Primary stability vs. viable constraint: A need to redefine

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_Thanks to continuous advancing technology_, the field of implant dentistry is always growing, changing and evolving. Clinicians need to be vigilant in their efforts to keep up with the new techniques, new products and new technology that could affect how they plan implant treatment.

That’s just one reason the publication you are holding right now is so valuable. As always, in this issue of implants, we’ve assembled a collection of articles from a variety of respected names and companies in dentistry. These expert clinicians are sharing their first-hand knowledge and expertise with you. In this issue, you can read about primary stability, and you can also learn about immediate implantation and provisionalization. We also have news on the latest implant events and technology.

But that’s not all. Every issue of implants magazine also contains a C.E. component. By reading the articles (beginning on Page 6) on “Primary stability vs. viable constraint: A need to redefine,” by Dr. Michael Norton, and “Immediate implantation and provisionalization: Single-tooth restoration in the esthetic zone,” by Dr. Susan McMahon and Karrah Petruska, and then taking short online quizzes on the articles at www.DTStudyClub.com, you will gain one ADA CERP-certified C.E. credit.

Keep in mind that because implants is a quarterly magazine, you can actually receive four C.E. credits per year out of your already busy life without any lost revenue and time away from your practice. To learn more about how you can take advantage of this C.E. opportunity, visit www.DTStudyClub.com.

Finally, if you are interested in becoming a published author, we are always looking for experienced clinicians to write C.E. articles and offer their expertise to our readers. Contact Managing Editor Sierra Rendon at s.rendon@dental-tribune.com for more information on submitting an article.

I hope you enjoy this issue of implants and that it enhances your daily life in the dental office.

Sincerely,

Torsten Oemus
Publisher
Dental Tribune International
**c.e. articles**

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Primary stability vs. viable constraint: A need to redefine

Author: Michael R. Norton, BDS, FDS, RCS(Ed)

Any regular reader of the Journal of Oral & Maxillofacial Implants or indeed of any other publication on dental implants could not fail to have noticed how much attention has been focused on primary stability. The concept of primary stability is not new; indeed, as early as the 1970s, there were studies emphasizing the need to establish mechanical stability to ensure uninterrupted healing of the bone.1 This was most evident in the orthopedic literature as it pertains to hip prostheses.2

By the 1990s, numerous reports were being published on immediate loading of dental implants,3-6 and the groundbreaking work by Neil Meredith on the application of resonance frequency analysis (RFA) came to the fore7-9 with statements that achievement of implant stability was a prerequisite for long-term positive outcomes.

At the same time, Meredith recognized it was possible for clinically firm implants with poor axial stability to still be prone to failure.6 Of course, Brånemark recognized this in his early work, proposing as he did a period of submerged healing because of his concerns for any destabilization of the bone-to-implant interface during the early healing phase. However, today, we all recognize that such protective protocols are frequently unnecessary, with widespread acceptance of not only transmucosal healing but also immediate temporization and/or loading.

So how do we define primary stability? The most simple definition is one of mechanical friction between the implant and bone. Certainly, we can all appreciate that this contrasts with secondary implant stability where secondary stability is achieved by biological integration, i.e., osseointegration. The gradual shift from primary stability to secondary stability is critically poised at around three weeks. This is seen to be the least stable time point where viscoelastic stress relaxation of the bone along with remodeling results in a loss of primary mechanical stability9 but with an as yet poorly established degree of secondary stability or osseointegration.

This is also apparent in RFA curves, which, like a heartbeat, always register a certain pattern in healthy bone that reflects this loss of stability at the third or fourth week,10 regardless of bone density.

That said, we still need to define what constitutes primary stability, i.e., that which sets it apart from biological integration. As stated above, mechanical stability is one where a friction occurs between the implant and the surrounding bone, giving rise to a resisting torque at time of insertion. This resisting torque is proportional to the effort required to seat the implant or peak insertion torque; they are in essence one and the same and depend largely on the characteristics of the implant, the density of the bone and the differential size of the osteotomy as it pertains to the diameter of the implant. Mathematically, it can be defined as follows:

\[
\text{Resisting torque} = \mu \times P \times H \times \pi \times D^2
\]

Where: H = height of the implant cylinder and D = diameter of implant cylinder

P = Critical pressure on the bone

\(\mu\) = Coefficient of friction

The important factor in this equation is P, the critical pressure on the bone, as high pressure re-
sults in unfavorable bone strain, particularly within the cortical compartment. However, the formula indicates that the resisting torque is proportional to the diameter \(D\) raised to the power of 2. This means that if you double the diameter, the resisting torque becomes four times higher. Put another way, if we use the same insertion torque for a 3 mm wide implant and a 6 mm wide implant, then the critical pressure \(P\) will be four times lower for the wider implant!

For example, an implant of 3 mm diameter inserted into 1 mm thick cortical bone with a torque of 20 Ncm will transmit the same pressure to the bone as an implant of 6 mm diameter inserted into 2 mm thick cortical bone with a torque of 160 Ncm. This assumes that 100 percent of the torque originates from the pressure on the cortical bone, and the contribution to torque from bone cutting, etc., is neglected. Yet manufacturers persist in providing a single target value of insertion torque across the range of implant diameters they offer.

It is therefore reasonable to discuss the virtues of insertion torque and ask the pivotal question: Is the insertion torque an appropriate measure by which to quantify optimal primary stability? After all, bone is a living tissue, so any measure of primary stability must also reflect the future viability of the bone.

It is clear that higher insertion torques fulfill the desire to achieve a high degree of mechanical stability as interpreted through manual perception. Indeed, it is usual for manufacturers to provide some guidance on optimal insertion torque with some implant designs being specifically tailored to deliver higher insertion torques, in excess of 75 Ncm. This yields a sense of comfort for the clinician that the implant is initially “stable.”

However, such a high torque has not been shown to be propitious to the surrounding bone. Numerous studies have been published that clearly demonstrate that the critical pressure these high torques create leads to micro-fracture of the bone,\(^{11,12}\) with a net resorption in the cortical zone\(^{11,12,13}\) and, indeed, an unfavorable delayed healing process with a reduced bone-to-implant contact.\(^{14}\) Such a response might well shift the onset for secondary stability and thereby delay or extend the period of potential vulnerability. This is clearly counter to the goal we are trying to achieve with immediate or even early loading protocols, whereby we want to transfer from simple mechanical fixation to full osseointegration in the shortest possible time.

The most fascinating aspect of this debate is the lack of correlation between insertion torque and the implant stability quotient (ISQ) as measured by RFA, which appears to be counterintuitive. How is it possible for an implant that is driven in at 30 Ncm to have the same ISQ as one that required 100 Ncm of torque? Nonetheless, the weight of literature would seem to suggest this to be the case.\(^{15-18}\)

Because ISQ is measuring axial stiffness, it must be clear that frictional rotational resistance is a completely different parameter. After all, I don’t doubt we have all have experienced the “spinner” (an implant that exhibits little or no rotational stability) that went on to osseointegrate, and there are a number of studies published that report high success rates for immediately loaded implants that were inserted with low insertion torque.\(^{19-22}\)

By contrast, implants with an ISQ of less than 50 rarely go on to integrate successfully, and ISQ has been described as a good predictor of success.\(^{23,24}\) It is this dichotomy that has got me thinking and has led me to write this editorial piece. Could it be that axial stiffness is far more pertinent than rotational friction in ensuring an implant integrates? We already know from the literature that an implant can tolerate a degree of micro-motion, thought to be circa 100-
I have labeled this objective measure viable constraint (vC), whose central purpose is to obtain a clinically relevant degree of stability while maintaining a low critical pressure on the vulnerable cortical tissues through which our implants are inserted.

Bone is not wood. It is not inanimate. It would behoove us all to remember this, and avoid the carpenter’s approach to implant dentistry.

