlas was supported by the Hong Kong Dental Association and the FDI’s Vision 2020 oral health initiative. The book content includes chapters and data from 30 contributors, and was reviewed and edited by the two editors-in-chief.

The atlas can be downloaded free of charge from the FDI website and will be translated into the FDI’s official languages of French and Spanish. These versions will be available electronically in early 2016.

Factors and inequities in oral health, as well as oral disease prevention and management. Moreover, it aims to ensure that oral health is granted higher priority on the global health and development agendas. Written for national dental associations, health organisations, industry professionals and the general public, the atlas provides them the means to address policymakers, governments and local authorities based on sound facts so that they can better advocate for change in oral health-related policies, Williams said.

According to the atlas, only about two-thirds of the world’s population have access to adequate oral health care, even though oral disease, particularly tooth decay, is among the most common human diseases. “Untreated tooth decay is the most common health condition of children across all countries, recently confirmed by the Global Burden of Disease Study looking at the burden of 281 diseases and conditions”, said Benzian. “Children with severe untreated tooth decay are impacted in their growth, have frequent episodes of pain, miss days in school and have a generally lower quality of life,” he continued. They also usually have the lowest access to oral health care and preventive services, added Williams. Therefore, the two editors-in-chief hope that the second edition of the Oral Health Atlas will be an advocacy tool for institutions, policymakers and dental associations in their effort to improve access to oral health care worldwide.

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New dental school opens in Malaysia

By DTI

KUALA LUMPUR, Malaysia: With the completion of the new dental faculty building on Sungai Buloh Campus, Universiti Teknologi MARA (UiTM) is now operating the largest dental centre in the country. The RM73.8 million (US$17.1 million) project, which was launched seven years ago, houses Malaysia’s first sterilisation and dental supply centre and will allow treatment of up to 500 patients per day.

The new building unites academic, clinical and administrative facilities for both undergraduate and postgraduate dentistry students. The faculty’s state-of-the-art facilities are expected to deliver high-quality education and training for staff and students alike.

As reported online by Astro Awani, the new building houses operating theatres, wards, a radiology unit, as well as the first sterilisation and dental supply centre in Malaysia. Of the 16 clinics included in the faculty, two specialise in treating persons with disabilities.

During a press event held to celebrate the completion of the new facilities on 1 September, UiTM Vice Chancellor Tan Sri Prof. Sahol Hamid Abu Bakar stressed that the faculty’s clinics will offer dental care services to people from all walks of life. “When fully operational, we estimate some 205 patients can be treated at any one time, with 400 to 500 patients per day,” he said.

He further expressed his hope that the new campus will produce more competent and professional dentistry graduates to allow for the provision of the best services to the community.

The UiTM’s Faculty of Dentistry was founded in 2006. Collectively, the university offers more than 300 academic programmes and has over 40,000 students on its main campus and 80,000 throughout the country.

English is the sole language of teaching.

2016 WOHD campaign launched

By DTI

BANGKOK, Thailand: Since 2013, World Oral Health Day (WOHD) has sought to spread the key message of good oral health being relevant to general health among the public worldwide.

The new campaign, launched last month at the National Liaison Officers’ Forum at the FDI Annual World Dental Congress (AWDC) in Bangkok, will offer more tools and applications than ever to help dental associations around the world to promote this important event, FDI Executive Director Enzo Bondioni said.

In addition to the customisable poster application first introduced in February, this year’s campaign will be supported by a promotional video featuring individually recorded messages from dental professionals around the world explaining why they think good oral health is important. For this, attendees of the AWDC in Bangkok were invited to visit the WOHD stand on the second floor in the Bangkok International Trade and Exhibition Centre to have their message recorded. Individual messages can also be sent to the organisation via e-mail. The best of these will be included in the final product.

Furthermore, a smartphone game is in development that will be available for iPhone and Android platforms later this year, Bondioni said.

Originally held in September, WOHD is now celebrated on 20 March every year. In addition to public awareness campaigns and sponsored oral health-related events, the FDI’s member national dental associations, schools, companies and other groups worldwide celebrate the day with individually organised events to inform people everywhere in the world about oral health issues and the importance of oral hygiene. Last year saw over 100 countries around the world participating in the effort. As a highlight, the campaign’s key message was broadcast to the world via the giant NASDAQ screen in Times Square in New York in the US.
Data security: How not to become the next Ashley Madison

By Naz Haque, UK

At the heart of the relationship between a dentist and a patient lies trust and respect. Recent events, such as the Sony or, more currently, the Ashley Madison breach, have brought to public awareness the importance of securing one’s data. Data security and governance is a very tricky area. I must make it clear I am not a lawyer, but I am a highly experienced information technology professional with a good understanding of data protection and other relevant legislation. All interpretations provided here are my own.

Even if a dental practice has not embraced the digital age and all records and correspondence are ink and paper based, the practice still has a number of responsibilities regarding data security. As dental practices collect patient details, they must register with the Information Commissioner’s Office (ICO) here in the UK. Dental records must be stored safely and securely for a number of years (up to six years for the National Health Service; NHS) and kept for a maximum of 30 years (Department of Health). Records must also be disposed of in a policed manner to avoid fines.

What about dental practices who have embraced digital? Data is accessed in two situations, storage and movement, the same as physical records are. This also means that there are two situations in which data can be compromised in the digital world. Dental practices have an obligation to ensure patient data is backed up, recoverable (in case of disasters), secure and protected.

This applies during both storage and movement. If you are using one of the popular industry patient management systems, such as EXACT (Software of Excellence), it should have features to support this in place; liaise with your account manager to verify this.

The next area of concern then is movement of data. This can be via e-mail, online referral tools or portals, feedback platforms or devices, and your website. E-mail is not a secure medium, and communication with patients about their medical history or medical circumstances using this platform raises potential issues. The service provider you use for your e-mail could also inadvertently making you breach data security rules. For example, if you are using one of the popular US-based organisations for e-mail, such as AOL, Hotmail and Gmail, and liaise with your patients via this e-mail platform, you have to consider where the e-mail is being stored; most likely on servers outside your own country.

The UK’s Data Protection Act states that “personal data shall not be transferred to a country or territory outside the EEA (European Economic Area) unless that country or territory ensures an adequate level of protection for the rights and freedoms of data subjects in relation to the processing of personal data.” As a dental practice, you should reconsider if you are using a commercial e-mail provider to liaise with your patients, and determine whether your website communication tools and feedback portals are compliant and if not ensure your designated data policy controller addresses this as a priority. Here in the UK, the ICO can issue monetary penalty notices, requiring organisations to pay up to £300,000 for serious breaches of the DPA occurring on or after 6 April 2010. Clients at Dental Focus expect us to take care of online compliance and provide guidance on keeping up to date and resolving these issues. Make sure your data is secured and protected before it is too late.

Naz Haque, aka The Scientist, is Operations Manager at Dental Focus. He has a background in mobile and network computing, and has experience supporting a wide range of blue-chip brands, from Apple to Xerox. As an expert in search engine optimisation, Naz is passionate about helping clients develop strategies to enhance their brand and increase the return on investment from their dental practice websites. He can be contacted at naz@dentalfocus.com.
Clear aligners more beneficial than braces

By DTI

MAINZ, Germany: In recent years, clear aligners have become a favourable treatment alternative in orthodontics to fixed orthodontic appliances (FOA). However, there are few studies about the effects of aligner treatment on oral hygiene and gingival condition. A team of German researchers has now compared the oral health status, oral hygiene and treatment satisfaction of patients treated with FOA and the Invisalign aligner system. They found that Invisalign patients have better periodontal health and greater satisfaction during orthodontic treatment.

To date, the majority of patients, particularly during childhood and adolescence, are treated with FOA. However, these appliances tend to complicate oral hygiene and thus interfere with patients’ periodontal health. Moreover, treatment with FOA is not very popular in adult orthodontics for aesthetic reasons. Therefore, other orthodontic techniques have been developed to improve aesthetics and simplify oral hygiene procedures. An alternative to FOA is clear aligners, which are discreet and have the advantage of being removable during oral hygiene and eating or drinking. The use of clear aligners has increased greatly in the last decade, one prominent example being Invisalign, produced by Align Technology since 1999. However, only a limited number of studies have compared the effects of Invisalign and FOA on oral hygiene, the researchers from the Johannes Gutenberg University of Mainz pointed out.

