



Teeth in a Day

The Branemark Novum System

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Abstract

The Branemark Novum system is a one-day treatment of the edentulous or periodontally hopeless mandibular dentition. There are four drill templates and eight drill guides that precisely position three implants which are totally parallel and level. A prefabricated lower bar is placed on the three implants, and an upper bar fits on the lower bar. The restorative dentist has previously selected denture teeth and recorded the vertical dimension of occlusion. The case is waxed up, adjusted, processed and delivered in one day.

ON APRIL 9, 1980, Dr. Per-Ingvar Branemark conceived of the Novum concept. The next 15 years were spent exploring the surgical and prosthetic procedures, spatial dynamics, and biology between titanium and bone. The first clinical application was in 1996.¹ This procedure provided patients with a third dentition. Dr. Branemark reported on his experience in 1999.²

The evolution of modern implant dentistry really begins with the work of Dr. Branemark, beginning in the 1960s. The modifications and enhancements over the years have involved various bone grafting materials and techniques—including membranes—immediate placement into extraction sites, single-stage implant procedures and, eventually, immediate loading.³ The Novum protocol is the next step, in which implants are immediately loaded, stabilized, and the reconstruction is completed in the space of a single day.⁴

Preoperative Evaluation

A potential Novum patient must possess a mandible of adequate shape, height, width, bone density and enough space between the mental foramen on both sides.⁵ A dentascan is invaluable in preoperative planning (Figure 1).

The radiologist can place three simulations, one in the center and two posterior implants, 16 mm apart, center to center.⁶ Measurements can be taken on the oblique and panorex views. Life-size axial films can be used with the guide template to check the suitability of the shape of the mandible. There needs to be suitable clearance in relation to buccal-lingual undercuts, angulations and the mental foramen. Fifty mm of height are necessary for access for drilling components, templates and implants. Medical considerations are the same as for any other type of implant surgery.⁷

Advantages

There are a variety of advantages to the Novum system. The most significant is completion of the surgery and reconstruction in one day, with rigid stabilization at the time of implant placement. This might not seem as important to the dentist as it is to the patient, but one-day teeth are a major breakthrough.

There is the reduced cost of the surgical phase of treatment and an even more significant reduction in cost from the restorative dentist. The relative ease of the restorative procedure and low laboratory cost can bring mandibular reconstruction into the realm of mainstream dentistry, particularly for the less experienced dentist.⁸ One surgical procedure, one anesthetic procedure and the psychological benefits of immediate treatment cannot be minimized for the medically compromised, phobic or long-distance patient. There are no impressions, castings or large laboratory expenses. Reusable prefabricated surgical and prosthetic components are used in a precision protocol.

Disadvantages

There are an equal number of disadvantages to the Novum procedure. The appearance of the lower bar when the patient pulls down his or her lower lip concerns some patients. This has virtually been eliminated by overlapping the pink acrylic over the lower bar. Another disadvantage is, there are no individual crown and bridge units.

The Novum system is best suited for Class I and Class III occlusions. It cannot be used for Class II Division I occlusions, since the surgical preparation to flatten the residual ridge places the implants in a somewhat lingual position, and there are no additional implants if one fails; however, there is a rescue protocol available.

Initially, it was necessary to have the restorative dentist present, but this has been overcome by marking the vertical dimension of occlusion the day prior to surgery and covering the nose and chin marks with surgical tape. It is imperative to have an interested, accommodating laboratory available with knowledge of the procedure and the ability to dedicate a technician to the case until it is completed. The more expeditious the restorative phase, the sooner the patient goes home and begins postoperative care.

The surgical procedure is very labor-intensive and much more demanding than routine implant surgery. The patient selection process limits the number of candidates since it is a one-size-fits-all approach in terms of drill templates and implant sizes.

All of the above being stated, it is an extremely worthwhile service for the properly selected patients.

Prosthetic Planning

Prior to the surgical procedure, the patient is seen by the restorative dentist to evaluate the jaw relationship (horizontal and vertical), occlusal plane and angulation. Any changes in the vertical dimension or occlusal plane are made through restorative dentistry, denture correction or a new maxillary denture prior to surgery.

Parel recently described a bone reduction surgical guide for the Novum procedure.⁹ This enables the surgeon to better reduce the ridge adequately in terms of the proper amount of bone reduction and proper position of the bone platform in relation to the maxillary occlusal plane. On the day of surgery, or the day prior, the restorative dentist marks the nose and chin and takes the vertical dimensions of occlusion.

