Dentures are Not the Answer

Millions of despondent denture wearers yearn for renewed quality of life.

If edentulism were an infectious disease, it would be classified as a pandemic. According to the United Nations’ World Health Organization (WHO), somewhere between 6 and 10 percent of the world’s population is toothless, which is both a tragic problem for people suffering such loss, and an epic opportunity for professionals prepared to provide oral rehabilitation with the support of Nobel Biocare.

The dramatic WHO statistics are presented in the centerfold spread. As daunting as these figures are, it’s important to remember that these vast numbers do indeed represent individual people—potential patients—who can be helped to a better life, one at a time. In this context, the well-proven implant-based solutions depicted in the columns to the right represent Nobel Biocare’s offerings to the dental professional in a nutshell.

All of Per-Ingvar Brånemark’s first patients were edentulous cases that he treated with full-arch restorations. Consequently, no other form of oral implant treatment has more or longer favorable follow-up than these traditional bone-anchored solutions.

The data set extends well back into the post-war era. Nobel Biocare is proud to continue to develop new solutions based on this experience.

If you’re looking for an efficient full-arch treatment concept for immediate loading—one that’s both affordable and well-proven—All-on-4 treatment is supported with almost fifteen years of clinical success. This high-tech with the advent of the NobelProcera Implant Bar Overdenture. (Read all about it on page 10.)

There are many options to consider when you meet dissatisfied removable denture users—including zygomatic solutions for the long-time denture wearer with severely resorbed maxillary bone. Nobel Biocare covers all the bases.

The challenge of longevity

Despite reports from the WHO that indicate that oral health is improving in all age groups globally, edentulism is still on the upswing as we’re surviving into old age in greater numbers than ever before. In this context, the well-proven implant-based options depicted in the column to the right represent Nobel Biocare’s offerings to the dental professional in a nutshell.

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Tell removable denture wearers that there is a well-proven, scientifically validated, bone-anchored alternative to the countless social, emotional and even nutritional disappointments they’ve faced since losing their teeth—and they will be eager to know more.

“No one should have to die with their teeth in a glass of water beside their bed.”

— Per-Ingvar Brånemark

continued on page 2

Don’t Miss the Next Big Thing!

New York City, New York

Planning to attend only one professional meeting next year? Then make it the Nobel Biocare Global Symposium 2013 at the Waldorf Astoria! On June 20-23, the field’s foremost speakers will be presenting the best science to the greatest audience in the world of implant dentistry. Think that’s hyperbole? Well, that’s the way we talk in New York: an exciting city full of attractions that include world-class theater, music, sightseeing, and sports.

More to explore:
Read the full article on page 14.
Everyone deserves a healthy smile.

Decades ago, Per-Ingvar Brånemark started a revolution by treating edentulous patients first, and that’s where we still have our greatest impact on patient quality of life today.

You do your part and we do ours. You and your fellow customers provide the skills, and we at Nobel Biocare provide the most attractive range of products and solutions for all indications. Together, there isn’t a patient we cannot help.

Our company has a long and storied past that is reflected in the development of our well-proven edentulous arc solutions—and for that matter—our entire product portfolio. No one else builds on such extensive expertise and clinical data, and our innovative solutions and comprehensively provide the prove the point.

We pride ourselves for keeping our customers at the forefront of modern dentistry. Side-by-side, we have helped millions of edentulous patients regain their quality of life. This is what keeps us moving forward together.

Dentures are Not the Answer

numbers than ever before. Living a full life—rather than just surviving—requires teeth that work; and for the edentulous patient that means implant-based prosthetics. (See the McGill consensus report reference on page 9, for example.)

Implant innovations, such as NobelSpeedy and NobelActive, deliver the high initial stability necessary to turn immediate loading into routine procedure today, but are only part of the treatment equation.

You have to trust every aspect of the treatment protocol, the associated surgical and prosthetic components, and the time-proven reliability of the entire treatment concept, if you are going to recommend implants to the removable denture wearer. Nobel Biocare delivers on all these points.

To effectively present the good news of implant-based alternatives to denture wearers, one has to be aware of their worries and concerns and make them aware of the long-term detrimental effects of edentulism.

Bone resorption leads to facial changes, accelerated superficial signs of aging, and masticatory difficulties. Even the best fitting removable dentures could cause additional problems such as difficulty speaking.

"The loss of teeth may prove painful in a number of different ways, as one is deprived of appearance, function and self-esteem."

— Professor Björn Klinge

NobelActive™

High initial stability in all indications

NobelActive satisfies both the surgical and restorative clinicians’ needs.

By Jim Mack

NobelActive provides clinicians with maximum flexibility, both in placement and restorability, and its unique design expands treatment options.

With its innovative tip and thread design, NobelActive slices through bone, unlike conventional self-tapping implants, which cut the bone as they tap. With NobelActive, bone condensing increases progressively with each turn as the threads widen.

This action, together with reverse-cutting flutes and apical drilling blades, enables clinicians to make fine adjustments to implant orientation during insertion in order to optimize the final position of the prosthetic connection—and all without jeopardizing this implant’s proven high initial stability.

With a strong, sealed, internal conical connection for abutment-supported restorations, and an external platform for implant-level bridge restorations, the dual-function prosthetic connection has been designed to maximize soft tissue volume as well as restorative flexibility.

The patient first. Patient seminars offer removable denture wearers an opportunity to hear about the relative advantages of different Nobel Biocare implant-based options in a relaxed, informative environment.

Then there is the issue of resorption. Denture use may actually accelerate the shrinkage of jaw bone, while load-bearing implants prevent resorption.

Removable denture wearers often complain of chronic problems due to bad fit. For understandable reasons, implant patients rarely do.

Add to these comparisons the fact that patients with implant-supported prostheses never need adhesives or a denture relining, and it’s easy to understand the attraction of the bone-anchored alternative.

So here’s the message: let’s help you deliver. A dental implant mimics the root of a tooth. Patients get that.

Let them know that a fixed solution will feel like their own teeth, that oral hygiene will require a few new skills and take some practice—and that treatment is possible in most cases—and we’re sure you’ll find the response gratifying.

From the CEO

Richard Ladue, CEO

Published regularly by Nobel Biocare Services AG


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The classic fixed solution

Indications: Edentulous mandible or maxilla

Principle: Multiple implants supporting a fixed full-arch prosthesis

Benefits: Looks, feels and works like natural teeth • Helps prevent further bone loss • Preserves facial structure • Restores oral functionality, both in terms of chewing and speaking • Greater comfort than removable dentures • Longest history – most proven implant-supported edentulous solution • Increases the patient’s self-confidence and quality of life.

Surgical considerations: Can be combined with the computer-aided guided surgery concept NobelGuide • Open flap, or recommended with NobelGuide: flapless, mini-flap and flap.

Prosthetic considerations: Final restoration is possible with a wide variety of prosthetic solutions, including NobelProcera Implant Bridge in zirconia or titanium with acrylic veneering, or individual NobelProcera Crowns cemented to the bridge framework.

Available implant systems: All Nobel Biocare platforms and other major implant systems with multi-unit abutments.

NobelGuide: Prosthetic-driven diagnostics, treatment planning and guided surgery system • Powered by NobelClinician Software, NobelGuide is a complete treatment concept for diagnostics, prosthetic-driven planning and guided implant surgery: NobelClinician functionalities work both individually or as part of a full planning and guided surgery process.

“I no longer feel handicapped!”
Meet Richard Soh, 58, from Singapore.

Removable dentures diminished the quality of life of a widely respected swimming coach, but a Nobel Biocare implant-based solution saved the day.
By Richard Soh

I lost all my teeth years ago and lived with dentures much too long. I love fruit, especially apples, but I couldn’t eat them for years.

