



By Ash Vasanthan, DDS, MS

Minimally Invasive DENTAL IMPLANT SURGERY

As we enter a new decade in time, we are also entering an exciting and interesting time in the practice of dentistry. At the present time, most, if not all general practitioners are involved with some form of restorative dentistry with dental implants but only a few are involved with the surgical aspect of implant placement and the reason for this could be the surgical protocol. Minimally invasive surgery, which is a flapless surgical approach, could make it much more simple for more dentists to consider getting on board the surgical part.

Flapless Implant Surgery

As the one stage implant surgery became more predictable, there was an interest in pushing the surgical part another step and placing the implant with a flapless approach. In my opinion flapless surgery can be divided into 3 categories: 1. Traditional Approach, 2. Model Based Approach 3. Computer Fabricated Guide Approach and 4. Real Time Navigation Approach.

Traditional Approach: This approach involves more surgical experience and is generally followed by implant surgeons in the posterior quadrants of the mouth on a relatively common basis on preference. It involves a reasonable understanding of the bone and soft tissue profile of the area and includes use of an initial tissue punch and sequential drilling to widen the osteotomy and placement of the implant¹. This particular situation is one where the use of a surgical guide may or may not be required based on the location and the number of implants. (Fig. 1, below)



Fig. 1: Four implants placed in a traditional approach



Fig. 2: Ridge Mapping to assess the bone profile and soft tissue thickness



Fig. 3: Implant site preparation through model based guide in place.



Fig. 4: Minimal tissue trauma with the implant in place

Model Based Approach: This approach involves the use of models of the case with ridge mapping information transferred to the model. Ridge mapping involves the use of a calibrated probe with a stopper to measure the thickness of the tissue along the edentulous site on a bucco-lingual manner including the crest. This is done after the patient is anesthetized in the area and a minimum of 4 – 8 areas are measured along the ridge from buccal to lingual. The information of each reading in the location is then transferred to the model in the form of dots on the model corresponding to the same location. It is then sectioned with or without the use of pins (similar to that of sectioning a model for crown and bridge) and the ridge form can be evaluated or assessed. Based on this information, a surgical guide can then be fabricated. The surgical guide is then used to follow the steps of implant site preparation and placement through the flap. (Fig. 2, 3, 4, above)

Computer Fabricated Guide Approach: This is the newest method currently used and probably the most efficient approach to placing multiple implants in a flapless way. This method involves the use of a CT scan of the patient with the radiographic guide in his jaw in order to generate a virtual 3D model of the jaw in the computer. Utilizing an implant planning software, a virtual implant is placed within the bone profile of the edentulous site in the scan. The

information on the location and size of the implant are sent to the company, which will make a stereolithographic surgical guide milled out of the information obtained from the planning software. Since this majority of this process is automated, there is less room for human error in the transfer of information and fabrication of the surgical guide. The surgical guide generated in this manner, allows the implant surgeon to place the implant with little error². Although the surgical placement has become predictable with the computer generated surgical guide, the restorative aspect being done at the same time can be quite challenging and calls for meticulous steps to be followed in order for it to happen at the same time. The computer generated guide is usually received in the dental office within 1-3 weeks of the software based planning and can vary depending on the company and the lab involved in the process. (Fig. 5, 6, 7, 8, opposite)

Real Time Navigation Approach: Image Guided Implantology® is a company based out of Israel which provides implant navigation with motion tracking technology. It tracks the position of the implant drill in the patient's jaw, in real time, as the site is being prepared for implant placement. This technology requires the use of a pre-surgical CT scan to allow the surgeon to navigate through the CT scan in real time as he is preparing the site and placing the implant. Unlike the computer fabricated

surgical guides, this technology allows for direct placement of the implant without a guide and will give real time information on the angle of the implant as the drilling sequence proceeds. The company claims that it is a “GPS for implant dentistry”³. At this time, there are a few places in the United States that this technology is being tested and utilized. A friend of mine had the opportunity to use this system for a few months in his practice and said, “The process was laborious with a steep learning curve but the surgical part was exciting and the technology is promising.” Over the next few years, we shall see the evidence in peer reviewed journals to facilitate clinicians like us to consider its use if the cost is not prohibitive.

I have listed my recommendations and rationale to consider the use of minimally invasive dental implant surgery and this is an exciting time in dentistry, especially implant dentistry where science and technology is making the surgical part simpler and easier to do and minimally invasive to the patients. ■

References:

1. Campelo LD, Camara JR; Flapless Implant Surgery: A 10 year clinical retrospective analysis. *Int J Oral Maxillofac Implants.* 2002 Mar-Apr;17(2):271–6.
2. Elian N, Jalbout ZN, Classi AJ, Wexler A, Sarment D, Tarnow DP. Precision of flapless implant placement using real-time surgical navigation: a case series. *Int J Oral Maxillofac Implants.* 2008 Nov–Dec; 23(6):1123-7
3. <http://www.image-navigation.com/IGI/overview>

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RECOMMENDATIONS / INDICATIONS:

- 4mm of keratinized gingiva from the mid-point of the crest buccal and lingual to the site.
- Bone thickness of 6mm as measured or assessed.
- Minimal anatomical risks.
- Guidance to the path of implant site preparation.
- Surgical parameters within restorative requirements.

CONTRA-INDICATIONS:

- Inadequate bone thickness.
- Need for bone or soft tissue grafting.

RATIONALE / ADVANTAGES:

- Minimally invasive
- Decreased pain and discomfort
- Preserves vascularity
- Preserves crestal bone
- Less plaque accumulation
- Enhanced esthetics for provisionalization

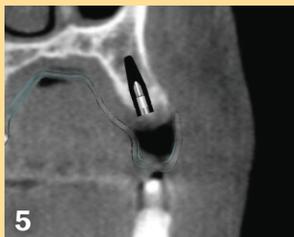


Fig. 5: Software based planning with virtual implant

Fig. 6: Software with radiographic guide showing virtual implant with abutment and guide

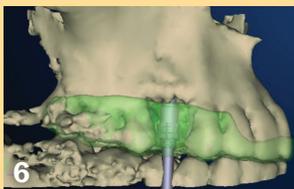


Fig. 7: Surgical Guide with metal sleeve along the edentulous spot

Fig. 8: Implant placed as per guide with minimal tissue trauma

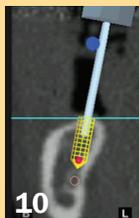


Fig. 9: Real time display of the implant drill on computer screen

Fig. 10: Real time display of drill angulation with future location of the implant in that path displayed as the yellow shell with red dot.



WHY KEEP ASPIRIN BY YOUR BEDSIDE?

About Heart Attacks: There are other symptoms of an heart attack besides the pain on the left arm. One must also be aware of an intense pain on the chin, as well as nausea and lots of sweating, however these symptoms may also occur less frequently. Note: There may be NO pain in the chest during a heart attack. The majority of people (about 60%) who had a heart attack during their sleep, did not wake up. However, if it occurs, the chest pain may wake you up from your deep sleep. ■

- take two aspirins
- CALL 911
- say “heart attack!”
- say that you have taken two aspirins.
- phone a neighbor or a family member who lives very close by
- take a seat on a chair or sofa near the front door, and wait for their arrival and...
- DO NOT LIE DOWN

In the case of a heart attack: