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A proven heritage

By NEOSS

Convinced that existing implant systems were too complex, Professor Neil Meredith and Fredrik Engman founded Neoss in 2000 with the idea to create a much simpler and more rationalized solution. The benefits of the resulting products are clear: reduced patient treatment time, optimized inventory control and superior outcomes for patients.

Proven clinical evidence and design of Neoss Implants

Produced with Commercially Pure Titanium (Grade IV), ProActive Implants have a low surface roughness flange designed to reduce marginal bone loss[1]. At the same time, higher surface roughness of the threaded body of the implants optimises stability and osseointegration.

The universal Thread Cutting and Forming (TCF) design of the implant ensures suitability for all bone qualities. The secondary cutting face provides additional efficiency in dense bone[2]. Threads extend to the tip of the implant ensuring excellent stability.

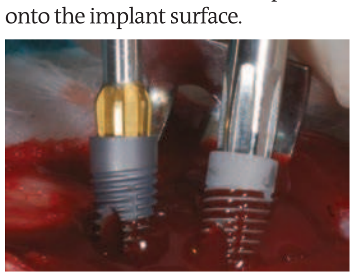
Proven clinical experience

A randomly selected population of 100,000 implants was sampled from the Neoss warranty registry and statistical analysis indicated a 3 year cumulative survival rate of 98.2%. Of the 1.8% of failures, the major aetiological factors were smoking, a combination of poor bone quality, bone quantity and immediate loading[3].

Features of the Neoss ProActive® Surface

Surface roughness and hydrophilicity are essential to the absorption of proteins and biomolecules onto implant surfaces thereby facilitating healing and bone formation[4]

Neoss has utilised Electrowetting on titanium surfaces to increase hydrophilicity and maximise the penetration of blood and its components onto the implant surface.

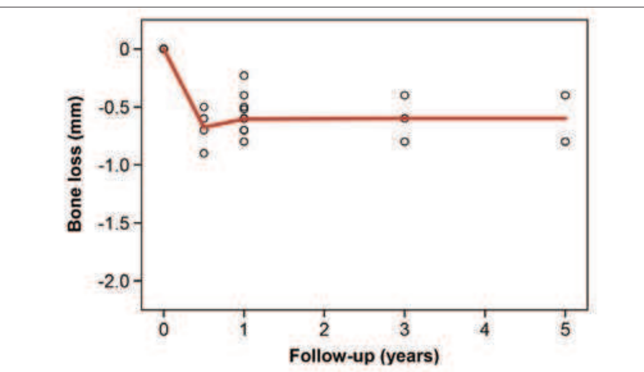


The etched, blasted and treated ProActive Implant surface stimulates bone to form more rapidly and with a greater strength at the implant interface[5]. ProActive Implants surpassed the performance of competitive implants in in-vivo removal torque tests[6].

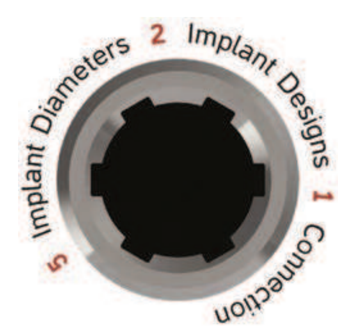
In the first published study of ProActive Implants, they recorded a 100% success rate after 1 year of placement in non-bone grafted patients and 98.5% in bone augmented patients[7]. In the same study group of patients, marginal bone loss of 0.4mm was recorded at one year[8].

Studies have consistently shown outstanding survival rates and retention of marginal bone levels.

With five implant diameters, two implant designs and just one connection, the Neoss Implant system provides both surgeons and restorative dentists the greatest possible freedom and flexibility without compromise in performance or success. All



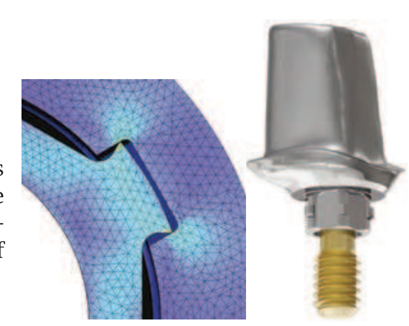
Low bone loss and stable bone levels over time with Neoss implants



prosthetic components in the Neoss System are compatible with both the ProActive Straight and ProActive Tapered implants providing a choice of implant at the time of surgery.