Worst of all, my dentures interfered with my work. I’m a swimming instructor, and the water dissolved the adhesive on my dentures so they fell out. Now that I have implants, I can swim for hours and I really enjoy food again. And best of all: I no longer feel handicapped! <

There’s more to this story!
If you or your patients would like to view a video of Richard Soh explaining how implants from Nobel Biocare have changed his life, visit: nobelbiocare.com/patient-stories

In this case of moderate bone resorption, a patient who was dissatisfied with her dentures received an entirely new, bone-anchored, third dentition.

By Dr. Peter S. Wöhlerle and Dental Technician Aki Ogata

The patient in this case was a 56-year-old woman who had been wearing upper and lower removable dentures for approximately one year when she first came in for a consultation concerning bone-anchored alternatives.

Her chief complaint was about the discomfort of her dentures, but as we discussed the matter, it became clear that changes in her speech and worries that the dentures might fall out were also contributing to her well-articulated sense of insecurity. She told us that in addition to these overriding concerns, her removable dentures felt "foreign" to her, and that she was looking for a more esthetically pleasing solution.

Promising status

An excellent candidate for implant-supported, full-arch restoration, the patient’s overall health was very good. She had no medical issues.

At the oral examination, she presented an edentulous maxilla and mandible, both with moderate bone resorption. The top of the edentulous ridge was outside the aesthetic zone.

After further discussion with the patient, we decided upon fixed implant-supported bridges for the sake of high comfort, stability and esthetics.

We carried out implant treatment planning in NobelClinician Software and chose flapless implant placement using NobelGuide. At the time of implant placement, we used fixed temporary restorations.

As can be seen in the photos below, the final restorations were built on NobelProcera Implant Bridge frameworks.

Great care was taken with the porcelain veneering, with natural-looking restorations for the missing teeth and gingival tissue as a result.

Although healing times can vary from case to case, the total elapsed time for total treatment with this patient was six months. <

More to explore:
For more extensive reading about the products and solutions that Nobel Biocare has to offer for full-arch restoration, visit the company website at: nobelbiocare.com/edentulous
A Swiss research team presents their findings – and some striking scanning electron microscopic images.

Implant surface properties are considered key when it comes to advanced osseointegration – in particular when healing times are reduced or implants are placed under demanding bone conditions.

In the recent edition of this newsletter, the authors described how TiUnite interacts with blood cells and tissues during early wound healing, and how osteoconductive bone formation is supported. Building on that foundation, they discuss new findings, which further explain how additional surface parameters, such as texture and design, may positively influence fast bone formation and osseointegration.

By Drs. Peter Schüpbach and Roland Glauser

Just prior to the turn of the century, implants with a moderately rough surface were introduced by Nobel Biocare to enhance osseointegration. Over the ensuing years, an enormous number of in vitro studies have been performed to report upon and evaluate such variable conditions as surface energy, surface texture modification (down to the nano level), increased wettability, and surface chemical modifications.

Despite the great cumulative volume of these in vitro reports, pivotal questions about the biological rationale behind the faster bone formation, higher bone-to-implant contact, and greater removal torque values of these implants—when compared to smooth surface implants—remain to be definitively resolved.

Latest research reveals a *in vivo* reality may be substantially different from the *in vitro* situation. During the installation of a TiUnite implant, the moderately rough surface texture acts like a micro-grained sandpaper: It scratches along the walls of the cortical and trabecular bone of the osteotomy and emerizes the bone surface.

**Interesting smear layer**

This results in a several-micron-thick smear layer composed of bone debris and blood, covering the implant surface.

This smear layer provides osteoinductive potential due to the presence of growth factors needed for bone formation (Tabassum et al., 2011).

Consequently—because the bone smear layer masks them—such properties of modified surfaces as increased wettability, high surface energy and chemical alteration may not decisively influence either the initial wound healing or subsequent bone formation.

**Decisive differences exist**

Moreover, not all so-called “rough” implant surfaces are the same regarding their potential for establishing such a bone smear layer. In particular, implant design, surface texture—as well as the preparation protocol for the osteotomy—will influence the presence and amount of bone smear.

Following implant insertion, only the outer tips of the threads are often in direct contact with the adjacent bone, and the serrations reason growth factors needed for bone formation (Tabassum et al., 2011). Consequently—because the bone smear layer masks them—such properties of modified surfaces as increased wettability, high surface energy and chemical alteration may not decisively influence either the initial wound healing or subsequent bone formation. Therefore, it’s not surprising that several animal and human studies have demonstrated enhanced osseointegration—both in terms of speed and amount of bone-to-implant contact on par with that of hydroxyapatite surfaces—which many still consider the gold standard for osteoconductivity.

**The role of bone fragments**

In the pursuit of fast and reliable osseointegration, another factor must be considered. When drilling—and even more pronounced when using self-cutting implants—bone fragments will be generated and accumulate in the osteotomy, especially in the apical region. In this area, they serve as nuclei for bone formation by guiding osteogenic cells through the wound and towards the TiUnite surface.

This effect is similar to that of a graft material—but here on an osteoinductive level. In conjunction
The premier moderately rough surface. With pore openings and volcano-like elevations both in the lower micrometer and nanometer range, TiUnite is produced from phosphate enriched titanium oxide.

with the osteoconductive TiUnite surface, this auspicious phenomenon serves as a powerful tool for speeding up osseointegration.

In particular, implants with a pronounced self-cutting design, such as NobelActive, demonstrate this effect most clearly. The worm-gear-like action of NobelActive during installation shovels bone fragments to its apical region, favoring accelerated osseointegration.

**TiUnite and osseointegration**

Taken together, these new observations not only complement earlier scientific findings but also help to elucidate the biological rationale that makes osseointegration possible. In particular, they explain why osseointegration with TiUnite implants is so highly predictable.

TiUnite fully meets current criteria from the surface technology research point-of-view and—at the time this is being written—has also demonstrated an impressive 12-year clinical performance track record, which is unmatched in the entire field of implant dentistry.

From a clinical perspective, TiUnite has enabled the predictable application of very short implants and implants placed in very demanding bone conditions. Moreover, TiUnite has both reduced the healing time necessary before functional implant loading can take place and lifted immediate function solutions to a very high and very reliable level of success (Glauser 2011).

**Conclusions**

The clinical behavior of an implant design or implant surface as documented by in vivo observations is of much greater value than in vitro experiments and animal studies.

Immediate biological effects of any surface modification may be neutralized due to the presence of an osteogenic/inductive bone smear layer created during the installation of moderately rough implants. In situations such as these, the theoretical benefit of such modifications will be masked, thus providing a rich field for further research.

Finally, the generation of bone fragments during both the drilling and installation of implants has an important clinical implication. Consequently, rinsing the osteotomy following drilling may be counter-productive and should be avoided.

**More to explore:**

Glauser, R. (epub ahead of print). "Implants with an Oxidized Surface Placed Predominately in Soft Bone Quality and Subjected to Immediate Occlusal Loading: Results from a 7-Year Clinical Follow-Up." Clin Implant Dent Relat Res (An 11-year follow-up poster is being presented at the EAO this fall.)

**But what is it?**

There's nothing quite like TiUnite®!

**TiUnite is titanium oxide developed into an osteoconductive biomaterial through spark anodization. TiUnite builds on the tradition of the machined implant surface, but offers improved results.**

Since its market introduction in 2006, TiUnite has shown that it serves to maintain implant stability immediately after placement with enhanced osseointegration and anchorage in surrounding bone.

Maintaining marginal bone in the long term is crucial for maximizing functional endurance and ensuring esthetics with long-term soft tissue support. As you would expect from Nobel Biocare, TiUnite supports stable marginal bone levels after the initial bone remodeling phase and over the long term.