Surgical Procedure

The full Branemark operating room protocol is being used for all cases in an implant-dedicated operator. An anesthesiologist provides intravenous conscious sedation and monitors the patient with an electrocardiogram and pulse oximeter.

The patient's face is prepped with hibiclens (*Zeneca Pharmaceuticals*) and chlorhexidine intraorally. Oxygen is administered and complete draping is done. Local anesthesia is adequate with intravenous sedation (Figure 2).

Any remaining teeth are extracted with forceps, if this can be done easily. It improves access prior to the initial incision. Occasionally a molar may be retained temporarily or permanently to keep the vertical dimension of occlusion. A crestal incision is used in an edentulous case. Buccal and lingual flaps are reflected into the molar region, and the mental foramen is identified on both sides. (Figure 3). A vertical bur line is scribed in the midline.

Once the bone is clean, the ridge is reduced initially with a heavy rongeur. This is followed with large Brasseler (*Brasseler U.S.A.*) surgical burs. One of the critical steps in the procedure is preparation of the bone platform. It is necessary to have a flat 6-to-7-mm bone platform

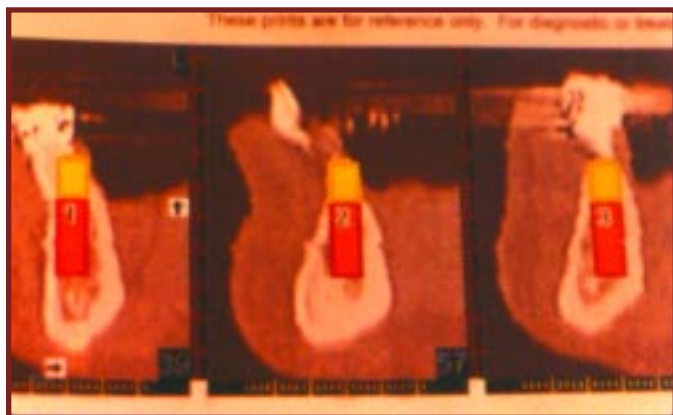


Figure 1. Dentascan simulations in oblique view.



Figure 2. Preoperative view.

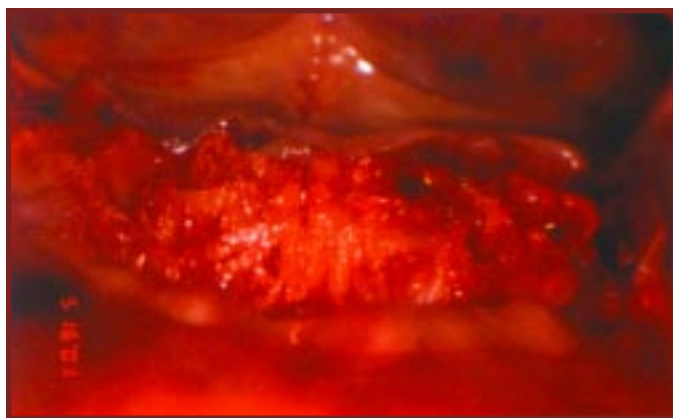


Figure 3. Flaps reflected, teeth extracted.

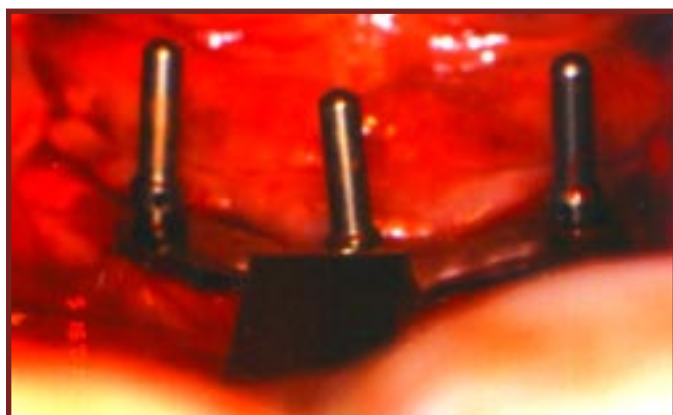


Figure 4. Guide template with guide pins (first template).