Their study included 100 patients who underwent orthodontic treatment, divided equally between FOA and Invisalign, for more than six months. The researchers performed clinical examinations before and after treatment to evaluate the patients’ periodontal condition and any changes. Furthermore, a detailed questionnaire assessed the patients’ personal oral hygiene and dietary habits, as well as satisfaction with the treatment. All of the patients received the same oral hygiene instructions before and during orthodontic treatment. This included the use of toothbrush, dental floss and interdental brushes three times daily.

The data analysis showed no differences between the two groups regarding periodontal health and oral hygiene prior to the orthodontic treatment. They found that gingival health was significantly better in patients treated with Invisalign, and the amount of dental plaque was also less but not significantly different compared with FOA patients.

The questionnaire results showed greater satisfaction in patients treated with Invisalign. Only 6 per cent of the Invisalign patients reported impairment of their general well-being during orthodontic treatment, compared with 36 per cent of the FOA patients. Other negative effects that also were significantly higher in FOA patients included gingival irritation (FOA: 56 per cent; Invisalign: 14 per cent), being kept from laughing for aesthetic reasons (FOA: 26 per cent; Invisalign: 6 per cent), having to change eating habits during orthodontic treatment (FOA: 70 per cent; Invisalign: 50 per cent), and having to brush one’s teeth for longer and more often (FOA: 84 per cent; Invisalign: 52 per cent).

The researchers concluded that orthodontic treatment with Invisalign has significantly lower negative impacts on a patient’s condition than treatment with FOA, both with regard to gingival health and overall well-being.
The concept of osseointegration has been applied to dental implants for several decades. As an orthopaedic surgeon and engineer, Dr Rickard Brånemark has continued the work of his famous father by adapting the concept to the treatment of amputees. In an recent interview with Dental Tribune at the EAO congress in Sweden, Brånemark explained the benefits and future possibilities of osseointegrated amputation prostheses.

**Dental Tribune: Dr Brånemark, could you please give an outline of the development of osseointegrated prostheses?**

Dr Rickard Brånemark: The work started by my father was the foundation of what we do in orthopaedics today. Using his concept, I developed new treatments for amputees based on osseointegrated implants, which I have been performing for about 25–30 years now.

Since 1998, I have mostly worked with my own companies, namely Brånemark Integration, the dental company I started with my father, and Integrum, which does all the development for orthopaedic osseointegration. However, we now also have multinational collaborations with universities in Gothenburg, Vienna, San Francisco and Chicago, and hopefully also Göttingen in the near future. As the Swedish implant system has recently been approved by the US Food and Drug Administration (FDA) for the treatment of amputees, I am currently establishing an orthopaedic osseointegration centre in San Francisco and am working closely with the US Department of Defense, which has many soldiers with amputations and is thus very interested in supporting our work.

**What do you consider the main challenges of this treatment?**

Anchoring something to the bone is the core of osseointegration technology and that is a fairly robust technology we have proven in millions of dental implants. However, in orthopaedics, we face additional challenges. There are, for example, no materials available today that are strong enough to withstand 20–50 years of high physical activity. Therefore, we have developed and continue to develop new materials and surfaces that better withstand the higher loads.

Another important concern is the mucosal area and skin penetration, which is maybe even more challenging. We are working with a concept very similar to the old Brånemark protocol and the bone-anchored hearing aid in that we have a smooth surface that is not an attachment. There are many groups working with attachments and, as far as I know, all have failed, especially in the orthopaedic field.

**How do you think that osseointegrated prostheses could potentially replace traditional prostheses in the future?**

Brånemark: This treatment would not apply to amputations of the lower leg as a result of poor circulation caused by diabetes or vascular diseases related to smoking. Such patients constitute about 90 per cent of the amputee population. However, the younger population who have been in road or war accidents or who have musculoskeletal tumours, which are more likely to occur in younger patients, will be candidates for this treatment.

We have already successfully treated one patient. However, our research is still in the early phase, but I think we could do amazing things in the future.

**Do you think that osseointegrated prostheses could potentially replace traditional prostheses in the future?**

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If the technology continues to be as promising as it appears now, the majority of patients will opt for it—just like they now have the choice between dentures or fixed dental implants, which are much better for the patient. There will be a shift, but this will take some time. The introduction of dental implants took about 20 years, similarly, this shift could take another ten to 20 years. However, receiving FDA approval and having the system in use by the military could definitely speed up the establishment.

Overall, this treatment offers many alternatives to conventional treatments. However, there is often too much conservatism in the dental and medical fields when it comes to innovations, but I think we need to stay open-minded to new crazy ideas. This research shows what might be possible in the future. We might be able to restore sensory function of a non-existing limb, creating good artificial sensation. It also shows that the dental and the medical professions should work more closely together. As one can see, there are many synergies that could be drawn from the fields of dental and orthopaedic research in our case. The idea of translation of knowledge was also the original idea of the EAO, which has now become a purely dental meeting. This is a pity because we have to collaborate more, but maybe there will be more cross-disciplinary presentations and meetings in the future.

Thank you very much for the interview.
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“We are now able to enter the second phase of expansion”

An interview with Jörg Brenn and Christian Brutzer, representatives of Ivoclar Vivadent in Asia

In the presence of 100 guests and partners from South East Asia, dental manufacturer Ivoclar Vivadent recently opened a new marketing office in Indonesia. Located in the western province of Banten, the office is intended to provide marketing support on both clinical and technical products to business partners in the region. The former general manager of Ivoclar Vivadent China, Jörg Brenn, will head the new operation. At the recently held FDI Annual World Dental Congress in Bangkok in Thailand, Dental Tribune had the opportunity to speak with Brenn and Global Region Head Asia/Pacific Christian Brutzer about the new venture and how it will influence their company’s position and business strategies in the Asia Pacific region.

Dental Tribune: With the new office in Indonesia, your company has recently extended its marketing network to South East Asia. What was the incentive behind setting up a regional hub there?

Jörg Brenn: Besides having a large number of dentists and dental laboratories in Indonesia and the region, Indonesia’s economy remains one of the fastest growing markets in the entire Asia Pacific region. However, this was only one of the reasons for setting up an office there. We also decided to go to Indonesia because of its unique economic circumstances. Most of our competitors are still operating from Thailand or Singapore, so we decided to do something completely different.

The new office is based in the suburb of Tangerang (not in downtown Jakarta), which is very close to the airport. This means we can offer excellent connections for visitors from South East Asia who want to participate in our training programmes, for example.

Christian Brutzer: Some years ago, Jakarta and Indonesia as a whole were certainly a secondary choice in terms of accessibility and logistics. Now, however, one can reach all important hubs in the region and beyond from there. The country also boasts a domestic market potential that is far higher compared with countries like Singapore.

You mentioned that you will be offering educational programmes in Indonesia. How and in what courses will dentists be able to participate?

Brutzer: Ivoclar Vivadent is a system provider. This includes education, which we are now able to offer through the new International Centre for Dental Education (ICDE) in Indonesia. It is on the same level as our ICDEs in Shanghai and Osaka, for example. According to our knowledge, it is also the first training centre that a foreign manufacturer has set up in the country. Since we have highly trained personnel on-site, we will be able to offer support to our clients and part-

tners—something unprecedented in Indonesia. Our staff will be regularly trained at our head office and have full access to the Ivoclar Vivadent information network.

How does the new operation in Indonesia fit into your overall business strategy for the Asia Pacific region?

Brenn: After a year of preparation and observing the market, we are already seeing a positive development in Indonesia. We now know more than ever what huge opportunities this market offers for our business.

What are the prospects for Ivoclar Vivadent’s business in the Asia Pacific region?

Brutzer: The market in Asia is still growing more dynamically than any other market in the world, even more than Latin America. In some countries, like China, we are currently experiencing deflation owing to previous efforts by the government there to slow down growth. Naturally, this had an effect on dental services and the demand for materials and systems. However, we envision the private sector constantly expanding and this development will give us completely different opportunities in the years to come. We are seeing similar developments currently in India.

As usual, we have adopted a medium- and long-term strategy in South East Asia. This means that we do not expect the market to experience growth in the future. Fortunately, we are able to address a market like Indonesia with enough resources to accelerate that process. Our approach is based on sustainability.

Brenn: Jörg Brenn (left) and Christian Brutzer (centre) in talks with DTI Group Editor Daniel Zimmermann.

“Asia is still growing more dynamically than any other market in the world...”

Christian Brutzer and Jörg Brenn celebrating the opening of Ivoclar’s new SEA office with local staff members.
Mandibular body reconstruction with a 3-D printed implant

By Dr Saeid Kazemi, Reza Kazemi, Sita Rami Reddy Jonnala & Dr Ramin S. Khanjani, Sweden

Nowadays, no aspect of human life seems to have been left untouched by the ever-expanding digital technology. Particularly in scientific fields, digitalisation has working wonders during the past few years, to the degree that it is even difficult to imagine going back to the ordeal of analogue methods and putting up with their vagaries. A remarkable blessing of digital technology, among others, is the exceptional precision and high control over the measurements, never possible to obtain through any of the preceding methods. There is no surprise then that it has the strongest appeal to the fields of knowledge and practice wherein precision is amongst the most critical element of success.

Hot spot for digital technology

With a lot of technical sensitivity at its heart, the dentistry can easily be viewed as a hot spot for implementing digital technology to achieve the most-wished precision. Indeed, the digital technology has already gained a stable foothold in dentistry and there is an ongoing shift towards embracing digital systems into the dental practice. Predictably, the majority of the advertised technologies and services are geared towards routine dental procedures. On the other hand, the most significant advancements have been witnessed in an area which falls only within the experience of specialists, it is the domain of maxillofacial surgery where tailoring the treatment plan to the unique conditions of the patient is the key to success. Here the state-of-the-art digital technology comes in handy to fully customise the treatment by taking the slightest details into consideration and reflecting that into the surgical and restorative solutions.

Though the successful reconstruction of any human structure is justifiably a challenge, the stakes are even higher when the oral and maxillofacial area is affected. In this latter case, care must be taken to rewire function in conjunction with restoring aesthetics. Oftentimes, even the second objective might take precedence. Assuch, the significance of precision and adaptability to the existing structures for the maxillofacial implants cannot be overemphasised. Fortunately with the advent of 3-D digital designing and additive manufacturing a fully satisfactory treatment is no more a remote possibility.

The virtual environment of 3-D software accommodates full inspection of the surgical area from multiple angles. It also facilitates designing and adjustment of the form of the future implant with much ease and with respect to topography of the surrounding structures. Thanks to the availability of technology and material, now it is possible to 3-D print such intricate designs with above-standard accuracy and minimum technical glitch. The result is the highest fit of precision always craved for by maxillofacial surgeons to complement their skilful incisions.

Case presentation

Since its inception, DRSK Company has been committed to exploring potentials for incorporation of the digital and computer science into the dental field by devising innovative solutions. With 3-D services being a major activity of DRSK, the company has been approached for 3-D designing the maxillofacial implants of different kinds and successfully accomplished them. All these 3-D designed implants are highly customised and feature great accuracy and therefore satisfy both surgical and mechanical standards.

Patient case

One such recently carried out project that merits further elaboration is the design and manufacture of one of a kind mandibular implant (Fig. 9) for reconstructing the missing mandible body (Fig. 2). The patient, a young man, had lost the entire mandible except for the ramus after being severely injured in a blast. Over the years, the patient had undergone several surgeries with little improvements achieved. In point of fact, one consequence of these surgeries was the formation of fibrous scar tissues which, as will be explained in the following, exacerbated the situation and restricted the chance for an effective treatment.

At the time the surgical team contacted DRSK, the patient had already received a graft taken from his fibula. Owing to the extent of structure loss, the graft alone failed to yield the anticipated results. Needless to say, the ultimate goal of the treatment was to improve the aesthetics and retrieve the function of the reconstructed jaw by a prosthetic treatment and giving the patient a chance to experience an almost normal mastication once more. However, the form and size of the grafted bone could not provide the required support for prosthetic structures such as dental fixtures.

Eventually, the surgical team decided to seek assistance from DRSK and use its 3-D services expertise to design and manufacture an ad hoc mandibular implant that fully complies with the patient’s unfavourable conditions and enables the complementary prosthodontics...
The overall shape of the implant and its relation with other anatomic structures, including the grafted bone and the soft tissue were all fleshed out and requested by the surgical team. One stipulation of the surgical team was to keep the previously grafted fibula. They considered it as a safety measure in event of implant’s failure.

### The Design Solution

One big challenge to carry out this particular project was to design the implant in such a way that it can be easily seated in the correct position. There were two major impediments to a one-piece implant solution. First of all, the implant was intended to be mounted over the remaining parts of the patient’s jaw, i.e., his two rami. To achieve the maximum anchorage from the rami, those parts of the implant connecting them were supposed to adapt to their external anatomy. Since the rami converge to the front, the same was expected from the corresponding implant design.

However, such designing choice would have made the matters complicated for surgical placement of the implant. What’s more, the fibrous tissues resulting from the previous surgeries have dramatically reduced the patient’s ability to open his mouth. Therefore, DRSK 3-D design team had to cross out the one-piece implant solution. Eventually by taking different limitations into account and after consulting with the surgical team and receiving their endorsement, it was decided to make the prosthesis in three pieces.

Each of the two larger left and right segments of the implant was designed to be placed and screwed individually over the corresponding rami (Fig. 3), while at the front they met and dovetailed into each other (Fig. 4). A third part then had to be placed over the two pieces at their interface, embrace both and hold them together securely (Figs. 5 & 6). This way the whole thing turned into a unified structure.

### Excellent Fit with 3-D Designing

The success of the proposed design was to a large extent reliant on obtaining an excellent fit for each piece. This is the reason why the role of 3-D design and manufacture was so essential in this procedure. The parts of the right and left sections that meet the rami had to be exactly adapted to the form of their corresponding anatomic structures. Each of them had to be formed in such a way that can fold over the edges of the ramus and embrace it enough for a proper support. Using 3-D design as well guaranteed the perfect contacts between these pieces which otherwise might have been an area of concern for a design of this nature.

Given the necessity for including a prosthetic solution and considering the patient’s limited mouth opening, the most feasible solution was to incorporate the artificial teeth into the structure of the mandibular implant. As described above, during the surgical procedure and after screwing left and right pieces over the rami, the two overlapping front ends of left and right parts were fully fixed in place by adding the middle segment. The idea for the final design was to include the artificial teeth as part of this middle section.

However, to eliminate the risk of any force or pressure that would have compromised the success of the surgery, a temporary or surgical middle piece was designed to be placed over the left and right section at the surgical session (Fig. 5). The function of this piece was simply to hold two pieces in place at the front (Fig. 6) before being replaced with the prosthetic permanent middle sections (Fig. 7).

#### The Prosthodontic Component

On the surgical team’s recommendation, the mandibular dentition included in the design of the middle section only comprised ten teeth including incisors, canines and premolars on both sides (Fig. 7). Due to the size of third surgical piece and its function of uniting the other two sections, only incisors and canines are in contact with the interconnecting surface of the middle part. So when the middle prosthetic piece is seen independently, the premolars look unsupported in the manner of a cantilever bridge.

However, after insertion of this enfolding middle part over the overlapped arms of left and right pieces, the premolars become tightly in contact with left and right sections; this prevents any destructive lever function from taking place. Again such close contact has only been enabled by the accuracy of 3-D designing and the following 3-D print procedure.