NeoLoc® connection

NeoLoc® is the unique Neoss implant to abutment connection that offers the advantages of a remarkably strong and tight connection, proven long-term clinical success, high levels of bone preservation, optimal flexibility for restoration and the 'one connection' concept.
Neoss engaging abutments have deformation lugs which minimise rotational movements and secures a distinct seating.
Crystaloc™ abutment screws are 30% stronger than gold screws in static strength testing thus facilitating a high clamping force between the abutment and implant[8] offering an additional 10% resistance to fracture during long-term clinical function[9].
Warranty data over many years has demonstrated an unparalleled low fracture rate with less than one fractured implant per 10,000 implants[10].



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Since its foundation in 2000, Neoss continues to innovate and invest in product development research, design, manufacturing and selling products of the highest quality which offer market leading functionality. Following double-digit growth in 2016, Neoss sits as a pioneer in dentistry, with ever-growing clinical evidence that delivers long term and exceptional patient results. The expansion and success of the company can be credited to the success rates of Neoss' products, which are guided by the company ethos of intelligent simplicity of implant dentistry with stability, strength and speed.

Neoss continues its success story and will celebrate new product innovations in practice at their LINK Team Days event in Sorrento, Italy in October this year.

For further information on the Neoss Implant System, please contact Ahmed Ghandour, Neoss Area Sales Manager for Middle East & Africa: info.mea@neoss.com/ +971 4 448 75 77 DT

Advancing levels of precision in dental implants through computer navigated surgeries

By Dr Shyam Bhat, India & Dr Shankar Iyer, USA

Advances in technology have enhanced clinicians' comfort and accuracy by minimizing the margin of error. We have seen a paradigm shift from using only a radiograph to using cone beam CT scans for diagnosis. A cone beam CT scan now has become the standard of care in treatment planning for dental implants.

Traditionally, implants have been placed free hand or aided by the use of static guides derived from a CT scan. Although using well-planned surgical guides have all the same advantages, they are usually bulky and do not provide adequate information regarding angulation of the drill, degree of deviation from the planned position, implant delivery in a three-dimensional perspective and often precludes irrigation to the osteotomy sites. A possibility of error always exists, no matter how thoroughly the guide is planned.

Using a static surgical guide along with a specific guided implant surgery instrumentation can result in less than 2 mm of crestal and apical deviation and an angulation error of less than 5 percent[1-8].

However, implant placement without any guide results in significantly more error than either guiding modalities[8]. This article is an attempt to explain the instrumentation and procedure involved in placing implants under dynamic computer navigation.

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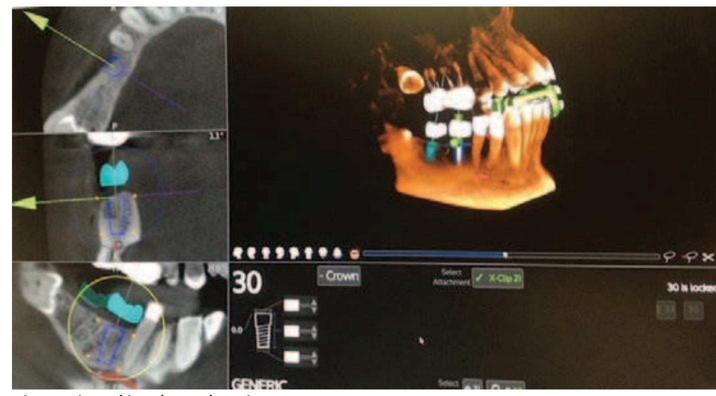
Fig. 1: Virtual implant planning

Instrumentation and Workflow

Dynamic guided navigation works on the principle of tracking two markers in their positions relative to each other. One marker rests on the patient's jaw, and is usually teeth supported. This marker is placed on the patient's teeth, usually on the opposite side (for example, if the implant is placed in the lower right quadrant, the marker is positioned in the lower left quadrant) using a thermoplastic resin to be able to reproduce the same position during surgery. A cone beam CT scan is taken with this marker in position in the patient's mouth. The dental surgeon plans the placement of implants in a virtual treatment planning software, that is usually included in the dynamic navigation machine (Fig. 1). Since there is no need to manufacture a physical guide, the surgery may be scheduled as early as the next day. On the day of the surgery, the second marker is fixed to the surgical hand-piece according to manufacturer recommendations (Fig. 2). The marker in the hand-piece and the marker in the patient's mouth are calibrated in position to each other as well as to the proposed position of the implants. This is done using two cameras which are part of the navigation guide system (Fig. 3). In short, a dynamic navigation guide system has the following essential parts:

1. A hand-piece attachment/ marker
2. A jaw attachment/ marker
3. Cameras and sensors to record and monitor the position of markers before and during surgery, and
4. A software which co-ordinates the information received from the pre-surgical cone beam CT scan and correlates it with proposed position of the implant during the actual surgery and acts as a guide.

The machine, which has recorded the final position of the implant in all three axes from the information obtained from the cone beam CT scan as well as the virtual implant planning software, and is able to guide the surgeon's hands with great precision in real time using motion-tracking technology.

Surgery begins as soon as calibration is done. The cameras track the orientation and depth of the drill as the surgeon begins the osteotomy in the traditional fashion. The surgeon correlates the position of the osteotomy drill and subsequently the implant with real time feedback from the software.

Discussion

Guided implant surgery can be performed in two ways, Static and Dynamic. The static approach refers to the use of a static surgical template. The position of the implant is reproduced on the surgical guide from the virtual implant placement performed on the cone beam CT scan, and hence does not allow intra-operative modification of the implant position[9,10]. With the static systems, the planned implant location is usually transferred to the surgical template by a specially designed drilling machine[11]. Another Static option, called the Stereolithographic method, uses specifically designed software to design the surgical stent virtually and then fabricate it using polymerization of an ultraviolet sensitive liquid resin[12]. The dynamic approach refers to the use of a surgical navigation system that reproduces the virtual implant position directly from computerized tomographic data and allows intra-operative changes of the implant position[9,10]. These systems are based on motion- tracking technology that allows real-time tracking of the dental drill and the patient throughout the entire surgery[13].
The placement of dental implants needs to be prosthetically driven. Proper placement of the implants results in favorable esthetic and functional outcomes. A multi-center study involving 478 patients and 714 implants have shown that there are significant positional and angular errors in freehand implant placements as compared to dynamic guided placements[8]. They have concluded that dynamic guiding systems are at least as accurate as static systems, and much more accurate as compared to freehand placement. Multiple studies have asserted on the matter of high accuracy of dynamic guides[14-17].
Dynamic guided implant placement has many advantages over static guides. Developing a treatment plan is faster and easier, and there is no need to take an impression and rely on the guide manufacturer and wait for the guide. A significant advantage over static guides is that there is no bulky guide that needs to be placed on the patients' jaw. It, in turn, results in increased patient and surgeon comfort. The absence of a physical guide also helps the surgeon in visualizing the alveolar ridge during implant placement, if need be. It also allows for changes to be made in relation to size of implant, site of placement and the choice of implant system used at anytime during the surgery, unlike in a static guide. The cost of using the navigation system is less as compared to using a static guide system. A static guide system requires the use of rigid, often bulky splints which have sleeves to direct the osteotomy drills to the pre-planned position. A dynamic guided navigation system results in more consistently accurate implant placement as compared to static guides, which in turn is proven to be more accurate than freehand placement[17-20]. A significant advantage of this navigation is the universal applicability of any implant system that can work with this technology.