So I would take this opportunity to ask that we think in terms of viable constraint. It will, of course, take controlled prospective studies to determine the optimal conditions for vC, but if I were a gambling man (which I most certainly am!), I would guess for a 4.5 mm implant in bone with a cortex of <1.0 mm thickness that a maximum torque of 20 Ncm and an ISQ of 60 represent the optimal measures we are looking for to ensure safe immediate loading.

In the past, we used to think length was important with implants, whereas today there is increasing focus on short implants. However, I would point out that a strong correlation has been shown to exist between ISQ and implant length and, as such, for immediate loading, I also believe a longer implant with a higher ISQ, inserted at a lower insertion torque, will yield a more favorable outcome.

**References**


about the author

Dr. Michael R. Norton, BDS, FDS, RCS(Ed), graduated from the University of Wales, School of Dental Medicine, in 1988. He runs a world-renowned practice dedicated to implant and reconstructive dentistry in Harley Street, London. He is a specialist in oral surgery and, in 2007, was awarded a prestigious fellowship of the Royal College of Surgeons, Edinburgh, without examination, for his contribution to the field of implant dentistry. In 2013, Norton was made an adjunct clinical professor to the Department of Periodontology at the Ivy League Dental School at the University of Pennsylvania.

For more than 20 years, Norton has led the way for implant dentistry in the United Kingdom, becoming one of the world’s most respected and renowned implant surgeons. His considerable portfolio of research has been groundbreaking, and he has become one of the most sought after lecturers in his field. Since 1989, Norton has dedicated all his clinical and postgraduate time to the practice and study of implant reconstructive dentistry. He is secretary, board member and fellow of the Academy of Osseointegration (AO) and is past president (1999-2001) and honorary life member of the Association of Dental Implantology (ADI), UK. He is past editor of the ADI’s Academy News and is currently associate editor of the International Journal of Oral & Maxillofacial Implants (IJOI). He also serves as a referee for a number of other peer-review journals.

Norton is widely published in the literature including one of the earliest Quintessence textbooks on the subject published in 1995. From 1995 to 2010, he was joint owner and editor of the journal Dental Implant Summaries.
Immediate implantation and provisionalization: Single-tooth restoration in the esthetic zone

Authors: Susan McMahon, DMD, and Karrah Petruska

Anterior tooth loss and restoration in the esthetic zone is a common challenge in dentistry today. The prominent visibility of the area can be especially distressing to the patient and requires a timely and esthetically pleasing solution.

Immediate single-tooth implantation followed by immediate provisionalization is becoming an increasingly desirable treatment that offers numerous benefits over conventional delayed loading.

In the past, the non-restorable tooth was extracted and possibly grafted for site preservation. A removable partial denture (or flipper) was fabricated and placed for use during healing. After an adequate healing period, an implant was placed and buried under the gingiva, and the patient continued to wear the flipper until the implant had osseointegrated and was ready to be uncovered and restored. The patient would therefore wear the removable partial denture for upwards of six to eight months.

This course of treatment often results in a less than desirable gingival architecture surrounding the final restoration. There are also clear indications that partial removable dentures are an important causative factor in the alveolar bone resorption process.1

Today, immediate treatment offers a better solution. Immediate implantation and same-day provisional replacement of single anterior teeth minimizes treatment time and cost while enhancing esthetic quality.2 In addition to alleviating patient trauma, this technique decreases resorption of hard and soft tissue and results in better function.3 Overall, this leads to greater patient satisfaction.

In this process, the implant is placed and a provisional is quickly loaded. A nonfunctioning, also known as non-occluding, provisional is used in a protected occlusal scheme.

The placement of the non-occluding restoration must occur within 48 hours to be considered immediate loading.4 Both of the following cases received same-day provisionalization.

The clinician faces several challenges when restoring teeth in the esthetic zone. Major cosmetic concerns in the fabrication of the immediately placed provisional are the retention of the interdental papilla and prevention of alveolar bone collapse.4 Research has suggested that immediate provisionalization following implanta-
Immediate implantation and provisionalization allows for greater clinical control over the regeneration of tissue surrounding the site of extraction.\(^5\)

Unfavorable alterations to the alveolar bone structure must be avoided using ridge preservation techniques and precautions in terms of osseous exposure.\(^5\) Immediate placement of the implant into fresh extraction sockets prevents the post-extraction resorption that occurs commonly with alternate forms of treatment, preserving the integrity of the alveolar ridge.\(^6\)

A compromised implantation site is also a concern when dealing with tooth loss. Bone resorption may leave insufficient bone for implantation. Furthermore, a deteriorated gingival architecture produces an inferior esthetic. Immediate implantation into the fresh extraction socket allows the clinician to maintain the gingival tissue and create a more esthetically pleasing restoration.\(^2\)

Minimum criteria for implant placement have been established for successful immediate loading. Rough quantitative values for insertion torque and implant stability quotient (ISQ) as well as surgical assessment play a role. Values as low as 15 N-cm for insertion torque and 50 ISQ both resulted in successful provisionalization.

Additionally, the surgeon must assess where there is adequate bone support at the apex, at least 3 mm of circumferential bone, and primary stability of the implant. Research has shown that “early loading of dental implants does not appear to interfere with osseous modeling of a developing osseointegration as long as significant micromovement does not occur.”\(^7\)

In addition to providing both esthetic and functional benefits, immediate implantation and loading of a nonfunctioning provisional has also been found to result in comparable implant survival outcomes to more traditional techniques.

A recent study measuring clinical success, survival, and satisfaction found the technique to be “not less favorable than conventional loading.”\(^6\) In consideration of this, current literature is now purporting immediate implantation and non-occlusal loading to be the “treatment of choice” in cases of single anterior tooth restoration.\(^8\)

The following are two case studies involving immediate provisionalization. In both cases, the maxillary right central incisors had sustained trauma, were endodontically treated and functioned for a number of years. Approximately 15-20 years later, the teeth in each case failed due to internal resorption. The failing teeth were extracted and implants were inserted immediately and restored the same day with a non-functional provisional.

Dental root resorption involves the loss of hard tissues that compose the teeth (dentin, cementum and enamel).\(^9\) In most cases, tooth resorption is the result of trauma or irritation to the periodontal ligament and/or tooth pulp.\(^5\) These conditions may occur as a result of injury, inflammation or chronic infection of the pulp, periodontal conditions, orthodontic tooth motility or tooth eruption.\(^9,10\) Internal resorption is generally asymptomatic and is discovered most frequently through radiographic examination.\(^9,10\)

If internal root resorption is left to progress untreated, it may result in extension to the periodontal ligament through a crown or root perforation.\(^9\)

### Case study 1: failing maxillary right central incisor

The patient is a 30-year-old healthy male who was examined in our office for a failing maxillary right central incisor. His history involves a soccer accident in 1993 that resulted in an elbow to the face with trauma to the right maxillary central incisor. Approximately one week subsequent to the accident, the patient’s tooth was treated endodontically. It eventually became discolored and grew increasingly out of alignment (Fig. 1). Radiographic examination revealed internal resorption.

Clinically, all other maxillary and mandibular teeth were in good condition. Periodontal examination revealed healthy gingival tissue. The patient was con-
cerned that his anterior tooth would fracture unexpectedly and desired an immediate replacement.

_Treatment options_

Several treatment options were considered. The first was extraction of the maxillary right central incisor and fabrication and placement of a conventional fixed bridge of porcelain fused to metal or an all-ceramic system. The second option was extraction of the tooth followed by placement of a removable partial denture. The next option was extraction, provisionalization with a removable partial denture (flipper) followed by implant placement, healing while wearing the flipper and, finally, restoration of the implant.

The best alternative was extraction and immediate replacement of the extracted tooth with an implant, followed by immediate loading with a nonfunctioning provisional. After adequate osseointegration, a final restoration would be fabricated. Advantages and disadvantages of all options were explained to the patient. He decided to continue treatment with an immediate implant restoration. The patient was then referred to a periodontist for further evaluation and implant consultation.