The particular design of arms of left and right pieces, which collectively form the body of the mandible, is also worthy of note. These arms feature a 90 degree twist in the approximate area of molar. In this way they can adopt to both the superior posterior part, which is anchored over the ramus and the frontal part that required...
High viscosity ionomers

Amalgam alternatives in the posterior section

By Dr José Ignacio Zalba Elizari, Spain

This article discusses a treatment approach change in the Minimal Intervention model, where high viscosity glass ionomers present some advantages that position it as the restorative material of choice in the posterior section for all patients, especially for those with high risk of caries including children, older people, periodontal patients and patients on medication.

Changes in the treatment approach and the development of adhesive materials led to progress in dentistry. Minimal Intervention has changed the traditional model where treatment of cavities does not just involve a mechanical approach, but also requires a biological approach, made possible by less invasive techniques, therefore the biocompatibility of the materials requires greater attention.

Biomaterials are, by definition, any materials that take on the functions of the tissues in natural organs, capable of imitating the properties of the tissue as far as possible in its biological environment. Biomaterials must meet the requirements of functional feasibility, biostability, biocompatibility and sterility.

No restorative material can replace enamel and dentin perfectly and therefore preserving these must be of utmost importance in any treatment plan. Aware of the situation, the profession has developed new techniques and dental serving as protection for the pulp. Proper adhesion will help prevent microleakage by isolating residual bacteria from nutrients, reducing its metabolic activity, thus stopping the progress of demineralisation, while the calcium, phosphorous and fluoride ions available in the ionomer will increase remineralisation. The ultimate in MI models involves greater conservation of end up being more economical in the work process, which makes them of more interest in current climate where it is not only about doing it well, but less expensively too.

There is strong controversy on the potential health impacts caused by the use of amalgam, which started long ago when some members of the scientific community raised doubts about its effectiveness and safety regarding the effects on animals and humans of the mercury contained in amalgams that have been used for several decades in various odontological applications. All this requires thinking anew and more so now that we have more biocompatible materials with a high success rate when it comes to resolving the requirements of restoring teeth using current MI working models. The team at the dental clinic itself suffers the greatest risk of contamination when handling it, since it causes mercury to be released into the surgery environment.

Up to now, the restorative material that is closest to nature is glass ionomer (EQUA, GC Europe), which is a mineral. We could say that EQUA is in itself a new restoration concept involving two materials: a next generation high viscosity glass ionomer (EQUA Fill), with a translucency and aesthetic similarity to enamel in this type of material, and a nano-filled varnish (EQUA Coat) that not only heals the material bodily, but also protects it as it matures.

With this new restoration technology, we have the huge advantage of being able to fill a cavity all at once and carry out very quick restorations, which results in an economical restoration that is at the same time aesthetic. Another added benefit typical of ionomers as explained before, is that it is not necessary to isolate the area, so we will have better adhesion in fillings where it is difficult to get an adequate dry area.

Minimally invasive restorative models, combined with the demand for more aesthetic, biocompatible and lower cost materials, are causing current direct restorative minimal intervention dentistry to move away from amalgam in order to find new systems based on glass ionomers as the material of choice in the posterior section. In addition, this new restorative concept is a perfect alternative for any patients who reject composites for financial reasons or in those situations where the isolation required for a composite may not be attainable.

Clinical case—Fig. 5: Initial situation with dental caries—Fig. 2: Opening of the cavity—Fig. 3: Application of the material (EQUA fill) of all once—Fig. 4: Modelling after 90 seconds—Fig. 5: Application of the nano-filled varnish—Fig. 6: Result after light curing 20 seconds.

Black’s classification of cavities was used in dentistry for treating dental caries for much of the last century, and lesions have therefore been treated by removing the diseased tissue from the tooth along with a healthy portion as well. That past reality fit the techniques and material available at the time, primarily amalgam.

As Dr Karl-Heinz Friedl demonstrated, the new restorative concept involving two materials: a next generation high viscosity glass ionomer (EQUA Fill), with a translucency and aesthetic similarity to enamel in this type of material, and a nano-filled varnish (EQUA Coat) that not only heals the material bodily, but also protects it as it matures.

The latest publications have even indicated that high density glass ionomers can be used in Class II under stress where the isthmus is less than half the intercuspal distance.

Clinical note: This article was originally published in GCADENTAL.PL, March 2015.

Dr José Ignacio Zalba Elizari is a specialist in minimally invasive dentistry. He is currently working as a dentist at Zalba dental clinic in Pamplona in Spain. Zalba can be contacted at consulta@capdental.net.

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THE POWER OF THE PERFECT FIT
A mosaic of numerous individual pieces

Treatment plan for restoring a badly abraded dentition

By Dr Jan Kersting & Alexander Miranskij, Germany

Many different therapeutic components combine to produce a treatment solution that focuses on both functional and aesthetic parameters. However, the different pieces have to be carefully matched in order to obtain a satisfying, long-lasting result. A well-structured treatment plan is requisite, particularly in extensive restorative procedures. Continuous interaction and communication between the practitioner and the dental technician throughout the treatment and the patient’s confidence in these specialists represent important components in the process of restoring the aesthetics and function of the patient’s dentition.

In addition, materials play a pivotal role. In this regard, the high-strength lithium disilicate glass-ceramic IPS e.max Press (Ivoclar Vivadent) offers excellent physical and aesthetic characteristics, making it the ideal choice for many indications. Apart from its high strength and aesthetics, the lithium disilicate glass-ceramic is particularly noted for its very high resistance against fracture. The material has a very attractive material appearance, allowing exception success to be achieved, even if space is limited.

When the patient consulted our practice for the first time, he had severely worn anterior and posterior teeth. He was one of the strongest athletes and had been participating in competitive sports for many years. His facial muscles were exceptionally pronounced (Fig. 1). Dental professionals are increasingly faced with cases demonstrating this type of pathological loss of tooth structure today. Causes include erosion (demineralization of the teeth without the involvement of micro-organisms), attrition (physiological or pathological occlusal contacts) or abrasion (mechanical processes and bruxism).

Preoperative considerations

The patient originally presented to the dental practice to have a cavity lesion in tooth 46 repaired. Owing to the obvious dysfunction of his jaw, we explained to him the medical importance of undergoing a suitable treatment. In order to achieve the long-term success of the treatment, we first had to re-establish the physiological vertical occlusion. Therefore, we needed to establish the cause of the destruction, as this significantly influences the treatment planning and the choice of the materials to be used in the process.

In many cases, wear is caused by one of different factors. Here, the strenuous physical activity of the patient appeared to be the main contributor to the loss of tooth structure. We devised a minimally invasive treatment plan, which was discussed with him. All the necessary patient details were recorded. Owing to the extensive loss of vertical occlusion, the patient’s physiognomy had changed dramatically. His facial features were asymmetrical and his smile was crooked. The corners of his mouth were not properly aligned. Contrary to aesthetic guidelines, the curve of the lower lip was not parallel to the upper incisal edge. The incisors had been so severely abraded that they no longer formed an upward curve. Furthermore, the lower lip drooped on the right side. The patient reported that he often clenched his teeth, especially during physical exertion. He also complained of tenerness of his jaw muscles.

Planning phase

The initial diagnosis involved the evaluation of intra-or full extra-oral photographs and a clinical functional analysis. In addition, study models were assessed. A diagnostic wax-up based on a digital aesthetic analysis (Digital Smile Design according to Dr Christian Coachman) gave us essential information about aesthetic aspects, the vertical dimension of occlusion, the occlusal design and bite elevation. The resulting structures were rebuilt in wax using an additive method, and the physiological state was restored. In this case, the wax-up was used not simply to evaluate the initial situation and guide the treatment process, but also as a communication device. The wax-up allowed the patient to visualise the treatment result. Furthermore, the model gave him the motivation to persevere in the challenging and time-consuming treatment goals.

In the first part of the treatment, the patient was fitted with a customised occlusal appliance. The aim of the splint therapy was to restore the physiological bite of the patient. Before the appliance was fabricated, a comfortable physiological rest position was evaluated. Furthermore, a 2.5 mm increase in the vertical dimension was required (Fig. 2). Several days after the splint had been placed, the patient reported that he felt comfortable with the old but new vertical dimension of occlusion. He wore the appliance for three months, during which time he did not experience any functional problems. The muscles relaxed quite visibly.

