A time shift link
How implant planning affects periimplant diseases

By Rainer Buchmann1, 2, Daniel Torres-Lagares3, Guillermo Machuca-Portillo3
1 University of Düsseldorf, Germany; 2 University of Seville, Spain

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.

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

c) OvO: 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.

OvO: Oral comfort, stability, oral hygiene and esthetics become fostered by timely implant placement and optimized implant prosthesis.

Functional relief and 3D Digital evaluation of the implant bone anatomy.

Functional decompensation
Fully and partially edentulous patients frequently reveal a bite reduction by usage (wear) with loss of front-canine equilibration and a resulting left and right groupwise premolar and molar side shift. Dysfunction and habits (pressing, grinding etc.) promote further damage. In severe periodontitis, group side shift accelerates disease progression, impedes post therapy healing and weakens alveolar bone assigned for later implant placement. Early implant planning includes following key issues:

1. Inspection of the oral cavity comprises evaluation of the mastication bars during later ototrusion on the operating side.

2. Placement of a relaxation appliance in the maxilla (overbite and deep bite in the mandible) for functional decompensation with a frontal plateau allowing a front-canine equilibration and temporary relief in the mandible (Fig. 5).

The primary objective is the decompensation of use-related dysfunctions to achieve relief, vascularization and mineralization of the already bone prior to implant placement.

Subsequent realization of the issues 1-4 ensures dispersal of the habitual use patterns after four to six weeks wearing. Due to hygiene and stabilization, the intraoral appliances are manufactured as strew splints in an dimension of 1.5 mm with extension limited to the first molars.

Digital imaging 3-D
Digitization means information and safety. The generation of a 3D model in early implant planning harbors three vantages:

• Commitment: The expenses of 120-180 € per tooth depending on 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 3D imaging during the first or second visit of implant placement.

• Accuracy: Additional information about vicinities to Na 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 & 7)

• Precision: The benefit of a time savings of 1-2 weeks in advanced periodontal disease and 3-5 weeks in severe periodontal disease.

(Figs. 1 & 2)

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.

2. Sound tooth removal to protect bone loss by intraoral root displacement.

3. Accuracy of implant diagnosis and implant placement by 3D visualisation (IVT) of surgical access.

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

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 muscels (M. temporalis, M. mas- seter) and the temporomandibular joints (M. pterygoideus medialis and lateralis) with focus of tension, induration and pain pressure.

2. Osteopathic examination of craniofacial dysfunctions: initiated by body states (inclined position), (mus.) posture, walk (activity) etc. should exclude somatic sources. If applicable supportive therapy.

If applicable, manual osteopathic treatment to improve physiologic function, i.e. body alignment, symmetry and support homeostasis that has been altered by somatic dysfunctions.

3. Carefull reduction of prominent protrusive contacts (front) and side智 teeth are manufactured as strew splints in an dimension of 1.5 mm with extension limited to the first molars.

(Figs. 8 & 9)

(Figs. 13 & 14)

(Figs. 15 & 16)

(Figs. 3 & 4)

(Figs. 6 & 7)

(Figs. 1 & 2)

(Figs. 5 & 6)
Implant Tribune Asia Pacific Edition | 10/2015

Implant news

A slight subcutaneous 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, non-threaded implants) bone quality and 
anatomical localization. The authors strongly discour age from further 
‘screwing’ to avoid ongoing tissue injury of the implant bone interface.11
Periimplant therapy

Table II: Treatment of advanced periimplant bone defects is limited to 
surgical treatment of advanced periimplant bone defects. The following 
procedure is advisable (Tab. III).18

Maxillars: • Defect depths 1.0 mm: Oral hygiene and implant cleaning. 
• Defect depths ≥ 2.0 mm: In addition to oral hygiene, systemic 
management and periodontal treatment. Implant placement 
must be delayed by 3 months following to observance of expected 
healing response.

Mandibles: • Defect depths 2.0 mm: Oral hygiene, systemic 
management and periodontal treatment. Implant placement 
must be delayed by 3 months following to observance of expected 
healing response.

Summary

The prevention of periimplant disease is based on a comprehensive 
analysis, evaluation and planning prior to implant placement. 
Securing the residual dentition from periodon tal disease, on time 
removal of compromised teeth and functional compensation with 
focus on front canine equilibration are the key 
issues during implant planning prior to surgery.17 Implant 
diagnostic evaluation is required if proximally to anatom 
structures are anticipated and short and diameter-reduced 
implants are advocated to determine interimplant distances and safe 
guard implant treatment. Implant placement succeeds with minimal 
mechanical loading of implant bone and implant integration. Periimplant 
damages are likely to occur during routine implant treatment. The 
condensed action of eliminating inflammation, stabilizing function while minimizing 
surgery secures implant success, prevents periimplant diseases and 
promotes the reputation of dental health care providers in the 
community.

The authors appreciate the encouragement and support of Dr. Verena Lehmkühler, 
Düsseldorf for implant consultation.

Professor Rainer 

Buchmann is a specialist for 
periodontology and 
parodontics. He works in private prac 
tice in Düsseldorf/Germany and teaches 
positions at Heinrich Heine University of Düsseldorf, and 
the University of Seville in Spain. He can be contacted at info@peria.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 more complex and require much more preparation with modifications during and after patient management. Additionally, extractions can range from a simple, 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 post-operative 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.

Overall risk factors for IDN injury

<table>
<thead>
<tr>
<th>Risk factor for IDN injury</th>
<th>Radiographic signs of increased risk of IDN injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full bony impactions</td>
<td>Apices of the LM3 located inferior to the lower border of the IDC</td>
</tr>
<tr>
<td>Horizontal impactions</td>
<td>Darkening of the root</td>
</tr>
<tr>
<td>Use of bars for extraction</td>
<td>Abrupt narrowing of the root</td>
</tr>
<tr>
<td>Radioanergic risk markers</td>
<td>Interruption and loss of the white line representing the IDC</td>
</tr>
<tr>
<td>Clinical observation of the bundle during surgery</td>
<td>Displacement of the IDC by the roots</td>
</tr>
<tr>
<td>Excessive bleeding into the socket during surgery</td>
<td>Abrupt narrowing of one or both of the white lines representing the IDC, root of dentists and surgeons</td>
</tr>
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The resistance of hard tissue should be expected, particularly if maxillary second and third molars are being extracted, as the potential for fracture of both the buccal plate and the tuberosity is relatively common when excessive force is applied with dental forceps. Fracture of the tuberosity may produce irregular sharp bony margins, significant soft-tissue laceration and potentially an orificial fistula. If such risk factors are identified, tooth sectioning should be followed by elevation of roots with dental luxators instead of traditional elevators or forceps, which are known to deliver much higher force to the alveolar bone.

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

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

Preoperative radiographic investigations may include infra-orbital images, such as occlusal radiographs, panoramic views of the jaws, and conventional CT or CBCT scans. It should be noted that not predicting signs in radiographs only indicate that there is an increased risk of nerve damage associated with the extraction of the corresponding third molar. However, they cannot actually prevent the nerve injury if the tooth is to be extracted. The effective strategies that may avoid or minimise the potential nerve injury to the IDN are detailed in Table 2.

The surgery should be planned according to the information obtained from the preoperative assessment process. The procedure itself should aim to minimise the manipulation around the IDC. Both should include the carefully planned access, tooth sectioning and elevation techniques. In many scenarios, the extraction of the whole tooth may carry an unavoidable risk of injury to the nerve, therefore intentional retention of parts of the tooth was proposed via a planned procedure introduced around 20 years ago called coronectomy. This involves removing the crown of a tooth, leaving the root in situ. It is merely avoided to avoid or minimise damage to the IDN. The rate of complications after coronectomy is comparable to that observed for conventional 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 LM is close to the IDE and is certainly contra-indicated when the LM is decayed or its roots are associated with a pathology and should be considered with caution in severely inclined mesio-angular and horizon
tal 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 empha-
sised that incision may not extend beyond the distobuccal aspect of the tooth.

The other important aspect of the dental extraction procedure is the future replacement of the tooth to be extracted. The current trend of tooth replacement for both functional and aesthetic rea-
sons 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 com-
promise 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 dimen-
sional 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 bone lingually, and often forms a concavity. Such changes are pro-
portional 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 muco
erosional tissue produce a higher number of osteoclasts with-
in the alveolar ridge and hence greater resorption and shrinkage are seen after the classical surgical or traumatic extraction of teeth.

The preservation of alveolar bone for future implant placement may be achieved by avoiding unnecessary bone removal and stripping of the periosteum during surgery as well as performing a surgical alveolar bone preserva-
tion procedure. Bone removal can be largely avoided or minimised through modification of the tradi-
tional extraction technique. The first such modification is the use of dental periosteums and luxatomes to gently strip the peri-
odental ligament fibres and widen the socket without causing cracks or fracture of the cortical plates, as commonly encountered when using dental forceps or the bulky elevators. The use of such gentle instruments also eliminates the need for elevation of mucoperi-
osteal tissue. However, it should be noted that the safe use of these in-
struments requires adequate train-
ing and should be encouraged during undergraduate clinics. Cleft stabilisation through light packing of the socket with collagen sponges may help to minimise clot dislodgement, as well as accelerate the healing process and bone regeneration.

The second strategy is the alveo-
lar bone preservation procedure. This includes packing the extrac-
tion socket with different fillers, such as osteoinductive or osteo-
conductive materials, like auto-
genous, natural or synthetic bone grafting materials that support the alveolar socket walls, thus pre-
venting their collapse and shrink-
age. 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 po-
tential symptoms encountered after such procedures. The pre-
scription 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

Great deal of progress has been made in terms of materials, techniques and design of dental implants since the beginnings 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 organization 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 ceramic 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 non-metal implantable ceramic materials. However, many of the early ceramic plants were monocryalline and 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 intrabony implantation in dental implantology.

How did you become involved in research on 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 two decades had established themselves in both medicine and implant dentistry as the most bio-inert implantable material. In 2011, two colleagues and I decided to create the IAOCI.

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 education on bioceramics as implantable materials. The IAOCI is also a resource for the public seeking practitioners who have expertise 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 breach 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?

...reports of titanium and titanium alloy intolerance have increased and are increasingly being investigated and demonstrated in the scientific dental literature.”

In 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.
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 orthodontist who a few years back, in that consumers are pushing dentists towards metal-free implanto- logy 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 bioceramics 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 ease 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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