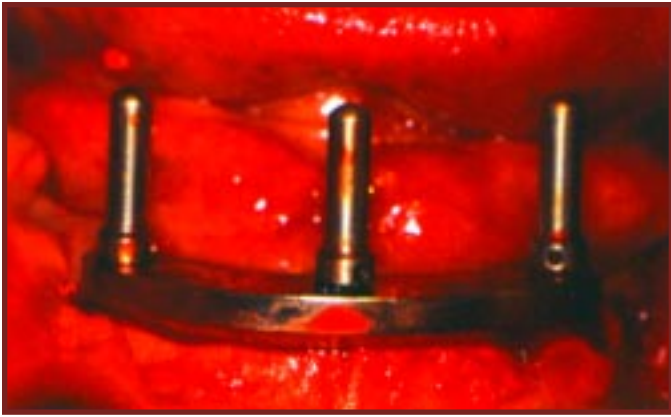


Figure 5. Evaluation template (second template). Note flatness of ridge.



Figure 6. Positioning template (third template), central implant placed.

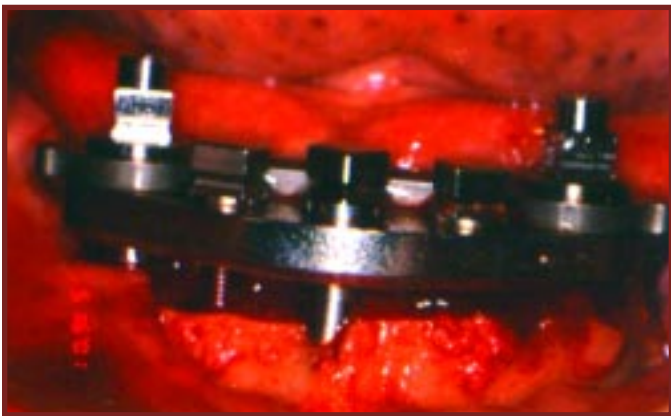


Figure 7. V-template (fourth template), posterior implants placed.



Figure 8. Three parallel and level implants. Note unthreaded supraosseous portion of implants.

from molar to molar. This enables adequate clearance for the lower and upper bars, which extend beyond the posterior implants. It is important not to lose the orientation of the bone platform to the maxillary occlusal plane and the midline.

The bone reduction surgical guide for the Novum is an excellent addition to the armamentarium for the Novum protocol. This enables proper vertical reduction, allowing about 15 to 16 mm from the incisal edge of the maxillary anterior teeth to the platform, and leaving room for the soft tissue, lower bar, upper bar and teeth. It also aids in proper alignment to the maxillary occlusal plane.

After the ridge is flattened to a 6-to-7-mm platform width distal to the mental foramen, the first template, called the guide template, is utilized (Figure 4). This is used at the midline with a standard Branemark drill kit round bur. The central site and posterior sites are marked slightly to the facial of the center of the ridge. This aids in counteracting the lingual positioning of the prosthesis and engages the buccal cortical bone. It is critical to evaluate the guide template in relation to the mental foramen. It is helpful to use a standard 2 mm 7-15 drill kit bur with the guide template because of its shorter length and depth markings.

After the guide template sites are complete, the second template is utilized. The evaluation template is used to check the flatness of the ridge and the relationship to the maxillary plane of occlusion (Figure 5). Changes in the bone platform can be made at this stage. Drilling of the implant sites are also continued with the 2 mm drill. Change in the angulation or position of the implant sites can also be made at this point.

The positioning template is the third template that is utilized (Figure 6). It is used to place the central fixture. The positioning template is held in place with two Novum guide pins. Drill guides are placed in the positioning template. There are special drill guides and matching drills at 2 mm, 3 mm, 3.5 mm, 3.8 mm, 4.0 mm, 4.2 mm and 4.4 mm.

Implants come in two lengths and two widths. They are 4.5 x 11.5, 4.5 x 13.5, 5 x 11.5, and 5 x 13.5. The 4.5 implants are drilled to 3.8 and tapped at 4.5. The 5.0 implants are drilled to 4.4 and tapped at 5.0. The 11.5 mm implants have a threaded portion and a 6 mm non-threaded collar. The 13.5 mm implants have a 7 mm non-threaded collar. Each diameter implant has a matching, special fixture mount.