The occlusal situation that could be established with the appliance was stabilised by treating the patient with long-term temporary restorations. We decided to provide him with non-invasive occlusal veneers made of composite, which would be adhesively cemented to the lower jaw. In this purpose, the study models were set up in the articulator in the arbitrary hinge axis position on
The discomfort while treating patients was so debilitating, Dr. Henderson nearly quit dentistry. After years of suffering—and expense—caused by poor ergonomics, he found a solution in A-dec. The rest is history. Dr. Henderson transformed a life of chronic pain into sustainable good health.

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– Keith Henderson, D.D.S.
the basis of a functional analysis. The anticipated final situation was waxed up according to the diagnostic set-up (Fig. 3). The wax-up restorations were recreated with composite and the help of a clear silicone matrix (Fig. 4). The occlusal veneers were then completed. In the process, we paid particular attention to functional and morphological principles. Next, the veneers were adhesively cemented in the patient’s mouth and the functional parameters were checked. This temporary restoration represented a decisive step in the treatment procedure and a significant component in achieving a lasting result. The patient could not be expected to wear the occlusal appliance continuously for 24 hours. The long-term temporaries, however, enabled the movement patterns to be optimally established, since they were cemented in place (Fig. 5).

The situation stabilised over the next three months and the patient indicated that he felt very comfortable. The temporaries did not show any signs of wear and the patient was pain-free. The time had come for the final treatment phase to begin.

We had carefully assembled all the strategic pieces up to this point. At this stage, the success of the permanent restoration would depend completely on the preparation technique. Neither the horizontal nor the vertical maxillomandibular relationship could be disturbed. The sequential preparation phase started with the occlusal veneers. In the first step, teeth 33, 46, 43 and 44 were prepared (Fig. 6), and three-point support was established subsequently. The maxillomandibular jaw relationship was recorded (Fig. 7), and teeth 43 to 47 as well as 44 to 47 were prepared according to minimally invasive principles. This is currently the acceptable standard in aesthetic and functional restorative treatment, as it corresponds to the requirements of patient-oriented and responsible dentistry. The patient’s teeth showed a number of cervical lesions (damaged fillings and untreated wedge-shaped lesions). As a result, the preparation strategy was adjusted to take these lesions into account. First, the damaged fillings were replaced with composite (Tetric EvoFlow, Ivoclar Vivadent), then the now intact fillings and the wedge-shaped lesions were included in the enamel preparation and sealed with the occlusal veneers. We ensured that the preparation margins were located in the enamel and were free of composite (Fig. 8). We decided not to prepare or build up the teeth with composite in the lower anterior jaw.

After the impressions had been taken, the study models were fabricated and mounted in the articulator in relation to the horizontal plane. Before the final mandibular restoration was completed, we discussed the aesthetic and functional reconstruction of the maxillary anterior teeth (veneers for teeth 19 to 23) with the patient. We helped the client to visualise the anticipated result by building up the teeth in wax. The wax acquired a distinctive shape and a suitable length. The wax-up was used to fabricate a mock-up, which was tried in the patient. He was extremely pleased with what he saw and was completely satisfied with the veneer solution. Nevertheless, he wanted our assurance that we would not grind any healthy tooth structure unnecessarily. State-of-the-art materials that can be cemented with adhesive methods enabled us to fulfil his wish. In this case, we used ultrathin lithium disilicate veneers, which bonded to the healthy tooth structure for long-lasting results.

Fig. 14: The situation anterior veneers were applied to pressed frameworks (cut back) — Figs. 15 & 16: The restorations in situ showed a lifelike interplay of colour. A well-structured treatment plan and high-strength ceramic restorations enabled the dental team to adjust the vertical dimension of occlusion of the patient and improve his appearance quite dramatically.

The teeth in the lower jaw were built up with a highly aesthetic composite resin (Tetric EvoCeram, Ivoclar Vivadent; Fig. 13 & 14). The maxillary anterior teeth (19 to 23) were prepared by removing a minimal amount of tooth structure. A model was produced and then the veneers were fabricated with IPS e.max Press HT ingots (high translucency). The pressed veneers were cut back and customised with a veneering ceramic (IPS e.max Ceram, Ivoclar Vivadent; Figs. 15 & 16). In the helping process, we strove to achieve a lifelike appearance and therefore paid a considerable amount of attention to this step. With the help of gold powder, we were able to produce a lifelike surface texture. We polished the restorations manually. All the parties involved were impressed with the result after the adhesive cementation of the restorations. The inclined all-ceramic restorations showed excellent fit and physiological function. As a result, a very natural-looking appearance was achieved (Figs. 15 & 16). A lifelike interplay of colour was observed within the veneers.

Conclusion

A well-coordinated treatment plan composed of many pieces, like a mosaic, is required in situations where complex restorative treatment, including bite elevation, is necessary. In the process, it is important to treat patients responsibly and inspire them with the required confidence. Careful deliberation is particularly important in the establishment of the physiological bite elevation. In the case described, a non-invasive strategy was devised to re-establish a stable vertical dimension. The teeth were ground for the preparation of the final restoration only after a suitably long temporary phase (occlusal veneers made of composite) and stabilisation of the bite elevation.

Fabrication of the final restorations

High strength was a priority in the posterior dentition. Therefore, full-contour restorations (monolithic) were fabricated with IPS e.max Press (Figs. 9 & 10). The occlusal veneers were produced in wax according to customary methods. The restorations were created in ceramic using the press technique and then prepared for adhesive cementation. The teeth were conventionally prepared according to the requirements of the adhesive technique. For the permanent cementation of the restorations, we used a dual-curing luting composite (Variolink II, Ivoclar Vivadent).

The teeth were cemented with an adhesive composite resin (Tetric EvoCeram, Ivoclar Vivadent). High strength was a priority in the posterior dentition. Therefore, full-contour restorations (monolithic) were fabricated with IPS e.max Press (Figs. 9 & 10). The occlusal veneers were produced in wax according to customary methods. The restorations were created in ceramic using the press technique and then prepared for adhesive cementation. The teeth were conventionally prepared according to the requirements of the adhesive technique. For the permanent cementation of the restorations, we used a dual-curing luting composite (Variolink II, Ivoclar Vivadent).

The teeth were cemented with an adhesive composite resin (Tetric EvoCeram, Ivoclar Vivadent).
A time shift link
How implant planning affects periimplant diseases
By Rainer Buchmann1,2, Daniel Torres-Lagares3, Guillermo Machuca-Portillo2
1 University of Düsseldorf, Germany; 2 University of Seville, Spain

Implants are becoming increasingly popular with low-cost offers prompting this development. The number of customers preferring implants to customary restorations is expanding. The variety of client demands, individual settings, treatment options and risks related to inflammation and bone damage following implant treatment advocate evident, comprehensible and durable solutions.

Planning

Early Decision Making

Early implant decision making comprises anatomical, functional and economic issues:

a) Anatomy: Treated severe periodontitis usually displays clinical stability with further drawbacks around implant supported bone at buccal plates or interproximal sites by inflammation (Figs. 1, 2).

b) Function: Following untreated periodontal diseases or tooth removal shifting of single tooth initiates due to myofunctional imbalance by loss of front-canine equilibration, a group side shift emerges with further bite reduction as result of age and musculature.

c) X-ray: Periodontal therapy of severely compromised teeth with bone loss >50% often results in a later date implant treatment that doubles dental efforts and bills. Economic issues should downregulate this strategy.

d) Oral comfort: Stability, oral hygiene and esthetics become fostered by timely implant placement and optimized implant prosthetics.

Clinical practice emphasizes a time-tested planning with (i) removal of severely compromised teeth, (ii) periodontal therapy securing the residual dentition, supplemented by (iii) microsurgical revision of deep intrabony pockets prior to implant placement to safeguard inflammation (Figs. 3 & 4). Implant planning resolves tentatively. A final quotation will be drawn after completion of muscles (M. temporalis, M. maser) and the temporomandibular joints (M. pterygoideus medialis und lateralis) with focus of tension, induration and pain pressure.

