Flapless Dental Implantation using Cortex Implants

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The following case study discusses the flapless implant surgery approach using the Cortex implant package and surgical kit. This article will depict the background for this technique as well as the potential advantages and disadvantages of the procedure.

The first studies of the flapless implant procedures began to appear in the last parts of the twentieth century after Lederman\(^1\) introduced the technique in 1977. A comprehensive study was conducted in 2002 by Campelo \& Camara\(^2\), who evaluated retrospectively 770 implants placed with a flapless approach over a period of 10 years. The cumulative success rate for implants placed using a flapless one-stage surgical technique after a 10-year period improved from 74.1% for implants placed in the 1990's to roughly a 100% from year 2000 onwards. This remarkable change can be largely attributed to the changes and technological advancements made in the surface of the various implants used in the procedure as well as the implants shapes.

The advantages illustrated and discussed in this case study were presented initially by Dr. Becker\(^3\) in 2005 and consist of the following: Reduced surgical procedure time; Minimal changes in crestal bone levels; Probing depth and inflammation; Minimized perceived bleeding; Lessened post-operative discomfort. In recent years, the popularity of the flapless technique gained due to the introduction of CT scans and tomography technological advancements, enabling doctors the possibility to use more accurate guiding methods in order to achieve accurate implant placement.

A study conducted in 2006 by Ghent University\(^4\) showed that there were no real differences in perforation or dehiscence of the crestal bone by either novice doctors or professional periodontics, corroborating the assumption that the flapless technique was in fact a reliable and easy to use method. The arising conclusion form the study showed that the key element of procedural success was the familiarity with the bone structure and anatomy.

A later study performed in 2009 by Goldstein \& Becker\(^5\) published a 4 year follow-up result showing 98.7% survival rate. Goldstein \& Becker concluded that flapless surgery was in fact a procedure with high implant predictability due to insignificant crestal bone loss for up to 4 years, and that proper diagnosis and treatment planning are key factors in achieving predictable outcomes. However, they asserted that the procedure actually required advanced clinical judgment and surgical experience and that surgeons performing the flapless procedure should also be familiar with other minimally invasive techniques such as minimal incisions and flaps, pouch techniques and tunnel dissections.

Apart from familiarity with the structure, anatomy and indications of the intended implantation site, a surgeon performing the surgery should be aware of the management of peri-implant soft tissues. Ideal tissue thickness is should be between 2.5mm and 3mm. This contributes to the maintenance of a stable peri-implant soft tissue environment. The combination of adequate soft tissue thickness and apicocoronal dimension of keratinized tissue help resist recession, protects peri-implant crestal bone levels, and provides esthetic masking of underlying metal components.
The advantages of the flapless procedure

The natural tooth has three sources of blood supply including: pulp, periost and bone. As the implant placed in the bone does not have pulp left are only two sources of blood supply – the periost and bone. Periostal flap elevation, results in of roughly 80% of the remaining blood supply. This may result in some deficiency in blood supply to the implant area and bone necrosis.

The preservation of soft tissue architecture

If a surgeon does not raise a flap after extraction he is left with complete integrity of the papillae architecture that may be preserved with a direct placement of the implant to the extraction site even in cases where immediate loading is performed, as can be seen in the following pictures where Cortex implants are used for fixed restoration.

Preservation of hard tissue volume at the site

Especially in cases of implantation after extraction, when a flap is raised, it is possible that small pieces of the bucal plate might be dislocated when it is relatively thin. As can be seen in the pictures below, refraining from raising a flap can help preserve the site its initial structure thus protecting the delicate and thin layer of bone plate and, if necessary, perform bone augmentation around emerging implant structure.
**Time Consumption and patient discomfort**

Statistics show that the use of the flapless approach decreases surgery time by a factor of two, from an average of 28 minutes (±13 minutes) to roughly 15 minutes. In addition, statistics show that when using a flapless approach a dramatic decrease in post-operative discomfort is present. Fewer prescriptions for analgesic were required and the amounts of drugs consumed by patients were substantially lower and for shorter periods of time.

**Accelerated recuperation and resumption of normal hygiene**

As a result of a less traumatic procedure to the soft tissue, without flap elevation, a significantly better soft tissue recuperation and better result is noticed when a flapless technique is utilized.

The absence of incisions and sutures post-surgery allows the patient to resume a better hygiene regime sooner and with less discomfort. This is mostly due to the fact that most patients tend to resume brushing of the implant area faster when pain levels are lower.

**Precautions and Disadvantages**

There are some notable disadvantages surgeons should consider before opting for the flapless approach. The first is the inability to visualize anatomic landmarks and vital structures that may exist beneath the surface. Such structures may include under-cuts in the mandible, maxillary sinuses or under-cuts in the pre-maxilla.
An additional disadvantage with using the surgical guides is the potential risk of thermal damage secondary to reduced access for external irrigation during osteotomy preparation. In some cases it is advised to use internal irrigation for this specific reason.

Another disadvantage is the possible perforation of the bucal plate as a result of malposed angle. If that occurs, it is advised that the doctor discontinue the flapless approach and raise a flap, or use a pouch or tunnel techniques in order to remedy the situation.

Another issue that should be addressed is that a flapless technique decreased ability of making a contour of osseous topography allowing the detection of various bone defects around the implant emergence. Like advised earlier, in cases where such defects are either suspected or found during the procedure, it is advised to raise a flap and facilitate a restorative procedure.

When the implant site not allow to obtain a circumferential adaptation of approximately 3 mm of keratinized tissue surrounding the emerging implant, flapless approach should not to be done, and flap elevation or other minimally invasive procedure in order to make an apical re-positioning of the flap should be performed.

**Case Study – Application of the free-hand flapless approach**

The following is a step by step depiction of a flapless approach technique use with a set of Cortex implants and tools. As evident in the pre-op scans, the subject is a 35 year old healthy male with reasonably good bone topography for implantation.

The CT scan shows that there is adequate width and height for the flapless procedure.

In this case soft tissue punching was with a surgical bur. A Cortex pilot drill was used next according to the desired length of the implant, established pre-op in the treatment plan.
It is highly important to check with a depth probe in the osteotomy site the integrity of the bone along the osteotomy preparation. If at this part of the procedure one can recognize signs of perforation, one should abandon the flapless technique and raise a flap or utilize pouch or tunnel techniques. After the initial preparation an additional drills was used as shown for the placement of a Cortex Dynamix 4.2 mm implant.
If the torque of insertion of the implant is above 40N/cm, measurable by a surgical torque wrench, Cortex implants are especially suitable for immediate loading. However, in this case since the site is posterior and there was no requirement for aesthetic considerations, the abutment was left in place and was covered with a plastic healing cap that is conveniently included in the Cortex PREMIUM package of the implant.

As can be seen below, the combination of the flapless approach and the Cortex implant system provide exceptional results.
References: