Guided Bone Regeneration using NeoGen Ti-Reinforced Membranes: Case Reports

By Neoss Ltd, Cases by Dr. Norbert Hassfurther, Germany

Membranes are used in Guided Bone Regeneration (GBR) to aid in the regenerative healing of bone defects. The membrane is surgically placed under the oral mucosa. It stops the soft tissue from growing into the defect and creates space for complete fill of the defect with regenerated bone.

In many cases where substantial bone regeneration is required, such as vertical bone augmentation, a titanium-reinforced non-resorbable membrane is required to achieve predictable results.

NeoGen Ti-reinforced Membrane is a new generation of non-resorbable titanium-reinforced membrane combining the handling and tissue interactions of expanded PTFE with the enhanced barrier function offered by dense PTFE. The membrane has a three-layer design. The outer, soft tissue friendly, PTFE layer has a tight texture that is impermeable to bacteria; the middle layer is a strong and highly shapeable titanium mesh that retains its shape throughout the healing period; and the inner PTFE layer has an expanded texture that enables predictable hard tissue integration. This combination results in a membrane that is easy to handle and protects the augmentation site in a predictable manner.

This article describes three cases of GBR using a Ti-reinforced PTFE membrane and simultaneously placed dental implants without the use of bone substitutes.

Case 1
Vertical ridge augmentation of severely resorbed mandible
A 52 year old male was referred to the clinic with a severely resorbed anterior mandible due to a failed bone graft after removal of a large cyst (Figure 1). Pre-treatment radiographic assessment (Figure 2) showed that the bone height was inadequate to properly house implants. It was decided to perform a vertical ridge augmentation using NeoGen™ Ti-Reinforced Membrane and simultaneously placed dental implants.

A full thickness flap with releasing incisions was opened and four Neoss ProActive Straight implants were placed; two anterior and two posterior. The vertical defect between the two anterior implants was 5-6 mm (Figure 3). Autogenous bone cylinders (3.4 x 4-5 mm) were harvested from the oblique line of the mandible in the molar region and placed between the two anterior implants to accelerate regeneration and to act as space fillers. A NeoGen™ Ti-Reinforced Membrane Large was trimmed, shaped, and fitted at the surgical site and secured buccally with two tacks (Figure 4). A stable membrane configuration was achieved using the implants as tent posts (Figure 5). Stress free flap closure was achieved by releasing the periosteum on the buccal side. The soft tissue healing was uneventful (Figure 6).

After 4-5 months, second stage surgery was performed. A mid-crestal incision was used to lift a flap and exposure the implants and membrane.
the premolar area of the upper jaw, two congenitally missing teeth in A 19 year old female presented with narrow ridge Regeneration of an extremely Case 2 The ridge had been regenerated to enclosed in newly formed bone, and in figure 7, the implants were totally connected to the implants. As seen and PEEK healing abutments were pose the membrane. The membrane was removed, excess bone removed and PEEK healing abutments were connected to the implants. As seen in figure 7, the implants were totally enclosed in newly formed bone, and the ridge had been regenerated to the desired height.

Case 2

Regeneration of an extremely narrow ridge A 19 year old female presented with two congenitally missing teeth in the premolar area of the upper jaw, resulting in a very narrow atrophic ridge, with inadequate bone width to properly house implants (Figure 8). The treatment plan included regeneration of the ridge using NeoGen™ Ti-Reinforced Membrane and simultaneously placed Neoss ProActive Straight Implants.

A full thickness flap was opened, ostotomies were prepared on the palatal aspect of the ridge, and two Neoss ProActive Straight implants were placed. Both implant sites had fenestrations on the buccal side (Figure 9) and palatal dehiscences (Figure 10). A NeoGen™ Ti-Reinforced Membrane Medium was trimmed, shaped, and fitted at the implant site. Autogenous bone chips collected during drilling of the implant ostotomies were used to fill the palatal dehiscence (Figure 11). No material was used to fill the buccal fenestration, the strength of the mesh created the space for bone regeneration. The membrane was secured with two tacks buccally (Figure 12). Flap closure was achieved, and the soft tissue healing was uneventful (Figure 13).

After 7 months, second stage surgery was performed. A mid-crestal incision with releasing incisions was used to lift a flap and expose the membrane (Figure 14). The titanium mesh kept the membrane shape stable for the entire healing period. Removal of the membrane revealed that the whole volume enclosed by the membrane had been regenerated with new bone and a new wide ridge had been created (Figure 15). Excess bone on top of the cover screws was removed (Figure 16). PEEK healing abutments were connected to the implants and the flap was closed (Figure 17). Radiographic assessment confirmed bone regeneration around the implants (Figure 18). After 3 months of soft tissue healing (50 months after membrane placement) the implants were temporarily restored (Figure 19).

Case 3

Vertical ridge augmentation in the esthetic zone A 40 year old patient presented with a missing central incisor and a resorbed ridge (Figure 20). It was planned to perform a vertical ridge augmentation with NeoGen™ Ti-Reinforced Membrane – Medium Interproximal and simultaneous implant placement of Neoss ProActive Straight implant.