2. Ostearthropathic examination of craniofacial dysfunctions initiated by body states (inclined position), (miss) posture, walk (activity) etc. should exclude somatic sources. If applicable, manual osteopathic treatment to improve physiological function, i.e. body alignment, symmetry and support homeostasis that has been altered by somatic dysfunctions.

3. Careful reduction of prominent protrusive contacts (front) and side bars manufactured as strew splints in dimensions of 1 mm with extension limited to the first molars.

Fig. 1: Severe periodontitis, residual inflammation and bacteremia. Poor hygiene capability, comfort and esthetics with functional caries.— Fig. 2: Drawn-out expectation period in advanced periodontal disease with 15, 16, 17 horizontal alveolar bone resorption at assigned implant site.— Fig. 3: Surgical access to deep intrabony periodontal pockets securing the residual dentition and safeguarding inflammation prior to implant placement following completion of non-surgical periodontal therapy.— Fig. 4: Microsurgical revision using vascular (pedicle flap) to maintain interdental papillae and augment rectifying periodontal pockets with autogenous bone. Usage of Osteora (antiinflammatory) or Emdogain, if applicable.— Fig. 5: Relaxation appliance in the maxilla with a frontal plate to decompress age and use related bite reduction prior to final implant planning.— Fig. 6: Advanced horizontal alveolar bone atrophy in the mandible with small ridge, vestibular sloping plateau, proximity to n. alveolaris and small keratinized gingiva.— Fig. 7: Securing implant planning (implant length, positioning, diameter and surgery) by DVT review (Cranium Bonn, Germany, 2014).— Fig. 8: Interimplant distances of 7 mm at front and premolar sites with 11 mm in molars to safeguard vascularization and perimplant damage, assigned from orthodontics. Surgery, D.G. Forstmann.— Fig. 9: Inadequate implant bone support with vestibular bone defect following tooth loss due to traumatic crossbite relationship in the left upper maxilla.— Fig. 10: Promotion of perfusion and healing by micro-invasive implant surgery with implant abutment insertion into vascularized blood-supplied alveolar bone.— Fig. 11: Sinus elevation N 16 with implant placement prior to periimplant enlargement.— Fig. 12: Free gingival grafts in situ prior to curing.— Fig. 13: Unstable periimplant gingiva with poor hygiene capability, persistent inflammation & 34 and chronic sensitivity.— Fig. 14: Conservative healing for 8 weeks posttherapy with functional relief by enlargement and periimplant stabilization.— Fig. 15: Long-cane implantoprosthetic abutments undergo no self-cleaning frequently irritating periimplant sensitivity.

Safeguarding implant treatment commences with careful tooth removal, pre-implant treatment and implant planning respecting four key issues:

1. Early decision making to ensure implant bone support with limited number of implant placements. Sound tooth removal to protect bone loss by intraalveolar root resorption.

2. Accuracy of implant diagnosis and implant placement by 3-D visualization (IVT) of implant surgical access.

3. Minimal surgical involvement with short and low diameter implants while restricting augmentation to prosthetic relevant settings.

4. Placement of a relaxation appliance in the maxilla (ovverte and deep bite in the mandible) for functional compensation with a frontal plate allowing a front-canine equilibration and temporary relief in molars by vertical release of 1 mm (Fig. 5).

The primary objective is the decrease of use-related dysfunctions to achieve relief, vascularization and mineralization of the alveolar bone prior to implant placement. Subsequent realization of the issues 1-4 ensures dispenses of the material- and time-intensive implant planning.

Digital imaging 3-D

Digitization means information and safeness. The generation of a 3-D model in early implant planning barthes three vantages:

• Commitment: The expenses of 200–180 euro depending to extent, area of analysis and institute display a motivational factor ensuring consent with the treatment plan. Young patients and IT employees ask for the benefit of 3-D imaging during the first or second visit of implant planning.

• Accuracy: Additional information about vicinity to N. alveolaris, extent of sinus maxillaris and anatomical septa, characteristics and mineralization of implant bone (following tooth removal) and implant positioning related to adjacent teeth (Figs. 6 & 9). However, inclined IVT readings result in measurement errors up to 30%.

• Precision: The benefit of a time-intense 3-D implant planning is a more precise, controlled and risk-reduced planning, and eases surgical implant placement. These advantages should be utilized by all dental health care providers, even with long-term clinical expertise even those with long-term clinical expertise.
If you are not a DVT owner, oral surgeons (specialists) and diagnostic radiologists (specialists) are appropriate contact addresses. For the intended 3D image, always allocate the original DICOM dataset to your viewer software suitable for your PC software. The expenses of both the IT&T and the digital analysis and evaluation are subjects to private costs.

Interimplant distance
During an adjacent to a tooth, the interdental papilla remains.
If two implants are inserted side by side, the supragingival biological width and the papilla as result disappear, independent of the implant type used.
The effects of implants with platform switching, concave abutments, micro-machined neck or implant abutment micro movement on the integrity of crestal bone and soft tissues are limited to subclinical notice. The interimplant distances primarily fail to prosthodontic requirements of the residual dentition.10 From anatomy, the present rules occur:
1. Minimal distance between single-rooted teeth incl. premolars: 7 mm, 2 mm in intermolar distances of at least 11 mm (Fig. 8).

For appropriate implant placement according to prosthodontics, the local bone anatomy is often inadequate, especially in patients with cross-bite or long-term periodontal damage.2,3 The clinical setting implicates deficient implant bone support. 3D digital imaging of alveolar bone including individualized implant positioning with diameter-reduced implants is allocated. Note: Prior to surgery, calculate additional efforts, extent and expenses of alternative augmentation bone grafting or autogenous bone grafts including pedicle flap surgery and infection due to soft tissue advancements.

Implant placement

Perfusion
The performance of vasculatureed implant bone is indispensable to avoid further periimplant damage as result of spontaneous bone tissue injury during implant surgery (early implant failures). Within implant insertion, bleeding of cortical bone following drilling is a necessary requirement for uneventful healing and integra-
tion of the implant into surrounding tissues (Fig. 10). The following step by procedure has been proven effective:
a) Utilization of keen pilot and multi-
use tapping drills (renew early, otherwise high drilling forces and danger of deviation from drilling axis occur)
b) Immediately implant bed prepara-
tion under permanent cooling with 0% saline
c) Prior to implant placement, wait until implant bed has been replene-
thed with blood.

Wetting of implant surface with blood prior to implant insertion
e) Limited rotation speed ≤ 800 r.p.m during implant bed preparation, hand implant placement with torque key, max. 10–30 Nm, if applicable.

A slight subcrestal position of the implant is advisable as drilling end-
point. To ensure healing, a primary fixation of the implant is mandatory for all implant types (cylindrical, form-fit etc.) and bone quality and anatomical localization. The authors strongly discourage from further "screwing" to avoid ongoing tissue injury of the implant bone interface.3

Periimplant Tissue (volumen)
Reduction of the periimplant gingiva bone defects resulting from tooth removal, periodontitis dysfunction, the conditions of peri-
implant keratinized gingiva around implants are not adequate.4 Safe-
guarding implant planning and sur-
gery, the additional dunes of soft tissue surgery to enlarge periimplant gingiva should be implemented into the quotation.

Short and diameter-reduced implants
The usage of short implants < 4 mm demands minimalization of surgical implant placement and healing are customer-friendly. However, micro-incision surgery requires ad-
ditional efforts by 0 mm imaging (IT&T) during planning and sensitiveness in clinical realization. Evidence-based practice is successful with focus on tissue biology and both renunciation from mechanical interferences and inter-
locking theories.