_Implant evaluation_

Implant examination revealed adequate bone height and width for implant placement immediately following extraction of the failing tooth. A surgical date was scheduled with the periodontist for extraction of the tooth and placement of the implant. An appointment was coordinated with our office for the patient directly following the surgical procedure for provisionalization of the implant.

_Surgical protocol_

The right central incisor was removed and a Nobel-Replace Tapered Groovy (internal connection) 5.0 mm x 13 mm implant was placed. An osseous graft of demineralized freeze-dried bone and a collagen membrane were utilized to augment the surgical site. The fixture received an emergence profile, healing abutment.

_Provisionalization_

The patient presented in our office after the implant placement with a healing abutment in place. The healing abutment was removed. A Nobel Biocare immediate temporary abutment was placed and a provisional was fabricated. Care was taken to contour the emergence of the provisional as to best support the gingival architecture. The plastic coping for the immediate temporary abutment was roughened with a 56 carbide bur to enhance adherence of the integrity provisional material used.

The provisional was polished and placed on the immediate temporary abutment with a small amount of flowable composite to enhance retention. The provisional crown was fabricated to be completely out of occlusion and non-functional to ensure the implant adequate osseointegration time undisturbed by occlusal forces. The provisional restoration was observed periodically during the six-month healing process to monitor gingival adaptation (Fig. 2).
Six months post surgery, the patient was scheduled for placement of the final restoration. After removing the provisional crown and the immediate temporary abutment, an implant impression post was placed, radiographic verification was made to assure complete seating and a final impression was taken with a polyether system. Complex shade-mapping was carefully performed to match the existing contralateral natural teeth. The provisional was then reinserted.

A Procera zirconia custom implant abutment was chosen. Zirconium implant abutments have not only been noted for their tooth-like color and esthetic appeal but also for tissue tolerability, high load strength and intrasulcular design enhancement.11

The extraordinary load strength of the oxide ceramics is not compromised by high bending and tensile strength or fracture and chemical resistance.11 Zirconium abutments are mechanically equivalent to their metal counterparts but boast greater biological compatibility.11

Results of a recent study provide evidence that the ceramic oxide abutments can be safely utilized in the incisor region of both the maxilla and mandible as determined by maximal bite forces in the esthetic zone.11 Because of excellent restorative properties in terms of strength and color conformity, the zirconium implant-abutment is becoming increasingly favored by clinicians for esthetically pleasing anterior implant restorations.12 A Procera zirconia crown was fabricated for this patient with Noritake CZR porcelain (Fig. 3).

At the time of insert, the provisional crown and immediate temporary abutment were removed. The Procera zirconia custom abutment was seated, the screw was hand tightened and the screw was torqued to 35 Ncm with the manual torque wrench. The access was filled with a small cotton pellet and topped with a thin layer of flowable composite.

The Procera zirconia crown was then seated; margins, contacts and occlusion were confirmed; and the crown was cemented in place with 3M ESPE RelyX luting cement (Fig. 4).

Case study 2: fractured maxillary right central incisor

This patient, a healthy male in his late 30s, was examined in my office for a fractured maxillary right central incisor. The patient had Feldspathic porcelain restorations on his upper central and upper lateral incisors that were placed several years ago. He had a history of trauma to the anterior teeth from a sports injury and subsequent endodontic treatment.

Recent periapical radiographs showed internal resorption in the upper incisors (Fig. 5). The patient sustained additional trauma to the maxillary right central incisor through a fall, which resulted in complete fracture of the crown (Fig. 6). The tooth was nonrestorable.

After reviewing the different treatment options, the patient decided on an immediate implant restoration. Although the maxillary left central incisor also exhibited signs of internal resorption, it was decided that treatment of that tooth would be performed at a later date. Consideration was given to the poor gingival architecture that results from placing adjacent implants in the esthetic zone.