TiUnite expands treatment possibilities while providing safe and reliable outcomes. Implants with the TiUnite surface can be used in all indications, bone types and treatment protocols. The longest clinical data available for TiUnite implants, immediately loaded in regions of predominantly soft bone, demonstrates a 97.9% cumulative survival rate (CSR) and stable marginal bone levels, ten years after implant placement.

Results of clinical use demonstrate that dental professionals can effectively reduce the time at risk for immediately loaded implants using TiUnite.

More than just a well-known brand, TiUnite has set the standard in implant surface technology for more than a decade. To date, it has been clinically documented in more than 190 publications with over 9,400 patients, 29,000 implants and—in some studies—more than 90 years of follow-up. In total, more than 11 million implants with TiUnite have been used.

**More to explore:**

Östman PO, Hellman M, Sonnerby L. Ten years later. Results from a prospective single-center clinical study on 121 oxidized (TiUnite) Brånemark implants in 46 patients. Clin Implant Dent Relat Res 2012 (Epub ahead of print)

**High stability in the critical healing phase:** TiUnite maintains implant stability immediately after placement with enhanced osseointegration and anchorage in surrounding bone. This is particularly important in regions with soft bone and high occlusal loads, and for immediate loading protocols.

**Stable marginal bone levels over the long term:** Implants with the TiUnite surface demonstrate excellent crestal bone stability over the long term. In the latest study on TiUnite (Östman et al 2012), mid-term change between 1 and 5 years is on average 0.0 mm; and long-term change between 1 and 10 years is -0.3 mm. Baseline adjusted at 1 year.

**More to explore:**

For a comprehensive list of relevant studies visit: nobelbiocare.com/scientific-evidence
In this case of moderate bone resorption, the All-on-4 concept—with NobelGuide in the maxilla and the flap approach in mandible—provided complete rehabilitation with a minimally invasive solution.

By Dr. Paulo Maló and MALO Ceramics

The totally edentulous female patient depicted here was a removable denture wearer in her early 50s, and in good general health. At the time she approached our clinic for alternative treatment, she had worn dentures for 15 years and was complaining about poor retention and the general instability of her removable dentures.

In addition to the discomfort she experienced, the patient found it difficult to speak clearly and chew well, and she was unhappy with the overall appearance of her mouth. She was well-motivated for the fixed, implant-supported rehabilitation that we subsequently proposed.

Our oral examination showed moderate bone resorption in the maxilla (at least 5 mm width and 10 mm bone height between the canines in the maxilla) and severe bone resorption in the mandible (at least 5 mm width and 8 mm bone height between the mental foramen in the mandible). The patient presented a low smile line.

We implemented fixed, implant-supported, bimaxillary rehabilitation through the All-on-4 concept, following the NobelGuide protocol (flapless) in the maxilla, and the conventional flap approach with the All-on-4 Guide in the mandible.

1. Intra-oral view of the removable dentures. Since the patient’s denture did not meet the functional and aesthetic requirements, a new removable upper denture was fabricated. After the intra-oral examination, special consideration was given to the low smile line and mouth opening capability of over 50 mm.

2. Pre-op radiograph together with the 3D radiographic analysis shows the moderate bone resorption in the maxilla and severe bone resorption in the mandible. Please note the lack of available bone for implant placement in the posterior maxilla and mandible.

3. All-on-4 treatment planning with the NobelClinician Software, for a detailed diagnostic process in both jaws. Prosthetic-driven planning based on the patient’s anatomy and prosthetic needs was chosen to ensure optimal implant support for an optimal restorative solution.

4. In the maxilla, a flapless procedure was chosen using the NobelGuide Surgical Template to optimally position the four implants and ensure minimally invasive treatment.

5. Post-op occlusal view immediately after the placement of the four implants and the multi-unit abutments. The straight multi-unit abutments were placed in the axial anterior implants. The 30° multi-unit abutments non-engaging were placed using a custom jig for the correct positioning of the angulated abutments.

6. After the traditional treatment planning in the mandible, a conventional flap procedure was done. The All-on-4 Guide was positioned to assist implant placement. The purpose of the All-on-4 Guide is to assist in the correct angulations for posterior implant placement between 30° and 45°.

7. Jumping ahead 6 months, the immediately loaded temporary bridges were replaced with a Malo Clinic ceramic bridge in the maxilla and—following the same protocol—an acrylic arch built upon a NobelProcera framework on the mandibular implants below.

8. Radiograph at 6 months shows successful All-on-4 treatment with four NobelSpeedy Groovy implants in combination with precision manufactured NobelProcera frameworks in each jaw. They were milled from a solid monobloc of titanium to ensure precision of fit and longevity, and designed to meet the patient’s esthetic and functional needs.

9. Extra-oral view of the patient showing the definitive rehabilitation with fixed bridges to fulfill the phonetic, masticatory and esthetic needs of the patient. The base of the definitive and provisional bridges are designed to be convex or flat, and polished for minimum plaque retention and easy cleaning.

By Dr. Paulo Maló and MALO Ceramics

Indications: Edentulous mandible or maxilla

Principle: Four implants—two straight implants in the anterior and two angled implants in the posterior—supporting a provisional, fixed and immediately loaded full-arch prosthesis.

Benefits:
- Helps prevent further bone loss
- Restores oral functionality, both in terms of chewing and speaking
- Minimal recovery time, ordinarily with very little discomfort or pain
- Angled posterior implants help eliminate the need for bone grafting by increasing bone-to-implant contact
- Efficient treatment flow results in shorter treatment times and improved patient satisfaction
- Increases the patient’s self-confidence and quality of life.

Surgical considerations: All-on-4 Guide is recommended for accurate placement of implants and abutments. Can be combined with the computer-aided diagnostics and treatment concept NobelGuide. Open flap, or with NobelGuide: flapless, mini-flap and flap.

Prosthetic flexibility: Final restoration after healing time is possible with fixed or fixed-removable prosthetic solutions. Fixed provisional acrylic prosthetics is a good match. Fixed final prosthesis—NobelProcera Implant Bridge in titanium with acrylic veneering, or individual NobelProcera Crowns cemented to the bridge framework. Removable final prosthesis—overdenture on a NobelProcera Implant Bar Overdenture.

Available implant systems: NobelSpeedy, the widely documented implant for All-on-4 (see article to the right). All Nobel Biocare implant platforms and other major implant systems with multi-unit abutments.

NobelGuide: Prosthetic-driven diagnostics, treatment planning and guided surgery system. Powered by NobelClinician Software, NobelGuide is a complete treatment concept for diagnostics, prosthetic-driven planning and guided implant surgery. NobelClinician functionalities work both individually or as part of a full planning and guided surgery process.

Please note the lack of available bone for implant placement in the posterior maxilla and mandible.
The Challenge of a Lifetime
A predicament in need of a solution

Years ago, a young dentist was confronted with the issue of total edentulism in a poignant situation that was, at the time, all too common in the dental profession.

By Dr. Paulo Malo

I was meeting with a patient whose quality of life would have improved enormously, had I only been able to provide him with a complete bone-anchored solution. Unfortunately, I had to tell him that placing implants in his maxilla was virtually impossible due to the lack of viable bone tissue there.

Back in the nineties, in his situation, the only practicable implant solution involved preparatory bone grafting, also known as bone augmentation, but such a costly procedure was out of my patient's reach financially, and his history of heart problems indicated that it would not be wise to proceed with such an invasive course of action in any case.

Unfortunately, cases like his were—and continue to be—commonplace among seniors.