Diameter-reduced (< 4 mm), small implants (minis) allowing transing.
ging healing. According to their material properties (fracture) and restricted implant-prosthetic indi-
cations and compatibility, Minis are limited to individual applications in a multiunit abutments with eden-
tulous mandible, enhanced risk for surgery i.e. advanced diabetes mellitus or heart diseases and handicaps for oral hygiene.3

Augmentation and revision
Exempt for sinus floor grafting, the number of augmentative implant surgery is decreasing and centered to reconstruction following trauma and tumor by vertical distraction or individual prosthetic or esthetic set-
tings. The indications for augmentation during implant place-
ment include:
1. Tooth loss in cross bite settings.
2. Lateral alveolar bone defects (pre-
molars and molar implant placement).
3. Modelling of periimplant bone in esthetically demanding situations at incisors and canines (emergence profile)

The authors have recently reported about the use and implementation of autogenous bone and spongous bone chips and their synthetic alter-
 natives in implant surgery in detail.6

The regressive developments of implant augmentation in clinical practice implicates direct recommen-
dations for surgical revision of peri-
implant defects. The following pro-
cedure is advisable (Tab. 8).

Macroex

• Defect depths ≤ 3 mm Oral Hygiene + IMP Cleaning
• Defect depths 3 → 5 mm CHX 0.2%, Er:YAG

Microex

Figs. 10–14. In the present edition, maxillary implants are presented by Er.YRG-decontamination. • Defect depths ≥ 5 mm CHX 0.2%, Er:YAG-decontamination.

Systemic antibiotics.
Irrigation with 0.2 % CHX, supplemental
• Defect depths ≥ 6 mm: Periimplant infection, if applicable (dentist).

Mucosa

• Defect depths ≤ 3 mm Oral Hygiene and implant cleaning (hygienist).
• Defect depths >3 mm: Additional-
ally 0.2 % CHX, Er:YAG decontami-
nation, if applicable (dentist).

To safeguard implant placement and protect against periimplant dis-
cases, an adequate periimplant width is more needed than soft tissue thick-
ness following thickening by free autogenous soft tissue grafts from the palate or roll flap. Loss of periimplant dimension is anticipated due to

Enlargement
Initially, implant planning (not to forget case models) and implant placement. Drilling into local bone, enlargement of peri-
implant gingiva with a ridge incision 1–2 mm orally is usually adequate.

In lateral augmentation in the maxilla, periimplant enlargement is frequently mandatory as result of flap advancement to cover the defect. During healing and prior to implant exposure, vestibuloplasty surgery with free autogenous gingival graft from palate at implant site in a separ-
ate visit (Figs. 13 & 14) in individ-
ual cases and edentulous in the mandible, periimplant enlargement with Tienda Mejhrar Vestibuloplasty surgery to create attached mucosa by a pedicle flap with adequate esthetics prior to implant placement. Also, to achieve soft tissue protection follow-
ing implant insertion (Fig. 13 & 14).

Thickening
To safeguard implant placement and protect against periimplant dis-
cases, an adequate periimplant width is more needed than soft tissue thick-
ness following thickening by free autogenous soft tissue grafts from the palate or roll flap. Loss of periimplant dimension is anticipated due to

In clinical practice, vertical decompensation with focus on front-
canine equilibrium are the key is-
iues during revision surgery prior to surgery. IT&T diagnostic evaluation is required if proximally to anatom-
ical structures is anticipated and short and diameter-reduced im-
plants are advocated to determine interimplant distances and safe-
guard implant treatment. Implant placement succeeds with minimal mechanical loading of implant bone and implementation of perfusion during surgery. Periimplant enlarg-
eme is scheduled during implant healing, either by free gingival graft or pedicle flap. Premolar and molar implant restorations are screw-fixed axially to have handling in case of periimplant damage. The concerted action of eliminating inflammation, stabilizing function while minimiz-
surgical success secures implant success, prevents periimplant diseases and promotes the reputation of dental health care providers in the com-

Community.

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Professor Rainer Buchmann is a specialist in prosthodontics and periodontal diseases. He works at a private prac-
tice in Düsseldorf, Germany. In addition, he teaches at positions at Heinrich Heine University Düsseldorf and the University of Seville in Spain. He can be contacted at info@perioimplant.eu.
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Avoiding common problems in tooth extractions

By Dr Kamis Gaballah, UAE

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

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

Complex extraction cases have been linked to a higher rate of postoperative complications; therefore, a cautious and systematic approach should be adopted that includes a detailed preoperative assessment to predict the potential difficulties that might arise during extraction. The documentation of all complicating risk factors along with their potential postoperative morbidities is crucial and should be included in the informed consent. In the following article, other useful tips will be provided that are not usually included in traditional textbooks or lecture notes to help general practitioners to perform safer extractions.

During clinical examination, it has been proven useful to observe the patient’s build. Tall and muscular individuals tend to have a long ramus with a higher mandibular foramen, and thus increases the possibility of failure of the inferior dental nerve block procedure of the former is not taken into account when determining the height of the injection site. This can be aided by tracing the inferior dental canal (IDC) to the mandibular foramen in the preoperative panoramic radiograph. The teeth of such individuals may also have longer and more curved roots and be embedded in highly dense, compact alveolar bone, and thus sectioning of the teeth may be required to ease the resistance. Racial differences should also be taken into account as extractions of teeth from individuals of Afro-Caribbean descent tend to be more challenging owing to the hardness of their bone and divergence of roots in their molars.

The resistance of hard tissue should be expected, particularly if maxillary second and third molars are being extracted, as the potential for failure of both the buccal plate and the tuberosity is relatively common when excessive force is applied with dental forceps. Fracture of the tuberosity may produce irregular sharp bony contours, significant soft-tissue laceration, and potentially an oroantral fistula. If such risk factors are identified, tooth sectioning should be considered in highly dense, compact alveolar bone. The indications for the extraction of impacted third molars LM3 are associated with significant morbidity. This may be because they are 4 % more likely to be fractured than the second molar; and conventional CT or CBCT scans. It should be noted that risk factors for IDN injury during extraction of LM3 are shown in Table 1.

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

Injury to the IDN may occur from compression of the nerve, either indirectly by forces transmitted by the root and surrounding bone during elevation or directly by surgical instruments, such as elevators. The nerve may also become transected by rotary instruments or during extraction of a tooth whose roots are notched or perforated by the IDN. The risk factors for IDN injury during extraction of LM3 are shown in Table 1.

Preoperative radiographic investigations may include intraoral images, such as occlusal radiographs, panoramic views of the jaws, and conventional CT or CBCT scans. It should be noted that risk factors in radiographs only indicate that there is an increased risk of nerve damage associated with the extraction of the corresponding third molar. However, they cannot actually prevent the nerve injury if the tooth is to be extracted. The effective strategies that may avoid or minimise the possibility of mechanical injury to the nerve is more likely in the case of multiple repeated attempts at the inferior dental nerve block procedure. Therefore, it is crucial that the operator achieve optimal pain control and minimal episodes of injection with minimal doses of anaesthetic agent.

The surgery should be planned according to the information obtained from the preoperative assessment process. The procedure itself should aim to minimise the manipulation around the IDC. It should include the carefully planned access, tooth sectioning and elevation techniques. In many scenarios, the extraction of the overall risk factors for IDN injury. Radiographic signs of increased risk of IDN injury

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<td>Full bony impactions</td>
<td>Apices of the LM3 located inferior to the lower border of the IDC</td>
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<td>Excessive bleeding into the socket during surgery</td>
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Table 1: Risk factors for IDN injury during LM3 extraction.

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

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

The other important aspect of the dental extraction procedure is the future replacement of the teeth to be extracted. The current trend of tooth replacement for both functional and aesthetic reasons is the placement of dental implants. The success of this treatment largely depends on the availability of healthy bone in sufficient volume. Therefore, it is crucial for the dental practitioner not to compromise the alveolar bone during extraction of the teeth. Changes in the alveolar bone ridge after an extraction are inevitable. After all dental extractions, bone height and width always undergo dimensional changes. Bone does not regenerate above the level of the alveolar crest, that is, its height will not increase during healing. The buccal plate tends to shrink, shifting the crest of the alveolar ridge lingually, and often forms a concavity. Such changes are proportional to the amount of trauma to the soft and hard tissue during the extraction.