He was then evaluated by the periodontist for the surgical placement of the immediate implant for the maxillary right central incisor. The patient’s treatment was similar to that of the patient in the first case study. The right central incisor was removed and a NobelReplace Tapered Groovy (internal connection) 5.0 mm x 13 mm implant was placed. An osseous graft of demineralized freeze-dried bone was utilized to augment the surgical site. The fixture received an emergence profile, healing abutment. The patient then received an immediate non-functioning provisional.

Final restoration

After the six-month healing period, the final res-
Immediate implantation and provisionalization is becoming more routine. Not only does placing the implants increase, instantaneous replacement of failing teeth can offer the patient. Esthetic quality is enhanced without comprising long-term implant stability. Immediately placing and loading implants is both functionally and cosmetically beneficial.

**References**


**_Conclusion_**

In the cases cited above, both patients had sustained injuries to their anterior teeth as young adults while engaging in sports. Each of the patients had been treated endodontically and experienced considerable resorption of the traumatized teeth approximately 15 years later. Both of their careers and lifestyles demanded immediate replacements that were non-removable and esthetically pleasing.

The failing teeth were extracted and implants were inserted immediately and restored the same day with a non-functional loaded provisional. Immediate placement and restoration of a single implant offers a highly aesthetic and timely treatment option in the case of internal resorption and tooth failure in the maxillary central incisors.

Furthermore, this treatment eliminates the need for a removable partial denture while maintaining the gingival architecture and preventing alveolar bone loss in the extraction site.

As esthetic expectations of patients and the desire for a convenient and timely treatment continue to increase, instantaneous replacement of failing teeth is becoming more routine. Not only does placing the implant immediately following extraction maintain the alveolar architecture and retain the interdental papillas, placing the provisional immediately there-
LVI Core I course is designed for doctors and teams to learn together

Author: Mark Duncan, DDS, FAGD, LVIF, DICOI, FICCMO, Clinical Director, LVI

As a patient, I expect the best care I can find. As a doctor, I want to deliver the best care possible. That takes us to the power of continuing education, and as doctors we are faced with many choices in continuing education.

As a way to introduce you to the Las Vegas Institute for Advanced Dental Studies, or LVI, I want to outline what LVI is about and what void it fills in your practice. The alumni who have completed programs at LVI were given an independent survey, and unlike the typical surveys, 99.7 percent said they love practicing dentistry, and of those surveyed, 92 percent said they enjoy their profession more since they started their training at LVI. That alone is reason enough to go to LVI and find out more.

While the programs at LVI cover the full breadth of dentistry, the most powerful and life-changing program is generally reported as being Core I, or Advanced Functional Dentistry — The Power of Physiologic-Based Occlusion. This program is a three-day course that is designed for doctors and their teams to learn together about the power of getting their patients’ physiology on their side. In this program, doctors can learn how to start the process of taking control of their practice and start to enjoy the full benefits of owning their practice and providing high-quality dentistry.

Whether he or she works in a solo practice or in a group setting, every doctor can start the process of creating comprehensive care experiences for his or her patients.

We will discuss why some cases that doctors are asked by their patients to do are actually dangerous cases to restore cosmetically. We will discover the developmental science behind how unattractive smiles evolve and what cases may need the help of auxiliary health care professionals to get the patient feeling better. The impact of musculoskeletal signs and symptoms will be explored and how the supporting soft tissue is the most important diagnostic tool you have — not simply the gingiva, but the entire soft-tissue support of the structures and not just in the mouth but also in the rest of the body.

A successful restorative practice should not be built on insurance reimbursement schedules. An independent business should stand not on the whims and distractions of a fee schedule but rather on the ideal benefits of comprehensive care balanced by the patients’ needs and desires.

Dentistry is a challenging and thankless business, but it doesn’t have to be. Through complete and comprehensive diagnosis, there is an amazing world of thank-yous and hugs and tears that our patients bring to us, but only when we can change their lives. The Core I program at LVI is the first step on that journey.

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Celebrating innovation and education at AGD 2015 in San Francisco

The only thing that remains constant is that everything is constantly changing. At AGD 2015, from June 18–21 in San Francisco, the Academy of General Dentistry (AGD) intends to not just embrace that change but celebrate it. Taking place at the Moscone West Convention Center, the 2015 annual meeting will showcase new technologies, new continuing education courses for dentists and staff and a keynote address from Travelocity.com founder Terry Jones.