Under the best of circumstances, bone grafting can provide an effective foundation for implant-based prostheses. Unfortunately, the aggregate need among the totally edentulous population for permanent solutions (and thus genuine oral rehabilitation) far outweighs the number of best-of-circumstances cases.

Looking at the big picture, it became obvious to me that the optimal general solution to the problem of total edentulism was not going to comprise bone augmentation.

Unacceptable status quo

Too many patients either could not be recommended for such procedures as a result of physiological limitations, or would not be able to finance such complex, multi-stage treatment.

Even if these obstacles could be overcome, there was still the question of the availability of surgeons skilled in the procedures of bone grafting.

When an estimated 65% of the population over 70 in North America and Europe is in need of complete oral rehabilitation (see page 8 for more figures), it is self-evident that a more time-efficient and reliable procedure than bone grafting is needed to meet burgeoning demand.

I decided to tackle the problem. My objective was simple: to provide fixed, long-lasting teeth on a reliable basis for my totally edentulous patients, who were a large and growing part of my practice. In order to meet this goal, I devised the following strategy:

First, I would determine the minimum amount of bone volume that was required for the routinely successful use of existing implant technology in connection with fixed prosthetics.

Second, in the pursuit of alternative solutions, I would retroactively evaluate all the totally edentulous cases that had been treated at my clinic for which the generally accepted implant procedures of the time could not be recommended. I spent a great deal of time exploring treatment alternatives through the review of scientific literature. In the process, an intriguing question arose:

How many teeth do we really need to assure pleasant esthetics and good masticatory function? No one seemed to be posing this question in the dental journals, yet without an answer, it would be impossible to optimize the bone-anchored rehabilitation I was pursuing.

New thinking

Think of it this way: As the number of teeth in a full-arch restoration increases, so does the amount of bone needed to support the underlying implants that support it.

In order to determine the minimum number of teeth needed to guarantee good mastication and esthetics, we devised something we called the “nut test.” We gave our test subjects a standardized portion of almonds, asked them to chew for ten seconds, and then we aspirated the crushed nuts in order to subsequently measure the size of the particles, the idea being that the smaller the particles, the greater the masticatory efficiency.

We compared the results from subjects with arches comprising 10 teeth (2nd premolar to 2nd premolar) to subjects with arches comprising 20 teeth (2nd premolar to 2nd premolar) to:

continued on page 14

NobelSpeedy™ Implants
A classic choice for the All-on-4™ concept

Designed for immediate function, NobelSpeedy is the original implant for the All-on-4™ treatment concept.

By Frederic Love

Well-documented, the Nobel-Speedy product line is designed for immediate function and encompasses a versatile assortment of implants.

This ingenious implant has a drilling protocol that varies depending on bone quality. The resulting reduction of chair time is beneficial for the patient and dentist alike.

Developed to cut through locally dense bone and facilitate bicortical anchorage, Nobel Biocare introduced this implant to ensure high initial stability in soft to medium bone, thus enabling the immediate function protocol. In addition to its surgical advantages, prosthetic flexibility is also a hallmark of Nobel-Speedy, as it provides a choice of either external or internal connections.

Efficient surgical procedures and prosthetic flexibility make Nobel-Speedy the cost-effective choice for All-on-4 treatment.

“‘I cannot believe the difference All-on-4™ has made in my life!’”

By Carole Lane

For much of my life, I suffered from gum disease, bone loss and unstable teeth. I was very self-conscious about my situation and thought that there was no solution to my problem.

My dentist had told me that I wasn’t a suitable patient for dental implants because of the bone loss. Then I read an article in the press about a new procedure called the All-on-4 treatment concept and regained hope. After an Internet search of local dentists, I found out that Queensway Dental Clinic inBillingham (UK) offered the procedure, and made an appointment.

Efficient surgical procedures and prosthetic flexibility make Nobel-Speedy the cost-effective choice for All-on-4 treatment.

From my first consultation with Dr. Jan Lane (no relation), I felt totally at ease and confident. After giving the recommendation for All-on-4 treatment proper consideration, I decided to go ahead and made an appointment for a few weeks later to begin the design of my new teeth.

Not long afterwards, the procedure was carried out in a single day by a consultant surgeon, Rob Banks, and the final prosthesis was produced onsite by the Queensway Laboratory. Throughout the treatment I had conscious sedation and it was totally pain-free. Even afterwards there was no bruising, just some slight swelling the next day.

I cannot believe the difference All-on-4 has made in my life, and I have been astonished by all the compliments I have received. My teeth look totally natural, and my husband says that my teeth and smile are back to what they once were. Life is good!
No Need to be Edentulous

Together with Nobel Biocare, you can offer your patients a third dentition today!

If a picture is worth a thousand words, then what's the value of a healthy smile? For many people suffering with edentulism, getting their smile back could be priceless.

By Jim Mack

Not everyone was gifted with a straight jaw line and a picture-perfect smile. As the world’s population continues to grow, there are ever larger numbers of people who don’t even have the primary components of such a smile: teeth.

Professor Brånemark has often stated that losing even one tooth can be considered a major defect, resulting in a significant blow to a person’s identity. The World Health Organization (WHO) has even gone as far as to classify the edentulous as physically impaired.

Losing one or more teeth leads to cascading repercussions that culminate in a pool of complex consequences that include both functional and emotional side-effects.

One true solution

Modern implant-based dentistry has delivered something to the edentulous patient that conventional dentures have never quite managed by comparison—substantially increased quality of life.

A prosthesis held solidly in place by dental implants not only provides the comfort and security a patient is likely to be missing with removable dentures, it also preserves bone. Add to the equation emotional benefits—such as improved self-image, increased self-confidence and a renewed social life—and an implant-based restoration becomes the clear choice.

At Nobel Biocare we offer the widest range of advanced treatment solutions available for treating edentulous patients. Combining diagnostics, treatment planning and guided surgery with implants for every situation and versatile prosthetics, we have scientifically proven options to meet every patient’s need.

Growing populations require greater treatment

POPULATION GROWTH

Population >65 years in millions

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<td>120</td>
</tr>
</tbody>
</table>


FULLY EDENTULOUS POPULATION

In the western world

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
<th>USA 44%</th>
<th>Brazil 20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: WHO, Nobel Biocare estimates, Piper Jaffray Investment Research.

Conventional dentures are NOT the answer

Lose more than confidence

- Severe bone resorption may occur without implant treatment.
- Conventional dentures can fall out at any time.
- Avoiding food can lead to nutritional deficiencies.
- Altered self-image.
- Avoiding social situations.

A limited alternative

- Restores only 10% of the chewing function.
- Poorly fitting dentures may lead to sore spots or painful blisters.
- Dentures may need occasional relining.
- Adhesives must often be added for comfort.
- Can limit lip and cheek support.

More to explore

For details on all the solutions Nobel Biocare provides for edentulism, please go to nobelbiocare.com/edentulous
Implant-based solutions improve quality of life

Advanced treatment approaches are available

1. Diagnostics and treatment planning
   Edentulous cases can be planned with NobelClinician Software and performed using the NobelGuide treatment concept, ensuring accurate diagnostics, planning and implant placement. NobelClinician is also an excellent communication tool for both patients and the entire treatment team.

2. Surgery
   An extensive assortment of bone and tissue-level implants is available for all indications, bone types and surgical protocols (two-stage, one-stage and immediate function).

“Several research studies have clearly demonstrated that fixed dental implant solutions, compared to removable dentures, significantly improve patients’ quality of life.”

“Fixed dental implants allow patients to chew and speak properly as well as increase patients’ comfort and self-confidence, and reduce bone resorption.”

Sources:

The Brånemark System Zygoma concept is a graftless solution that simplifies complex edentulous maxillary cases with severe bone resorption.