The present dynamic navigation systems require a few teeth to be present for the placement of the jaw marker, and hence makes it difficult for usage in edentulous arches. The initial high cost of the system is also a deterrent.

Static guide navigated implant placement, on the other hand, does not allow the flexibility of on-site changes by the surgeon. If the surgeon feels that the position needs to be altered by even a minute degree, the guide will have to be removed during the surgery, hence defeating the very purpose of using one. Further, using a static guide renders the surgeon blind to the surgical site, who has to rely entirely on the accuracy of the splint which is manufactured off-site, in a lab. The cost of manufacturing a splint is significant, and adds to cost of treatment. The time it takes to manufacture the splint dictates scheduling the surgery at least a week after formulating the treatment plan. The surgeon still has to contend with reduced working space in the oral cavity after positioning the splint, owing to its bulky nature. Using a static guide system also necessitates the use of manufacturer-specific guided surgery implant kits, with special drills and other instruments.

Conclusion

There is a significant learning curve involved in using a dynamic guide for implant placement[21]. According to a few studies, as many as 25 to 125 cases may need to be done by a single surgeon in order to get comfortable in using any new technological addition to existing practices[22-23].
The advent of dynamic computer navigated systems is a game changer, and has the potential to eliminate, or at least reduce drastically the margin of error in implant placements. Implant dentistry is a relatively new aspect of Dental care, and any new technological advance needs to be assessed scientifically. In order to do so, more data from non-biased randomized controlled trials is the need of the hour.

Declaration

The authors do not have any personal stake or interest in any of the instruments or machines described/ shown in the figures. No compensation has been received for any of the products described in this article. DT

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Editorial note: Full list of references available from the publisher.


Fig. 2: Instrumentation


Fig. 3: Picture shows position of the surgeon and the dual cameras in relation to the patient


Fig. 4: The jaw marker is seen fixed on the patient's left side. The drill is in position to begin osteotomy


Fig. 5: Real time navigation as seen on the monitor

Initial Consult, radiographs and study models → CBCT with Jaw marker affixed to patient's teeth using thermoplastic resin → Virtual Implant planning to decide final position of implant → Day of surgery- calibrate jaw marker, hand-piece marker and dual cameras with patient in final position for surgery → Surgeon lets the software guide orientation and depth of osteotomy and implant

Flowchart

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The synthesis of aesthetics, health and structural stability

The advantages of using the Angulated Screw Channel (ASC) abutment system

By Dr Chandur Wadhwani, USA

Fig. 1: Failed, removed implant, cement extrusion is noted on multiple threads.

Figs. 2a & b: The anterior teeth present a challenge to the screw-retained restoration unless an Angulated Screw Channel (ASC) abutment is used (a). In cases where the surgical placement is less than ideal, the ASC may help limit further compromise to the site (b).

Fig. 3: The ASC shows the angle redirection of the screw access channel.

There are many reasons why cement-retained implant restorations gained popularity over the last few years, which can be attributed to aesthetics, ease of use and familiarity with cementation techniques. However, Pauletto, Gapski and others reported that cement excess was problematic; then Wilson's study established a positive relationship between excess residual cement and peri-implantitis.

Surveys on cements used for implant restorations indicated a diversity in material selection, application technique and volume. This suggested a lack of conformity and understanding of cement usage within the dental profession. To overcome the cement problem, it became evident that improved understanding was required for cement material selection, abutment design and the determination of cement margin depths. Even with the very best intentions, however, residual excess cement can lead o disease, affecting the health of the implant/tissue interface and remains a dominant risk factor.

The association of residual excess cement and peri-implantitis has resulted in the need to re-examine alternatives such as the screw-retained implant crown. For many implant systems, the ability to use a screw-retained implant restoration is limited to regions where the screw access channel emerges in an aesthetically 'safe' site.

Usually the anterior maxilla and mandible present the greatest challenges, as the long axis of the implant often projects through the proposed incisal edge or even facial to the final restoration (Fig. 2a). Occasionally, when the surgeon places the implant in a compromised site—or the implant is inappropriately placed—the traditional screw-retained implant restoration may seem to provide more of a challenge than a solution (Fig. 2b).