A full thickness flap with releasing incisions was opened, revealing a large vertical defect (Figure 21). Autogenous bone cylinders (1.4 x 4.5 mm) were harvested from the oblique line of the mandible in the molar region and placed around the implant to accelerate regeneration and to act as space fillers (Figure 22). A NeoGen™ Ti-Reinforced Membrane Medium Interproximal was trimmed, shaped, and fitted at the surgical site and secured buccally with two tacks (Figure 23). Stress free flap closure was achieved by releasing the periosteum on the buccal side (Figure 24). The soft tissue healing was uneventful (Figure 25-27).

After 6 months, second stage surgery was performed. A mid-crestal incision with releasing incisions was used (Figure 28). The flap was lifted to expose the membrane (Figure 29). The soft tissue can easily be separated from the membrane after healing. The membrane was removed. Newly formed bone fills the entire space created by the membrane (Figure 30). Excess bone on top of the cover screw was removed to get access to the implant (Figure 31). A PEEK healing abutment was connected to the implants and the flap was closed (Figure 32). Radiograph taken directly after abutment connection shows that bone has been successfully regenerated up to the level of the implant platform (Figure 33).

Conclusion

The cases show that vertical ridge augmentation and horizontal ridge widening with optimal bone fill can be achieved in a predictable manner when performing GBR using the NeoGen Ti-Reinforced Membrane.

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Norbert Haugfurther qualified and was licensed to practice medicine in 1982 at the Justus-Liebig University in Giessen, Germany. In 1985 he completed his training and qualified to practice dentistry. He completed his Specialist degree in Oral and Maxillofacial Surgery in 1991 and was appointed as Senior Physician at the Department of Oral and Maxillofacial Surgery at the University of Giessen, Germany. In 1994 he established his own private practice in Wettinberg, Germany where his main focus is in the area of dental implantology and bone grafting. He has lectured throughout Europe on his bone grafting techniques.
Considerations for Long Term Success
Implants are Never Forever!

By Dr. Shankar Iyer, USA

This article will emphasize the importance of factors to consider before treatment planning for full arches with implants. It is not uncommon to make misleading promises before showing implant systems as an option with unfounded claims of 98% success rates. Most of the survival statistics have evaluated implants for full mouth reconstructions through preoperative citations of the original Branemark work published in 1976. Repeated citations of this article and the subsequent follow-up articles have made claims of a high percentage of success with implants. While this is partially true, the circumstances under which these implants survived has been incorrectly extrapolated to other clinical situations. The original Branemark research was done on edentulous arches with hybrid prosthesis opposing either complete dentures or prosthesis of similar construction.

Patients are now wondering with these highly overstated survival rates, why their implants are failing and need maintenance within a short span. The answer lies in the lack of understanding of biomechanics. The connotation that anything works has led to confusion in the field. The diametrically opposite views of short vs long implants, axial vs angled implants, graft vs graftless solutions, regular vs minis, delayed vs immediate, one- or two-piece guided vs free hand placements and platform switching concepts have caused anarchy in the discipline of implant dentistry. Possibilities have gained popularity through corporate support and we see opinion leaders vociferously making unsubstantiated claims through limited clinical evidence. A novice finds it very difficult to get involved in implant dentistry because the education is being blessed by companies and not through universities or institutions.

After being involved in implants for over 20 years, I find it to be an humbling experience with cases that I treatment planned two decades ago returning to me for maintenance. Seeing these cases today, I wish I had this experience at that time so I could have served my patients better. Today it has taught me a lot in treatment planning. I am able to prognosticate the outcome and its management in the event of an untoward incident. The lessons in biomechanics have complemented the initial biosurgical responses that can be predicted initially so that the survival of implant therapy is prolonged.

I am a firm believer of long term data and I fear the rapid evolution of products and techniques that claim to be faster and easier. If only I could train my patients osteoblasts to work harder and faster so their bones can heal rapidly, all of the problems can be eliminated and failures can be a thing of the past. The life cycles of cells have been a constant over a million years and now we are told that implants are approved for immediate use after one or two procedures. The life cycles of cells cannot be hastened because the mitotic cycle for the DNA takes the programmed time period for full turn over. Only in disease as rapid uncontrolled proliferation takes place. If this is not true then we are looking at metaplastic or anaplastic changes according to the turnover rate. Claims made by certain companies that bone heals faster with their implants is presumptuous. Bone levels are being maintained by their unique surface modification is also far from the truth. I have used over 16 different implant systems in my practice over the years and in my training programs and I have found that the osteoblasts are notoriously unbiased. There is bone loss with every system and modifying the surface or creating morphological shifts does not necessarily predict better bone loss.