Meeting highlights

AGD 2015’s celebration of change is most readily apparent in this year’s brand new continuing education tracks. This array of courses will help attendees focus on particular subject areas such as endodontics, implants and special patient care.

New for this year, the AGD is proud to present a 90-minute live-patient dental implant course hosted by Engel Institute founder Todd B. Engel, DDS, as well as fundamental and intermediate Invisalign® courses for dentists and their teams.

Fun and philanthropy

Meeting attendees are encouraged to bring their friends and family to the President’s Celebration to honor fellows and masters while enjoying fine dining and live music and networking with colleagues.

Friends and family are also invited to support oral cancer awareness and research at the 5K Fun Run/Walk presented by the AGD Foundation. Other foundation events include the silent auction and on-site oral cancer screenings designed to emphasize the importance of detecting it in its earliest stages.

Registration and housing

Registration for AGD 2015 is now open at www.agd2015.org. The official hotel of AGD 2015 is the San Francisco Marriott Marquis, 780 Mission St., San Francisco. To guarantee a spot for your family and staff, make your reservations early by visiting resweb.passkey.com/go/AGD2015 or by calling (877) 622-3056. International guests may dial +1 (415) 896-1600.
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“My personal journey at LVI taught me the best, most cutting edge techniques in dentistry. It taught me how important it is to work on my business and most of all it allowed me to enjoy what I do whilst providing my patients with life changing dentistry.” Dr. Conchi M. Sanchez-Garcia, Miami, FL

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Surgical drive instruments face anatomical limits when extracting wisdom teeth: The cheek obstructs straight handpieces in the case of small mouths, or the distal molar makes burr access difficult for contra-angle handpieces.

In either case, the new surgical contra-angle handpieces from W&H offer a solution — even for wide apical tooth sectioning. Dental handpieces WS-91 and WS-91LG combine the advantages of surgical straight and contra-angle handpieces for the first time ever. The extended angle between the shank and burr axis allows good access to the tooth row both buccally and occlusally. Displaced teeth can be comfortably sectioned.

The dentist also has a significantly better view of the surgical site than with the instruments previously available, W&H asserts.

Dr. Mario Kirste from Frankfurt/Oder had this to say: "If I turn the contra-angle handpiece head slightly, I can work particularly quickly and safely in the retromolar region. The instrument has the potential to reconcile the contrasting positions taken up by the users of straight and contra-angle handpieces."

Power plus hygienic safety

The new contra-angle handpieces WS-91/WS-91LG are real powerhouses at the same time, W&H asserts. Their transmission ratio of 1:2.7 results in a speed of up to 135,000 revolutions per minute. The key factor, however, is their high power combined with a surgical motor.

The contra-angle handpieces achieve an effective power of more than 2 Ncm on the working part of the burrs, making them almost three times as powerful as standard dental contra-angle handpieces combined with an electric dental motor.

Biologically necessary and hygienically safe cooling is also taken care of: An external triple spray cools the rotating instrument with a sterile saline solution. As with all dental handpieces from W&H, the surface of the new contra-angle handpieces is scratch-resistant and therefore easy to clean, according to W&H.

Successful balance

Apical resection is another indication for the contra-angle handpieces WS-91/WS-91LG. The sophisticated geometry ensures excellent vision in cases involving maxillary molars and small mouths, according to W&H. In the WS-91LG, a mini LED+ also illuminates the operating area with daylight quality.

"The new contra-angle handpieces are a really successful balance. This achievement by W&H extends my viewing angle and my options in routine surgery," Kirste said.

Below, application of the WS-91LG by W&H and a visual comparison of the W&H handpiece. (Photos/Provided by W&H)
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The surgical contra-angle handpiece with 45° angle head

The new WS-91 and WS-91 LG high-speed surgical contra-angle handpieces feature a 45° angle head. They allow completely new, considerably better access to hard-to-reach operating areas such as in cases of wisdom tooth extraction or apical resection.

Scan the QR code with your mobile telephone for more information on WS-91 LG.
BIOMET 3i has recently introduced its Smile Therapy™ System Solutions to clinicians and laboratories to help patients achieve beautiful, confident and healthy smiles. These solutions include:

- **Smile beautifully with sustainable esthetic solutions** — BIOMET 3i provides a comprehensive portfolio of surgical and restorative treatment options to assist in achieving long-term esthetic results.

- **Smile confidently with full-arch rehabilitation solutions** — These solutions are designed to work in synergy to provide comprehensive dental implant therapy for partially edentulous and edentulous patients, as well as those with failing dentition.

- **Smile healthy with peri-implant health management solutions** — These solutions combine products, professional education, guidelines and patient involvement with the goal of long-lasting patient satisfaction by focusing on prevention, diagnosis and treatment of peri-implant disease.

Each set of system solutions encapsulates the use of BIOMET 3i products to achieve optimal patient results.

“It is no longer just about the products you sell,” said Bart Doedens, president of BIOMET 3i. “Our doctors want solutions so they can better treat their patients who continue to expect faster, longer-lasting and esthetically optimal treatment. We are focused on the entire solution and not just the bits and pieces. There’s more to implant dentistry than that.”

**About BIOMET 3i**

BIOMET 3i is a leading manufacturer of dental implants, abutments and related products. Since 1987, BIOMET 3i has been on the forefront in developing, manufacturing and distributing oral reconstructive products, including dental implant components and bone and tissue regenerative materials. The company also provides educational programs and seminars for dental professionals around the world. BIOMET 3i is based in Palm Beach Gardens, Fla., with operations throughout North America, Latin America, Europe and Asia-Pacific. For more information about BIOMET 3i, visit www.biomet3i.com or contact the company at (800) 342-5454; outside the U.S. dial (561) 776-6700.
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BOOTH NUMBERS 408 & 501

Smile Therapy
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Gingival recession and associated root surface exposure and sensitivity are prevalent problems in around 23 percent of the population in United States. Treatment of gingival recession is performed using mucogingival therapy with concomitant effort to increase keratinized tissue.

PerioDerm is an acellular dermal allograft designed for predictably replacing damaged or inadequate tissue in the repair, reinforcement or supplemental support of soft-tissue defects. Traditional grafts require harvesting tissue from patient’s palate, causing second surgical site related morbidity, and are only available in limited quantities.

PerioDerm is processed at the Musculoskeletal Transplant Foundation (MTF), the largest tissue bank in the United States and is distributed by DENTSPLY Implants as part of its SYMBIOS regenerative solutions.

PerioDerm has the distinct advantage of achieving predictable and esthetically consistent results without the pain and discomfort often reported with palatal graft, according to DENTSPLY Implants.

PerioDerm is minimally processed to preserve extra-cellular matrix while minimizing risk of rejection and inflammation. This unique processing allows for rapid revascularization and incorporation of the graft within the surrounding soft tissue. PerioDerm has also been shown to support the migration of host cells from wound margins and surrounding tissue.

Compared with other acellular dermal products, PerioDerm also has the advantage of short hydration time (three to five minutes). It is not soaked in antibiotics and does not require additional washes before use.

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Figs. 1a, 1b. Due to recession and severe clefting, this patient will undergo surgery to correct the recession with the use of PerioDerm. (Photo/Provided by DENTSPLY Implants and Dr. Daniel Melker)
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trimmed once moistened to match the contours of the cement-enamel junction (CEJ).

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Clinical case is courtesy of Dr. Daniel Melker. This case* demonstrates correction of root recession using split-thickness flap technique using PerioDerm. The author believes that visual knowledge is necessary instead of just tunneling because it allows for a more definitive procedure to be accomplished.

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Reference

‘PerioDerm is an acellular dermal allograft designed for predictably replacing damaged or inadequate tissue in the repair, reinforcement or supplemental support of soft-tissue defects.’
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