Using two axial (straight) and two tilted implants, this is a scientifically proven solution, designed to support a full-arch restoration (up to 12 teeth) on only four implants. Tilting the posterior implants is a graftless approach that provides an efficient and time-saving form of treatment with immediate loading.

Nobel Biocare offers a broad range of implant bars and attachment types that provide safe and reliable solutions for all clinical and budgetary needs—both for Nobel Biocare implants and other major implant systems.
Why Overdentures?
Implant-retained overdentures – a prosthodontic solution for the 21st century

The clinical application of multi-unit, implant-supported restorations in edentulous jaws has proven to be a predictable long-term treatment option. In this prosthodontic context, implant-retained removable solutions provide a number of interesting advantages for select patients. By Professor Stefan Holst

Despite the fact that patients considering implant treatment tend to contemplate a fixed restoration first, numerous studies have proven that implant-retained overdentures can also significantly improve masticatory function and, at the same time, fulfill patients’ expectations and demands. An awareness of the need to restore esthetic appearances is not limited to the partially edentulous. Indeed, it is of great importance to fully edentulous patients as well.

The most conspicuous esthetic impairment these patients have to face affects extra-oral appearances. Substantial atrophy of the alveolar face affects extra-oral appearances. While this can be achieved technically with a fixed restoration, the resulting design of the prosthesis may significantly impair hygiene accessibility. It is important to differentiate between two different types of removable restorations. The implant-retained, mucosa-supported overdenture is mostly supported by two interforaminal implants with various anchoring mechanisms such as round or Dolder Bars, ball or magnetic, or other extracoronal attachments, such as Locators. An alternative to the resilient treatment modality can be found in the implant-supported removable prosthesis, which is a rigidly anchored prosthesis purely supported by implants (four or more fixtures). The implant-supported removable prosthesis is stabilized on extended (CAD/CAM-milled) bars, which prevent rotational movements of the prosthesis.

The advantage of this retention and support design is that the restoration is comparable to a fixed prosthesis. It provides for a stable occlusal plane and prosthesis position when functional forces are applied.

Studies have demonstrated high implant success rates concomitant with a minor degree of prosthodontic maintenance effort. In general, both fixed and fixed-removable implant restorations are viable treatment options for edentulous patients. Clinical long-term outcome is comparable if patient-specific characteristics are taken into account during treatment planning and execution.

Factors to consider
Repair options and maintenance needs are additional factors that need to be taken into consideration when decisions are being made about the design and retention mechanism of a superstructure. The most frequently reported technical complication identified for implant-retained, mucosa-supported restorations is loosening of the retentive mechanism (e.g., wear of matrices) requiring the replacement of components. However, the introduction of CAD/CAM-milled, high-precision bar elements for implant-supported removable prostheses has resulted in a significant reduction in the need for post-insertion maintenance. This also holds true for the rigid anchoring of implant overdentures by telescopic attachments. Clinical

Decisive factors for either solution include the patient’s age and expressed expectations, the amount of missing hard and soft tissue, the manual skills of the patient and his or her financial situation.

More to explore
There is a wide range of overdenture options available from Nobel Biocare. See the details at: nobelbiocare.com/edentulous

Removable implant-retained overdenture

The pros

- Re-establishing facial harmony through ideal support of peri-oral musculature
- Simple hygiene maintenance for the patient (accessibility of intra-oral retentive elements and extra-oral cleaning of the denture)
- Cost-efficient treatment solution without compromising maximum precision of fit and material quality when utilizing milled titanium bars
- No need for removal of retaining structure (bar) for hygiene recall appointments
- Setting of retentive forces can be adjusted to patient demands/capabilities (low friction — maximum friction)
- Reduced number of implants
- Fast and easy repair and long-term adjustment potential
- Transfer of an implant-supported removable prosthesis to an implant-retained mucosa-supported overdenture if manual skills for hygiene maintenance diminish

Removable implant-retained overdenture

The cons

- Patient’s demands and expectations for a fixed solution on dental implants
- Renewal of plastic/metallic attachment matrices in the implant-retained mucosa-supported overdenture
- Potential psychological impact
- Technical demands to manufacture frameworks for implant-supported removable prosthesis
- Space required for primary and secondary support structures

Experience drilling on a new level.

OsseoCare™ Pro

nobilocare.com/osseocare

Replace Select™ TC

Specially indicated for overdenture treatment. Replace Select TC is the perfect implant choice for use in combination with top-of-the-line NobelProcera™ implant bar solutions.
**NobelProcera™ Implant Bridges**

When only the best is good enough

Reporting from Japan, one of the country’s leading dental technicians writes about why he prefers to provide NobelProcera Implant Bridges for the treatment of discerning patients.

By Mr. Atsushi Sogo

Even the increase in implant treatment in recent years, it is not surprising that a greater number of problems have also been reported. Besides a greater absolute number of implant failures due to improper treatment, patients complain in increasing numbers about the design and shape of the final restoration. In my experience, failing to meet patient expectations is most likely due to a lack of communication. Discerning patients have high expectations for their implant treatment. They anticipate a high level of surgical and prosthetic performance and may not be willing to accept a compromised superstructure even if the doctor had no choice due to the status of the patient’s oral cavity.

The doctor must always understand the patient’s expectations and provide an adequate explanation of the treatment.

One way for the doctor and the patient to come to agreement amicably is for them to come to terms during the consultation phase on what should be expected of the final implant-based restoration.

The ideal restoration can be characterized by good functionality, fit, strength, ease of cleaning, biocompatibility and aesthetics. A good balance between these factors is important and no one factor should be significantly compromised for any other. This is the kind of fundamental information that must be discussed openly.

**Nobel Biocare at the forefront**

Current state-of-the-art diagnostic and implant treatment tools include not only 2D radiographic examination but also 3D simulation software, i.e. NobelClinician, through which the patient’s CT data can be used for computer-based implant treatment planning.

NobelClinician provides a solution to support implant treatment with a surgical template that makes guided surgery possible. It is also useful as a communication tool between the doctor and the dental technician in prosthetic-driven implant treatment, and furthermore as a patient consultation tool.

Laboratory work must keep up with the rapid progress of implant treatment, of course. Particularly in edentulous cases where large-scale restorations are under consideration, we dental technicians constantly have concerns over the fit and strength of the framework.

In the production of large restorations for edentulous cases in the past, we often felt the limitations of analog/manual techniques, which were the conventional methods, at that time.

NobelBiocare dental CAD/CAM was a savior. It resolved our concerns, and it is no exaggeration to say that this system made for a paradigm shift in dental technology for implant treatment.

In the production of NobelProcera Implant Bridges, NobelProcera technology continues to be an excellent choice as it ensures: 1) consistent quality, based on computerized management; 2) precision fit, backed by CAD/CAM technology; 3) high strength, due to one-piece structure; and 4) superior biocompatibility, based on erudite material science. Without question, NobelProcera Implant Bridges represent a great leap forward from the framework produced by conventional analog/manual methods.

**Early adopters**

We quickly adopted this system when it was first released and have since used it in our dental laboratory. As long as proper procedures are followed, we have not encountered any problems with fit or strength, and work-time management has become much easier than ever before.