Angulated Screw Channel saves the day

An innovative solution to the off-axial implant is the Angulated Screw Channel (ASC) abutment system developed by Nobel Biocare (Fig. 3).

With the ability to alter the screw channel up to 25 degrees, it eliminates the need for cementation in the vast majority of cases like these. The ASC provides for an active synthesis of health, aesthetics, and excellent structural and mechanical abutment joint stability.

Health

With use of the ASC abutment system, cement extrusion into the fragile peri-implant soft tissues is eliminated. The ASC puts an end to the onslaught of cement fluid pressure and unset chemicals from the cement material. It also gets rid of the potential for foreign bodies being pushed around the implant site, which can jeopardise implant health (Fig. 4). In addition, the use of zirconia abutment superstructures in combination with titanium bases provides optimised materials for biocompatibility and health.

Aesthetics

With the ASC, the screw access channel can be projected away from high-aesthetic-risk areas and placed appropriately at a variety of different angulations. CAD/CAM design enables the restorations to be efficiently designed and quickly manufactured at Nobel Biocare's production facilities (Fig. 5). Milled zirconia is highly aesthetic, thus especially useful at the soft tissue emergence site.

Figs. 4a & b: Even with shallow margins and minimal cement (a), the elimination of cement extrusion still presents a clinical challenge (b).

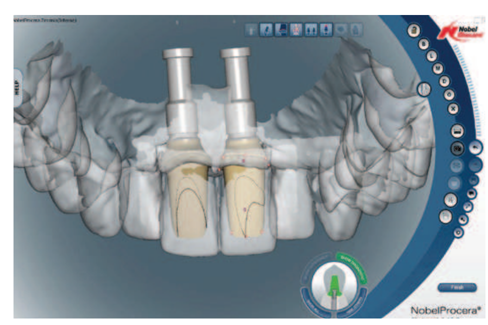

Fig. 5: The Nobel Biocare CAD/CAM software allows ideal screw access site to be planned, then machine fabricated.

Figs. 6a–c: The screw access from Figure 2a has been redirected using the ASC abutment and crown (a & b), producing a pleasing natural appearance thanks to a screw-retained implant restoration (c).

Mechanical stability

CAD/CAM utilisation (Fig. 6a–c) allows for optimised screw access site planning, and the machining of components provides a precise, dedicated connection, optimised for the implant-abutment joint.

As with all implant-to-abutment connections, the optimised passive fit results when these surfaces are in intimate contact and forces are distributed universally. Casting abutments cannot always provide an even connection with joint contact, as they are often inadvertently damaged through cleaning and polishing, which alters the consequent fit (Fig. 7). When this occurs, the joint connection may fail, with screw loosening or even failure of the implants as a result.

Structural components

Titanium alloy abutment bases provide the most accurate fit with machining tolerances readily controlled. Abrasive wear, i.e. the release of titanium metal into the peri-implant tissues from the inside of the implant, is not an issue. The zirconia abutment, with its well-designed circumferential wall strength, is held through the abutment screw, optimising the ceramic's ability to withstand forces that have been seen to fracture non-titanium base abutments.

Conclusion

The benefits of the ASC abutment system are numerous, reflecting a multiple symbiosis of engineering ingenuity and biocompatible materials, and allowing for the combination of good aesthetics and excellent health.

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Fig. 7: An actual case: Note cast abutment has been damaged through routine laboratory procedures.

Editorial note: For the complete references to this article please visit: nobelbiocare.com/news

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is a prosthodontist in private practice in Bellevue, Washington, USA. An adjunct assistant professor at Loma Linda University's School of Dentistry, he is also affiliate faculty at the University of Washington School of Dentistry in Seattle. He has written the first evidence-based textbook dedicated solely to implant cementation. Here, he describes some of the advantages of working with the NobelProcera ASC (Angulated Screw Channel) abutment system.