Surgical Guides and Appliances

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Many restorative headaches in implantology have been the result of poor treatment planning and little or no communication among the restorative team. Ultimately, it is the patient who suffers in the long term. Often, preliminary discussion and a surgical guide could have avoided many of the difficulties and instead provided an esthetic and predictable result.

There are as many surgical guide designs (appliances, stents or templates) as there are implant companies to choose from. The complexity of the surgical guide varies as well. In this article, we will discuss some of the differences, touch on some unique techniques and focus on the more effective virtual treatment-planning software that will be the standard of care in the future.

The least expensive and most basic type of template is the vaccuform, or suck down version, where a vaccuform is taken over a model and a small pilot hole is placed. They can be easily fabricated in the doctor's office. However, these are not stable and many labs no longer fabricate them. Nevertheless, they do provide minimal guidance. There is a vaccuform /suckdown technique that is effective and can be fabricated in the doctor's office. This is a unique system designed by Dr. Leo Malin (www.nis-inc.us) that incorporates an adjustable cylinder that will rotate 10 degrees in any direction (Figure 1a). A tomograph is then taken to ensure the cylinder is in the correct position, then glued into place (Figure 1b). This technique is effective with a single implant.

A step up from this is a clear acrylic type of guide. The model is sent to the lab to fabricate a stronger, more stable guide. There are a variety of ways to treat the implant site, such as leaving it as a solid acrylic site so that the doctor can create his/her own pilot hole. Some guides are drilled with a 'best guess' pilot hole, or the entire buccal or lingual is relieved to allow for freedom of the doctor to maneuver the drill once surgery commences. There are also a myriad of ways (wires, ball bearings, metal and plastic guide cylinders, gutta percha, or barium infused or coated teeth) to treat the acrylic to allow measurements to be made for radiography to assess the site for tissue or bone depth and angulation. As there are so many ways and techniques to create these guides, it is very helpful to communicate your preferred method to the lab. The difficulty with these types of guides is that the lab is placing the tooth where it should go for esthetics and function, but of course has no idea where any vital structures are (i.e. mandibular nerve, sinus, bone density or availability). It is simply a guess. It is reasonable to expect that only a doctor trained in placing implants can properly assess these variables. For this reason, many guides are rendered useless when these variables do not allow for the lab's 'ideal' placement. This is where frustration sets in as angulation or depth issues are presented when the patient is healed and ready for the final restorative phase.

For fully edentulous patients, the existing denture or a duplicate of the denture can be utilized with pilot holes drilled in the desired area. This is very effective. Bone screws can be used to retain or secure the denture during surgery where necessary. Again, there are multiple ways to prepare the denture for surgical use depending on doctor's preference.

Another system that employs a unique technique is the 'BASIC' implant system (www.basicdentalimplants.com), which involves tissue mapping. The implant area is probed and the tissue depth assessed in five or more different areas from buccal to lingual to give an idea of the amount of bone available (Figure 2a). The information is transferred to the stone model (Figure 2b). A nylon/plastic guide is placed in the proper position according to the tissue map (Figure 2c). A 1:1 periapical radiograph is then used to assess the landmarks, such as mandibular nerve, sinus, etc.

There are newer cutting-edge techniques utilizing diagnostic software such as Nobelguide, Simplant and coDiagnostiX® software, which are now available, and are revolutionizing pre-op diagnosis and treatment planning for patients. These allow for a thorough pretreatment plan that will precisely guide surgery to place the implant exactly where it is required and let a doctor know whether the patient has enough bone to place, or whether bone grafting will be required, etc.

For the Nobelguide, Simplant and coDiagnostiX® techniques, the lab fabricates a CT scanning appliance. The patient has a scan performed. In the case of Nobelguide, the doctor uses the software to treatment plan in-office, and Nobel biocare fabricates the surgical appliance in Sweden. Simplant treatment plans and creates the appliance at Simplant.

At the Las Vegas Institute implant program taught by Dr. Leo Malin, the coDiagnostiX® IVS system is utilized to teach a comprehensive implant placement protocol. A CT scanning appliance (Figure 3a) is fabricated in the lab on a model, and sent back to the doctor. The patient is then scanned in office using a computerized tomography unit (if available), or the patient is sent to a clinic or hospital. The information is stored on a disc in DICOM format and the doctor utilizes the treatment planning software to virtually place the implant three-dimensionally. All factors can be evaluated in minutes including bone depth, quality, density, shape, etc. as well as structures such as incisive canal, sinus, cortical plate, mandibular canal and any anomalies. Once the treatment plan is finalized, the software-provided coordinates are printed and sent to Aurum Ceramic/Classic to fabricate the surgical appliance. These coordinates

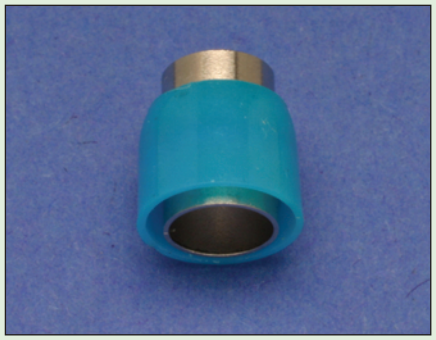

Figure 1a

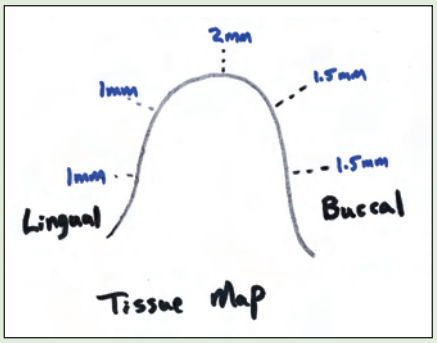

Figure 2a

Figure 1b

allow the scanning appliance to be set up on a Gonyx milling machine, and the holes to be drilled at the precise angle and placement prescribed. This protocol assures that the patient is properly assessed and treated with precision and accuracy, resulting in the highest quality product.

These techniques add a few hundred dollars to the overall cost; however, as patients become more informed and are presented with technology that will give them the best possible result, many will opt for what is in their best interest. Virtual treatment planning software coupled with precision surgical guides will be the standard of care in the near future. Word of mouth is a powerful referral program and nothing spreads this faster than a successful esthetic and functional prosthetic result that patient, doctor and lab can all be proud of.

Figure 2b

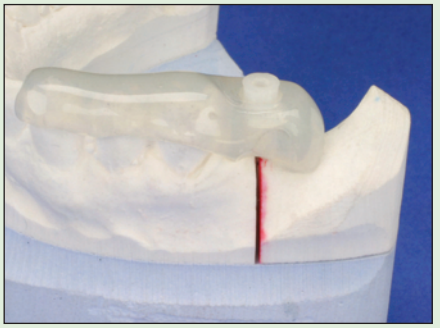

Figure 2c

Figure 3a

Figure 1a - Adjustable cylinder from NIS technique.

Figure 1b - Cylinder super glued into place, after adjustment.

Figure 2a – Tissue Map.

Figure 2b - Information transferred to stone model.

Figure 2c - Nylon/plastic guide in position.

Figure 3a - CT scanning appliance with holes drilled at precise angle and placement prescribed.