As Nobel Biocare is a well-established global manufacturer of implants—and an experienced provider of CAD/CAM-based prosthetic systems—the company routinely meets the quality and safety expectations of users. Thus, the company has become our preferred partner. Needless to say, we will continue to use the NobelProcera system.
Higher strain required to produce motion. Placement (~150 µm) and the force between the head of the micromotion device permits defined motion to a special implant. The motion device acts as a spring to return the implant in the center column of the fixation plate (not shown) connected to the implant differential transducer and load cell. A linear variable displacement transducer (L-DVT) permits measurement of the displacement of the micromotion device. The bone interface provides the key factors to avoid disruption of bone healing. But, at this point, we have only just two key factors. In examining the biological results of our experiments on micromotion, consider an experiment done in one sort of initial interface that we call a "bone-implant gap interface" (BIGI); this is an interface formed by implanting the 0.5 mm diameter pin-shaped implant (made of 70% L-lactide/30% D,L-lactide) into a 0.8 mm hole drilled in one cortex of the mouse tibia. The rationale for testing an implant in this type of initial interface is that an implant subjected to micromotion in this "gap" interface allows us to study the influence of certain strain fields on the disposition of the early fibrin clot and granulation tissue of the interface (along the lines depicted in our first article in Nobel Biocare News)—which should go on to form bone if the mechanical conditions permit this healing to occur! Accordingly, we have compared interfacial results around pin-shaped implants (as seen in Fig. 1) that were either secured motionless in the BIGI, or subjected to 150 µm of axial (downward) micromotion 60 times per day at 1 cycle per second in each day for 7 days total—which produced strain fields in the gap along the lines of those shown in Fig. 3.

**Figure 1.** In vivo micro-motion device permits defined stimulation of the bone tissue. The device—consisting of a hollow pin-shaped implant (A), held in place by a subcutaneous fixation plate (B)—is secured to a mouse tibia by two screws. An O-ring (C) placed between the head of the implant and the cortex of the fixation plate acts as a spring to return the implant to its starting position after axial displacement. A linear variable displacement transducer and load cell (not shown) connected to the implant permits measurement of the displacement and recording of displacement (~150 µm) and the force (~1N) required to produce motion.

**Figure 2.** Scanning electron microscopic views of the basic geometric form of pin and screw implants. Implants in these images are commercially pure titanium, although the implants used in the experiments described in this article were made of poly(L-lactide-co-D,L-lactide) 70:30.

**Figure 3.** These magnified analytic views of the strain fields at the bottom portion of the "pin" analogous findings about strain levels in the fracture healing literature. Such data begins to give us a good grasp of the strain levels to avoid when designing appropriate shapes and sizes of dental implants, as well as appropriate drilling protocols during surgery. The hope is that by understanding the design significance of factors such as implant size, shape, and surface texture, the implant surgical site, the properties of the bone at the site, and the loading of the implant, we can better predict what implant micromotion will occur under loading and also the associated interfacial strains—which ultimately govern success or failure. 

**Figure 4.** Typical motion case histology of pin-type implant recovered at seven days.
The Zygomatic Angle

When grafting is not an option, consider the advantages of implant anchorage in the zygoma.

Patients with chronic periodontal disease (a.k.a. “terminal dentition patients”) are often advised to remove their remaining teeth in order to improve their oral and overall health, but time after time, they do not follow this recommendation. One might ask, “How can this information be so plain to see, yet at the same time so hard to convey?”

By Dr. Edmond Bedrossian

I think the answer to the question posed above is obvious. The idea of losing all one’s teeth is devastating to most people. Even more objectionable is the idea of wearing a denture.

If this is true, we as dental professionals have an obligation to formulate and execute treatment plans that address the social, psychological, cosmetic—as well as the biologic—needs of this patient group.

Implant dentistry is the best option for existing edentulous patients or for patients with terminal dentition for one major reason: Implant-supported prostheses internally load the edentulous alveolar bone and therefore maintain the residual volume of the alveolar bone.

But what about the maxilla? Treatment planning for a fixed, implant-supported prosthesis is restricted by unique anatomical limitations in the maxilla.

The pneumatization of the maxillary sinuses bilaterally does not allow for the placement of implants in the posterior maxilla for the fabrication of implant-supported prostheses. Therefore, implants are usually placed in the os incisivum (Zone I), between the cuspid teeth. The placement of the implants in the os incisivum does not allow for adequate AP (antero-posterior) distribution of the implants, and results in the fabrication of a tissue-supported implant overdenture that does not internally load the residual bone.

To physiologically load the residual alveolar bone with biomechanically stable implant-supported prostheses, grafting techniques such as the sinus lift procedure are often proposed. Although sinus grafting is a stable and predictable procedure, the multiple surgical interventions needed, as well as the inability to immediately load the implants, limit the number of patients who choose to proceed with this treatment option.

Zygomatic advantages

To address this objection, the use of zygomatic implants in the posterior maxilla in conjunction with two to four premaxillary implants has solved the various issues associated with establishing a predictable posterior support for implant-supported prostheses.

The use of zygomatic implants has many advantages over grafting the posterior maxilla; this surgical protocol allows for a graftless approach, a single surgical procedure and immediate loading. These advantages result in an increased rate of patient acceptance of the proposed treatment.

The zygomatic implant protocol addresses the needs of patients who are missing residual alveolar bone in their premolar and molar regions, lack of bone in Zone II (the premolar region) and Zone III (the molar region), respectively. These groups of patients are sometimes referred to as having moderate to advanced resorbed maxilla.

The use of the zygomatic implant also addresses the “extremely resorbed maxilla, patients lacking bone in Zones I, II and III, otherwise known as the “untreatable” maxilla. By placement of four zygomatic implants, even this group of patients can be treated with fixed implant-supported prostheses.

The zygomatic implant is sometimes called the “Rescue Implant.” Many patients have had multiple grafting procedures to establish adequate bone volume for the placement of conventional implants. For various reasons, however, such as resorption of the bone graft or infection of the grafted bone, the residual bone volume remains inadequate for the placement of implants. The Brånemark System Zygoma implant addresses the needs of this group, too. The zygomatic concept encompasses procedures that complete the implant surgeon’s repertoire of surgical skills in treatment of the edentulous maxilla.

Consider the following possibilities:

Two scenarios

In scenario one, the surgeon is plac- ing tilted implants for the All-on-4 procedure. During installation of one or both of the posterior tilted implants, 35–40 Ncm of insertion torque is not reached. What should the surgeon do if immediate loading was the treatment plan proposed to the patient?

Scenario two: the All-on-4 procedure has been performed; the patient has been immediately loaded. After three months, the patient returns with a loose immediately loaded provisional prosthesis. After removal of the prosthesis, one of the tilted implants is diagnosed as mobile and is removed. After its removal, the surgeon notes the lack of buccal bone in the area where the failed tilted implant was removed. What options does the surgeon have?

In conclusion, the Brånemark System Zygoma surgical protocol allows for the treatment as well as rescue of every possible maxillary defect. It is a predictable protocol for either delayed or immediate loading for the patient with a fully edentulous maxillary arch.

Without question, the contemporary surgeon should incorporate this surgical protocol into his or her practice.

For Smarter, Easier, More Personal Choices

Nobel Biocare has launched an online store based on more than eight years of online sales experience. The US has been first in line; selected markets will have access to the store this fall.

At the new Nobel Biocare Store, customers can choose from the full range of high-quality Nobel Biocare products 24 hours a day. Intelligent filtering helps you find the product you’re looking for fast, and search results show related products to make comparisons easy. Shopping can take place on virtually any device, and with the “quick buy” function, you can order regular supplies with ease.

What’s more, you can buy items directly from your previous purchase history or even build up your own practice-specific product catalog—complete with product information.

At the Nobel Biocare Store, you can shop with confidence. All Nobel Biocare products are covered by generous warranties and the company’s convenient return policy is literally, “just what the doctor ordered!”

Visit the Nobel Biocare Store today!

store.nobelbiocare.com

The Nobel Biocare website is also a goldmine of information:

nobelbiocare.com/edentulous
Challenge of a Lifetime

continued from page 7

others with 12 teeth in each arch (1st molar to 1st molar) and to yet others with 10 teeth per arch (2nd molar to 2nd molar).

The results showed that while 14 teeth per arch provided the greatest chewing efficiency, 12-tooth arches worked almost as well, and even 10 teeth per acceptable mastication in terms of facilitating ingestion.

From the esthetic point of view, it was easy to demonstrate that, while smiling, most of our subjects showed harmeneses. Such forces do not bode well for good esthetics then, we determined that a 10-tooth arch was not adequate. On the other hand, the most posterior teeth of a 14-tooth arch would rarely, if ever, be seen by the subjects' acquaintances.

Optimizing the arch

With these results in hand, we knew how to proceed and began to develop an oral rehabilitation solution that would deliver 32 teeth per arch (1st molar to 1st molar).

In the mandible, we typically find enough bone to place straight implants in between the foramina mentalis, but not enough to place any posterior to the foramina. Depending on the position of the foramina, we found that we could place between six and eight teeth with no substantial cantilevers.

Our goal, of course, was to produce a 12-tooth bridge. Reviewing the literature, we found clinical cases (albeit not routine protocols) in which as many as three teeth were placed on cantilevers and were report to work well.

Undesirable bending

Evaluating the force on the implants due to cantilever bending in situations like these, however, one finds that the implant closest to the cantilever is subjected to substantial (and escalating) forces as the cantilever increases in length. In such cases, the implants do not bode well for successful long-term prognoses.

In order to reduce the length of the cantilever by one or two teeth, and thus improve the biomechanical long-term outcome, we chose to incline the posterior implant. Literature reviews showed us that angled implants had been in use for decades by Professor Bränenmark and his colleagues (Källus et al. 1990) and had not only been found as useful as straight, axially loaded, implants. In a fruitful cooperative effort with the late biotechnologist engineer Bo Rangert at Nobel Biocare, we realized that the use of long, well-angled posterior implants would be one of the keys to reaching our objectives.

Together with the straight anterior implants, these angled posterior implants become components in a virtual truss, making it possible to avoid vulnerable anatomic structures, while offering improved support of the prosthesis by reducing cantilevers.

What’s more, the apex of the angled implant can be placed in better aesthetic anterior bone. A straightforward treatment design innovation, angled posterior implants help to eliminate the need for bone grafting by increasing bone-to-implant contact. As Bo was fond of demonstrating on a chalkboard, napkin or a computer, from a biomechanical point of view, four implants provide an optimal solution for a full-arch and are eminently suitable for immediate loading strategies.

All-on-4 concept in a nutshell

Consider the following: When the cantilevers of a complete prosthesis are loaded, only the supporting posterior implants are subjected to load. The remaining two implants, placed in the anterior, are subjected to no compression transferred over the fulcrum from the cantilever load and only negligible tension, which makes additional implants superfluous.

The use of ancillary implants actually makes the surgery more difficult, as each additional implant competes for precious space, which is usually in short supply, and sometimes completely unavailable. Also, for the sake of good, long-term prognosis, one simple fact must always be taken into consideration: The closer the implants are placed to each other, the greater the potential for marginal bone loss.

Another factor that needs to be taken into consideration when designing a full-arch solution: the greater the number of implants used, the greater the number of holes in the prosthetic structure. In this context, it is important to remember that the inherent tensile strength of the prosthetic arch is always compromised to some degree by each additional hole.

What about hygiene and fit? Bas- ing each arch on only four implants facilitates oral hygiene, especially for older patients, the most common demographic among the edentulous.

The use of four implants makes it easier to achieve passive fit, which is of critical importance whenever a cantilever is called for. In short, the use of four implants reduces treatment complexity, which yields many benefits. Costs for both the doctor and the patient are reduced because less surgical time and product are used. The lab technician can profit from reduced intricacy in the fabrication of prostheses—leading directly to more predictable workflow patterns—and simplified hygiene bodes well for improved long-term oral health all around.

Our first case

Having completed this preliminary analysis, I felt very secure about our proposed procedure and was eager to tackle our first case.

To minimize risk, I chose a healthy, highly motivated candidate with good bone density. As I proceeded with the surgery in April 1998, it became clear that inclining the posterior implants at approximately 45° was not going to be easy working free-hand. As there were no teeth to provide points of reference, I ran the risk of missing the biomechanically correct position as I drilled.

To preclude this problem, I designed a universal guide that could be used for all mandibles. Made of metal, so it could be sterilized and reused, ours was a fixed guide, which was a remarkable innovation at the time.

The second and following surgeries went much more smoothly not only because of the guide but also because we were moving up the learning curve. After completing approximately ten cases, we decided to carry out twelve months of follow-up on those cases in order to evaluate results, before continuing. After one year, the results were extraordinary.

We were looking at a success rate approaching 100%, no more marginal bone loss than normal, and a huge degree of acceptance by the patients.

These were heady days. From the moment we took those first tentative steps, we decided to continue along the same path, fastidiously documenting every step. Tremendous things transpired as a result.

All-on-4 treatment for the maxilla followed and thousands of patients have subsequently been treated in accordance with this concept. Equally important, dozens of clinical studies have uncontestably documented the safety and efficacy—and remarkably high success rates—of the All-on-4 treatment concept for the rehabilitation of the totally edentulous.

Nobel Biocare Global Symposium 2013 in New York

June 20–23, 2013 at the Waldorf Astoria

Building on the success of the Global Symposium in 2011, this year’s event will feature a diverse array of advanced subjects. From diagnosis to treatment to patient evaluation, and all the way to patient follow-up, Nobel Biocare will focus on leading-edge topics and exciting new innovations.

Together with the straight anterior implants, these angled posterior implants not only optimize the esthetics of the restoration but also make it possible to achieve passive fit, which is of critical importance whenever a cantilever is called for.

In short, the use of four implants reduces treatment complexity, which yields many benefits. Costs for both the doctor and the patient are reduced because less surgical time and product are used. The lab technician can profit from reduced intricacy in the fabrication of prostheses—leading directly to more predictable workflow patterns—and simplified hygiene bodes well for improved long-term oral health all around.

Next June, under the theme, “Designing for Life: Today and in the future” osseointegration experts from all over the globe will be gathering in New York City.

Holding international symposia is a tradition at Nobel Biocare, one that is almost as old as the company itself.

These meetings have evolved over the years to provide forums for the free exchange of information about new issues relating to osseointegration. They have also served to put implant-based treatment in a valuable multi-disciplinary perspective.

A new program format that emphasizes “Patient Journeys” and optimal treatment flows—from patient evaluation to treatment follow-up—will be featured next June in New York.

The journeys will illustrate four major topics: missing anterior and posterior single teeth; missing multiple anterior teeth; missing multiple posterior teeth; and managing the terminal/failing dentition (i.e., the transition to edentulism).

We’re proud to announce that Professor George Zarb will be chairing the Scientific Committee. In New York, an impressive cadre of top researchers and clinicians will be sharing their expertise with participants, demonstrating how more patients can be treated with better quality than ever before.

Master classes, one of the hallmarks of Nobel Biocare international conferences, will also be offered on a wide variety of advanced subjects. Look for more information in Nobel Biocare News 1/2013. <><>

Stay updated!
A welcome video from the CEO, program details, special rates at the Waldorf, and more details about all program details, special rates at the Waldorf Astoria. Find more information at nobelbiocare.com/newyork2013
Intra-oral Radiography

Seven rules for the successful use of IOR with implant-based restorations

Rule number 1
Osseointegration can only be confirmed with light microscopy sections (see image below) and cannot be confirmed by radiographs alone.

Radography simply gives an indication of what is occurring, but as with any diagnostic tool, it is not without limitations. These should be clearly understood by the clinician so that information received can be properly acted upon. Here are my suggestions:

Rule number 2
Radiographic site information prior to restoration is extremely useful.