In the courses I teach, I recommend waiting for a period of three years after any new feature or biologic product is introduced into implant dentistry. There is no room for latest or newest in clinical practice. If a company is constantly introducing new product lines and changing their designs, there is only one conclusion. They are having troubles and hence they have to change. A robust system that works seldom needs modifications for getting predictable results. Aspirin can never be debunked for its efficacy, being so old and dated. The original Branemark external hex (now made out of type 4 Titanium but designed in 1965) is still very functional and a work horse for hybrid prosthesis. The surfaces have improved much but its basic design and biomechanical considerations will be valid for another 50 years. Premature adoption of technology or materials is fraught with shortcomings and unknown consequences. Classical examples of potential catastrophic failures include the TPS coating, HA surface modifications, sintered surfaces, flaps less surgeries, guided surgeries, immediate loading, costly BMPs and the list goes on.

The message is very simple – one crawling before they walk and you must learn to walk before you can run. The same is true for implant dentistry. The novice today has a wide choice – you can become a complete arch implant specialist with 4 implants and guided surgery over a weekend or spend a year learning the basics and judiciously treatment plan cases with customized solutions. Half of the participants of our Maxicourses that we run in the U.S. and overseas have practitioners who have placed hundreds of implants and got their training through corporate education. One does not become a musician by buying a piano or a musical instrument, nor can you become a pilot by buying a plane. Training in implant dentistry has become a fad. Most courses are offered through companies and the company’s sole interest is to sell their systems. There is a whole world of treatment plans that is out there before the system can be utilized. Let’s not place the cart before the horse. The void is very apparent the time is now for implementing judicious treatment plans. Let’s serve our patients with what they need and not what we want them to have.

Iyer’s 10 Top Guidelines for Predictable Implantology
1. Diagnose the problem first and don’t treat because you have a tool that you can use.
2. Measure the disease and provide the therapy, don’t sell concepts.
3. Leave what’s new and latest to the risk takers, stick with proven and tried systems.
4. Implants are the last resort in treatment planning – exhaust all conservative and conventional modalities.
5. Implants should replace missing teeth not replace teeth.
6. Expensive implants don’t mean success rates are better, cheaper does not mean everything works – you get what you pay for. There is no substitute for evidence based practice.
7. Consider every implant as a failing system and not a success.
8. Do not treat because you have a tool that you can use.
9. Measure the disease and provide the therapy, don’t sell concepts.
10. Leave what’s new and latest to the risk takers, stick with proven and tried systems.
entity and the trick is to do the best you can to maintain it as long as you can.

8. Select the system that does not change its product line every year.

9. There are two cuts or a faster way to get success in life and implants are no different.

10. The success rates of implants are inversely proportional to the number of years you practice implants.

Case Report

This case report will provide a rationale for a sound sequential treatment plan in the management of long-term failure of dental implants.

Jubilous use of implants and their treatment planning should have long-term considerations. I used to perform subperiosteal implants and blade implants in the past. One of the reasons for not using them now is not because they fail, but because in the long term, in the event of a failure, it can have some irreversible consequences. This case underscores the importance of over engineering cases from the beginning so that when patients live through their 90s they don’t become incapacitated, not being able to chew their food properly and lose the benefits of implants that they enjoyed for a long period of time.

A 78 year old Caucasian female presented to my practice for rehabilita- tion and management of a failing maxillary implant reconstruction. She reported having some implants 27 years ago and it has been trouble-free with symptoms of sinus infections and movement of the entire maxillary prosthesis (Fig 9). Radiograph revealed bone loss around the unilateral subperiosteal implants and the blade implants in the anterior sextant (Fig 3). A careful examination, it was decided that none the maxillary implants were salvageable. Treatment plan was formulated to stage the case to provide a mutually protected occlusal scheme.

The entire maxillary frame had to be sectioned and removed piecemeal (Fig 1). An immediate denture was fabricated and the tissues were allowed to heal for a period of two months (Fig 5). A stereolithographic model was created to assess the con- dition of the remaining bone (Fig 6). A decision was made to reconstruct the maxilla with bilateral sinus aug- mentation. The anterior sextant had bone loss till the anterior nasal spine. Six months following the augmentation, nine implants were placed in the augmented bone (Fig 7). Stage II surgery was performed after a healing period of 8 months. Impressions were taken (Fig 8). A Universal modi- fied abutment was utilized to bring all of the platforms equi-gingival (Fig 9). A verification jig was utilized to check for passivity and accuracy of the positions of the abutments (Fig 10). The metal frame was indexed, cast and tried in (Fig 11, 12). Face bow transfer record was obtained for ori- entation relationship. (Fig 13) Porce- lained overlay for an FPD prosthesis was processed and inserted (Fig 14, 15). A mutually protected occlusal scheme was designed (Fig 16). The patient’s vertical was maintained. The post op radiograph reveals a stable outcome (Fig 17). The anterior cantilevered crowns provide for optimal esthetics in the extremely resorbed anterior maxilla. The post opera- tive outcome provided an esthetic and functional rehabilitation of the failing implant FPD (Fig 18). The provision of pontics enhanced the outcome in the esthetic zone and in this case favored the design due to the atrophy that precluded implant placement in the premaxilla. The case has been in function for over 5 years and the patient has been on re- currence every 4 months.