An additional unfavourable change that may take place is the slow remodelling of the bone formed to fill up the extraction socket owing to lack of functional stimulation. The presence of poorly remodelled alveolar bone may compromise the stability and function of the future implant. Furthermore, studies show that the stripping and elevation of mucoperiosteal tissue produce a greater resorption and shrinkage of the alveolar socket walls, thus pre-venting their collapse and shrinkage. It should be noted that this intervention can only slow down the post-extraction changes to improve the success of the dental implant, but cannot stop them altogether.

Finally, post-extraction care should include an explanation of the healing process and potential symptoms encountered after such procedures. The prescription of medications should be limited to non-steroidal anti-inflammatory drugs in most cases and imprudent use of antibiotics or socket dressing should be avoided.
“Consumers are pushing dentists toward metal-free implantology”

An interview with Dr Sammy Noumbissi, founder of the International Academy of Ceramic Implantology

Many consumers are actively looking for alternatives to metal dental implants, and are demanding a more bio-compatible material. Dr Sammy Noumbissi talks about his work to create a metal-free implantology.

A great deal of progress has been made in terms of materials, techniques and design of dental implants since the beginning of modern implantology over 50 years ago. While titanium and titanium alloys have always been in use, the search for metal-free implantable materials began in the late 1960s and early 1970s, and during the last decade, zirconia has emerged as the most reliable implantable bioceramic. The International Academy of Ceramic Implantology (IAOCI) is an organisation entirely dedicated to ceramic and metal-free alternatives to metal implants. It was founded in 2011 by Dr Sammy Noumbissi, with whom Dental Tribune had the opportunity to speak about the mission and vision of the IAOCI, as well as the state of ceramic implantology today.

Dental Tribune: Dr Noumbissi, could you please provide some background information on the development of ceramic implants?

Dr. Sammy Noumbissi: The use of dental implants to replace teeth has increased very rapidly in the last 15 or more years. With this increase in dental implant procedures, the number of manufacturers has increased too. Also, we have witnessed the introduction of various alloys of titanium over time.

Now, just like with any pharmaceutical or medical product, the increase in demand and changes in production methods come with problems and challenges. Although initially anecdotal, reports of titanium and titanium alloy intolerance have increased and are increasingly being investigated and demonstrated in the scientific dental literature. Based on the body of research available today, this intolerance of implant alloys can in great part be attributed to the release of metal ions in the host bone and surrounding tissue as a result of the breakdown and corrosion of metal alloys in the presence of body fluids and the oral environment in particular. Such facts have been established and widely recognized in orthopedics.

In the late 1960s, pioneers in ceramic implantology and notably Professor Sami Sandhaus began the search for modern non-metal implantable ceramic materials. However, many of the early ceramic implants were monocrystalline in their structure and could not survive the demands of the oral environment. Then came the use of polycrystals and in the early 2000s, yttria-stabilized zirconia bioceramic emerged as the material of choice for metal-free intraoral implantation in dental implantology.

How did you become involved in researching ceramic dental implants?

My interest in ceramic implants came about in two ways. First, on a personal level, when I discovered that the metal fillings and implant I had in my own mouth were determined to be the source of some of the health problems I had experienced. Second, on a professional level, where a few of the patients to whom I had provided metal implants returned for check-ups or more implants, and upon reviewing their medical and dental history, it was also determined that the implants were at least in part responsible for the health problems they were experiencing. I then began to actively look for alternatives and at the scientific literature, including case reports in both medical orthopedics and dental implantology. It was clear that bioceramics in the last two decades had established themselves in both medicine and implant dentistry as the most bio-inert implantable material available. In 2011, two colleagues and I decided to create the IAOCI.

What is the primary aim of the IAOCI?

Associations and academies exist around various types of trades and industries. The common purpose of such groups is to organise and create a supportive environment for those involved in the respective area. The IAOCI was created with the same spirit, not only to organize metal-free implantology but also to provide the profession as a whole with quality and high-level continuing implant education on bioceramics as implantable materials. The IAOCI is also a resource for the public seeking practitioners who have experience with ceramic implants.

In your opinion, what are the dangers of metal implants?

Metal and most particularly titanium implants have been very successful. Their use has grown exponentially and with that manufacturers have multiplied, as well as manufacturing protocols. As a result, we have observed a steady increase in the alloy elements mixed with titanium during the manufacturing process. The problems begin when the metal implant highly alloyed or not, once placed is subjected to functional stresses, galvanism, body fluids and the harsh oral environment. The combination of mechanical, chemical and electrical events induces cracks and pitting of the metal, as well as breaches in the oxide layer, and the implant undergoes corrosion attack. The corrosion attack, which is essentially an oxidation process, leads to the release of metal ions that studies have shown to be found in the surrounding bone, lymphatics, spleen, liver and in some cases crossing the blood-brain barrier.

What alternatives to metal dental implants are currently available on the market?

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Today, the well-researched and proven alternative material to metal for dental implants is zirconium dioxide, also known as zirconia. This is also a well-proven fact in medical orthopedics. Zirconia is the crystal phase of zirconium and as such it is not a metal. There are different manufacturing protocols for zirconia for dental implantation and they all lead to a variety of polycrystal bioce- ramics, such as zirconia-toughened alumina, hot isostatic-pressed zir- conia and yttria-stabilized zirconia. The common and most important properties of these bioce- ramics are inertness in the bone and oral environment, structural stability, absence of electrical activity, extremely low plaque retention and superior aesthetics.

Is the success rate of metal-free im- plants comparable with that of tita- nium implants?

In the early days, there were chal- lenges. The materials were mono- crystalline with very highly polished and glossy surfaces, which made the early implants prone to fracture, poor attachment of bone-forming cells and low bone-implant contact. The manufacturing protocols, de- sign, surface modification tech- niques and technologies of zirconia implants have evolved to a point where bone integration is ensured and comparable results are ob- tained.

Are ceramic alternatives the future of dental implantology?

Every industry projection one sees about implants signals good news for the future. Implants are now and will continue to be widely accepted by patients and the pro- fession. Both groups agree that this is state-of-the-art treatment. How- ever, owing to technology, the public is much more informed about health issues and therapies. We are in a similar situation today to that of Invisalign braces a few years back, in that consumers are pushing dentists toward metal-free implantology for the most part. In five years’ time, I believe that the number of ceramic implants being placed will double.

Bio-inert materials are the future of any type of implantable device. I believe bioce- ramics have taken hold and will be around for a long time because there has been a strong shift toward providing health care with the minimum risk and in- vasiveness over the last few years, as well as in a way that is more in- tegrated, natural and biological. Furthermore, manufacturers have rapidly evolved and adapted the ma- terial and implant designs to clinical needs and demands. We now have a wide variety of implant designs, surface microstructures, components and prosthetic connections, making ceramic implants applicable to an extensive range of both replace- ment situations.

Dentists may have concerns about the reliability of ceramic implants. How does your organization address this?

Even within specialties, there is a need for organized groups because in today’s world research and ap- plication of discoveries are moving at lightning speed compared with 20 years ago. Therefore, once one has an environment in which much of the time and energy is spent tracking, learning and sharing in- novative techniques and materi- als, members have a forum where they can obtain the information, training and skills to deliver the best of care to their patients in an evidence-based and organized manner.

As a matter of fact, our member- ship has doubled in the last two years and when prospective or new mem- bers are asked why they want to join or joined the academy, the most common response is that they are seeking a forum where they can ob- tain structured information and training.

Another frequent reason is that dentists have had patients challenge or inform them on the use and oc- casionally the existence of ceramic implants. Through technology and the use of access to information, the public obtains information faster than we busy clinicians.

The AAOI will be hosting its fifth Annual Winter Congress in Montego Bay, Jamaica. What can people expect from the event? The theme in 2016 will be the last decade in ceramic implantology. We will have 14 speakers from seven different countries who will share their experiences with a variety of ceramic implant systems over the last ten years. One of our guest speakers has over 15 years of docu- mented experience with zirconia implants. We will also have work- shops on different implant systems, ceramic regenerative products and revolutionary soft-tissue- and hard-tissue-enhancing protocols proven to optimize implant integration and long-term stability.

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