The implant and the adjacent sites can be evaluated for any pathosis, the implant position, the angulation and the path of restoration insertion, among other things. Radiographs can reveal bone quality and quantity, and various bone patterns can be highlighted by IOR images.

This is important as implants are commonly placed in alveolar bone, which may have large marrow spaces that could impact the way we restore the implant. This is well understood in other areas of dentistry (e.g., endodontics). Marrow spaces provide an easy escape route for cement, which can sometimes be observed around implants when cementing a crown.

Rule number 3
X-ray angulation is everything.

When confirming how components fit, IOR can be indispensable, especially for sites that cannot be directly visualized or accessed with explorers. With the implant more than 20 degrees off the incident X-ray beam, the mismatch of components becomes almost impossible to detect. When the angulation error is closer to 5 degrees or less, the components can be confirmed to fit to within 50 microns or less. As a general rule, when reviewing radiographic images, the clearer the screw thread pattern seen, the closer the incident X-ray beam is to perpendicular to the implant body.

Rule number 4
Serial radiographs intended to monitor marginal bone levels must be standardized.

Standardized positioning requires establishing a consistent method of holding the radiographic sensor (or film) and the incident beam at 90 degrees to the implant’s long axis, each and every time the image is produced. Remember, when a 2-dimensional image is made of a 3-dimensional site, angulation grossly affects what is identified in the image due to beam projection.

Interestingly, most studies on bone loss around implants fail to achieve standard, reproducible images, making comparisons between serial images just about meaningless. Note that sites adjacent to the implant offer clues to angulation errors. Radiopaque crown margins that change shape on nearby teeth are frequently a giveaway of angle shift.

Rule number 5
Understand your implant system and how the mechanical union of the parts you are working with appear on a radiograph.

Because NobelReplace and Bränemark System components have flat matching surfaces, errors in attachments can be easily detected when the radiographs have been taken 90 degrees to the incident X-ray beam. Non-flat, internal tapered systems may appear very different to their flat-top counterparts. For instance, the Nobel Biocare conical connection fit is very unique. By assessing the screw dimensions carefully, the clinician will readily understand if the components match well and are seated correctly.

Rule number 6
When making a cement-retained implant restoration with inaccessible margins, use IOR to locate possible residual excess cement that may cause future problems.

Use a cement that can be clearly identified on a radiographic film. Many cements show up poorly, thus remaining undetected (see images to the right, above), which could impact the future health of the tissues supporting the implant. As a general rule, choose a cement with minimum radiopacity equivalent to 3 mm of aluminum (which is the same minimum required by the ADA for endodontic sealers). Use a cement that can be clearly identified on a radiographic film. Many cements show up poorly, thus remaining undetected (see images to the right, above), which could impact the future health of the tissues supporting the implant. As a general rule, choose a cement with minimum radiopacity equivalent to 3 mm of aluminum (which is the same minimum required by the ADA for endodontic sealers).

Rule number 7
Use radiographic imaging as one of several diagnostic tools.

A variety of clinical criteria need to be taken into account before treatment decisions are made. For example, probing-depths correlate very well with radiographic bone changes, especially within the first few years following implant placement. Using more than one test to determine what, if any, therapy is required is always a good idea. Remember no test is perfect or absolute!

And do remember: All radiographic procedures require that the most appropriate and best practices be used to minimize patient exposure to radiation.

Tips and Techniques

Osseointegration can only be confirmed with light microscopy sections like this. Radiography simply gives an indication of bone-to-implant contact.

The implant abutment is not seated correctly in the images to the left. Note the orientation and gap size, compared to the images to the right, where the seating is correct. A radiograph taken at a right angle to the implant is invaluable.

Marrow spaces can allow endodontic sealer to flow into them. Alveolar bone (from the latin for “little cavities”) consists of many such spaces, highlighted by this endodontic case.

Here are eight commonly used cements for implant restorations in the form of uniform disks, next to an aluminum step wedge for comparison. When radiographed, at 1 mm thick, only 3 of the 8 disks can be clearly seen. Note: if all these disks were fabricated from endodontic sealer materials, they would all be clearly visible.

The images to the left show failure of the abutment to seat fully. The gap is larger than 1 mm. Compare this to the images to the right, which show correct seating. Again, the value of a correctly angled radiograph is essential for appropriate interpretation of these effects.
Experts Seek Keys to Marginal Bone Maintenance

Some of the best minds in the field reach consensus, reporting their findings at Europerio 7.

An independent multidisciplinary working group tackled the issue and calls for greater scientific enquiry into bone management.

By Prof. Daniel van Steenberghe

The long-term survival of endosseous intra-oral implants has become a public health issue in recent years inasmuch as tens of millions of patients now have one or more of these implants.

To ensure implant survival and restorative longevity, the maintenance of marginal bone around these implants is a significant element of treatment and consequently should be the subject of conscientious scientific follow-up. Progressive bone loss may lead to insufficient anchorage, significant infections and even the loss of the implant, after all.

In order to address the issue of bone maintenance in a scientific and clinically documented manner, Nobel Biocare proposed that an international group of experts be assembled last year, and asked me to moderate the group. Our brief: to pose how to proceed in the future.

Thus the Working Group on ‘Treatment options for the maintenance of marginal bone around endosseous oral implants’ was born.

Eight independent scientists and clinicians joined the Working Group from the very beginning and have made valuable contributions ever since: Marco Esposto (IT), Björn Klinge (SE), Jörg Meyle (DE), Andrea Mombelli (CH), Eric Romen (BE), Tom Van Dyke (US), Hom-Lay Wang (US), and Arie-Jan van Winckelhoff (NL).

Myths and Realities

All of these renowned authorities joined the group under the proviso that they would be willing to participate on an independent, pro bono basis. For several months last year, they reviewed the literature on marginal bone from the perspective of their own fields of study, which include investigational methodology, oral and maxillofacial surgery, periodontology, immunology, biomaterials, oral physiopathology, oral rehabilitation, and microbiology.

After exchanging their review papers, the members of the group met in September for two days at the Karolinska Institute in Stockholm, where the Nobel Assembly chooses the Nobel Prize laureate in Physiology or Medicine each year.

Prof. Daniel van Steenberghe chaired the Working Group.

Early studies of osseointegration, in order to prevent such unintended trauma, it is of the utmost importance to treat bone as a living tissue. Other causes of resorption are less well documented, but are represented in the scientific literature nevertheless, and hardly in doubt. To give three examples: When implants are placed in jawbone with very limited bone volume, deficiencies often result, which leads to proximal bone resorption, although reluctantly reported, subgingival cement remnants generally result in substantial bone resorption, and too-deep placement of an implant can also provoke marginal bone loss.

At a later stage, several weeks or months after prosthesis installation, occlusal overload has been recognized as another potential cause of marginal bone loss. In situations like these, occlusal adjustments or other biomechanical interventions are called for to stabilize the bone.

Nowadays, a propensity for optimizing esthetics—or even cosmetics—sometimes leads to repeated removal of the abutment. These disruptions of the connective tissue seal can result in bone loss.

The same applies to insufficient biological width. The colonization of the implant surfaces by bacterial biofilms has been associated with chronic inflammation of the marginal tissues and subsequent bone loss. A proper oral hygiene regimen is the appropriate response in circumstances such as these.

There’s more to this story! Because Nobel Biocare implants have proven their exceptional performance for safety and efficacy over many years, the company welcomes both the effort of the working group and their findings. In our enhanced digital edition, Professor van Steenberghe discusses the importance of establishing a common baseline in continued research and appropriate forms of prophylactic and follow-up treatment in clinical practice.

See: nobelbiocare.com/newsletter