The V-template is the fourth template (Figure 7). This is attached to the central implant with a temporary screw. The 2 mm drill guide is placed, and two Novum guide pins are placed. At this point, two stabilizing screw sites are drilled through the V-template stabilizing screw holes, and two stabilizing screws are placed. These stabilizing screws, plus the central implant, hold the fourth template stable. The drill guides are placed for the drilling of the posterior sites.

Once the posterior implants are placed, the stabilizing screws are removed, the fixture mounts are removed and the temporary screw is removed. There are now three totally level and parallel implants (Figure 8). The flaps are sutured, and a silicone protective sheet is placed over the implants. Three temporary screws with compression rings are now placed to secure the lower bar to the implants. The implants have a flange, which is compressed when the temporary screws are tightened with a cylinder wrench. This creates an intimate

fit between the implants and the lower bar. The temporary screws are removed, one at a time, and replaced with lower bar screws and tightened to 45 newton/cms (Figure 9).

Prosthetic Treatment

The restorative phase starts at this point. The upper bar is attached to the lower bar with two upper bar screws. The upper bar is checked in relation to the maxillary arch.

The dentist takes a bite registration, using putty or wax, and has the patient close to the pre-established vertical dimension of occlusion that was determined and recorded before the surgery.

The upper bar is now removed, and a silicone protection rim is placed. The upper bar is sent with the bite registration to the laboratory. Previously selected teeth are set in wax, tried in, and changes are made in the set-up or occlusion, if necessary. The case is processed, and, in most cases, delivered the same day. Any occlusal discrepancies are corrected, and the case can be torqued if desired at this point to 45 newton/cms (Figure 10).

A postoperative panorex X-ray is taken (Figure 11), and postoperative directions are given to the patient. The patient is seen every few days until healing is complete. The silicone sheet is removed one to two weeks after surgery, as are the sutures. Oral hygiene instructions are given, and the patient is seen on recall as necessary (Figure 12).

Summary

The Branemark Novum system for one-day teeth has been described. It provides many patients who are suitable candidates for the procedure with the option of completing a mandibular-fixed restoration in a single day with one surgical procedure, immediate loading, stabilization and restorative care. The Novum has the ability to bring implant reconstruction of the mandibular arch into mainstream dentistry. It is especially advantageous for the less-experienced implant restorative dentist as well as the experienced clinician. ■

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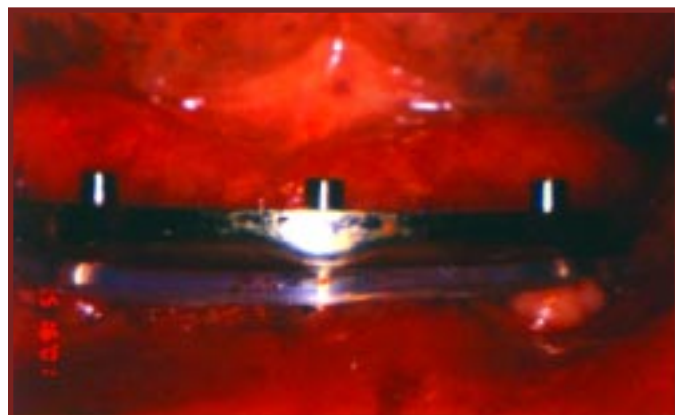


Figure 9. Lower bar, lower bar screws and silicone sheet.



Figure 10. Complete Case I.

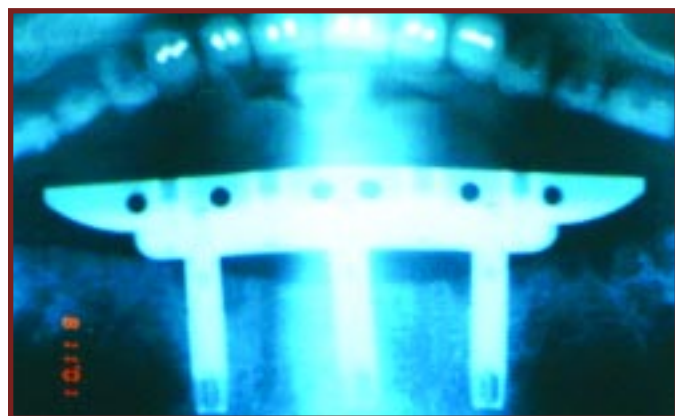


Figure 11. Panorex Case II.



Figure 12. Completed Case II with lower bar covered with acrylic.