This post is largely adapted from the PennWell's Dental Group CE information pamphlet: Implants: a primer

This information is provided as a clinical support tool and does not warrant continuing education credit.

Context

- The surgical placement and maintenance of a dental implant requires preoperative requirements as well as postoperative maintenance.
- The surgical aspect is dependent on a variety of factors, including the preoperative assessment of the implant site, surrounding anatomy, occlusion, and implant type and placement position, among others.
- Proper maintenance is a primary determinant of the longevity of the implant and prosthesis.

Assessment

- **Patient's health**: patients who are considering implant placement must be healthy overall, as well as intraorally:
    - Thorough medical history, including past and current medications that could affect the healing of bone and implant integration.
    - Absolute contraindications to implant rehabilitation included recent myocardial infarction and cerebrovascular accident, valvular prosthesis surgery, immunosuppression bleeding issues, active treatment of malignancy, drug abuse, psychiatric illness, as well as intravenous bisphosphonate use.
    - The mere presence of a disease does not necessarily preclude implant therapy or significantly affect long-term outcomes. Certain disorders, when controlled, or other situations allow implant survival rates that match those in health. These relative contraindications include adolescence, aging, osteoporosis, smoking, diabetes, positive interleukin-1 genotype, human immunodeficiency virus positivity, cardiovascular disease, and hypothyroidism.

- Determine the amount of available bone in which to place the implant.

- Selection of the specific imaging technique should be based on its suitability for providing the diagnostic information required by the implant team at different stages of treatment:
    - Visual inspection
    - Digital palpation
    - Periodontal probing
    - The use of bone calipers
    - Radiographs
    - Computerized tomography
    - Cone beam computerized technology

- An implant occupies a three-dimensional space and three measurements are needed to determine adequacy of bone volume:
    - Horizontal distance between the adjacent roots
    - Vertical height of available bone

- The width or thickness of the available bone

- A radiograph of a single site can be used to measure the two-dimensional distances between the adjacent roots:
  - The horizontal distance between roots and the vertical length or height of available bone.
  - The minimum distance between the implant and adjacent roots is 1.5 – 2.0mm, which provides an adequate amount of inter-implant-radicular bone space necessary for an adequate blood supply required to nourish the periodontal ligament of adjacent tooth roots and the bone surrounding the implant with the needed cells for creating osseointegration of the titanium-bone interface.
  - The height of available bone is measured from the most coronal aspect of the surgical site to the desired apical height.

- Probing the periodontal spaces of adjacent teeth will aid in determining the health of the site. Any periodontal therapy needed for adjacent teeth can be performed prior to implant surgery and the site reevaluated following healing.

Pre-surgical Preparation

- Review the informed consent documents with the patient, which should include all unforeseen sequelae of treatment.
- Patients must also be made keenly aware that while the track record for implant success is excellent, it is not perfect and implant failure and fixture and bone loss may result.
- If the site was an extraction:
  - Bone preservation is the primary focus.
  - The gold standard is to graft the socket at the time of extraction and place a guided tissue membrane, if needed, to aid in the growth of any missing bony walls and/or defects due to infection or trauma.

Day of Surgery

- Preparation also includes systemic preparation and antibiotic prophylaxis may be used, if needed, at the surgical appointment.
- It is still unknown whether postoperative antibiotics are beneficial, and which antibiotic is the most effective.
- Intraoral bacterial reduction at the surgical site is highly recommended and patients should be instructed to use a bacteriostatic rinse.

Placement

Surgical Phase

The decision to access the alveolus with a flap or flapless approach is based on aesthetic results and location of the surgical site.

Flapless surgery

- Less stressful and invasive procedure without affecting the high success rate of dental implant surgery.
- Predictable procedure when patient selection and surgical technique are appropriate.

Flap

- Papillae sparing incision (Figure 19) is made beginning on the palatal aspect of the ridge and extending several millimeters into the mucogingiva on the buccal.
- This is often best accomplished by using a scalpel handle and 15C blade, tissue forceps and a periosteal elevator.

Smile zone

- A papillae-sparing incision is critical to maintaining the integrity of the adjacent periodontium, both from a functional and aesthetic standpoint.

Non-aesthetic zone

- Such as the posterior maxilla or mandible, a full thickness flap may be raised. Here, periosteal elevators and tissue retractors aid greatly in reflecting the soft tissue during surgery.
- When flap is reflected, fully evaluate the bony crest and contour any irregularities in the bone.
- If a surgical stent is desired it is seated at this time and the osteotomy can be performed in part or whole through this guide.
- For ease of placement, radiographs may be taken with parallel pins or the actual surgical drills themselves to help determine angulation.
- Osteotomy creation is based on the surgical system provided by the manufacturer to best suit their implants.
- In general, maxillary bone is less dense than mandibular and care must be taken not to over widen the osteotomy.
- The implant is then screwed into the osteotomy and may be seated at or below the crest of bone depending on location in the arch.
- Final imaging should be taken to verify ideal placement and distances from various anatomic landmarks that will provide a successful outcome.
- At this point, the operator may choose to place either a cover screw, healing cap or provisional restoration on the implant.
- If a flap was created, closure can be accomplished in the aesthetic zone using polyglycolic acid (PGA) and chromic gut in non-aesthetic sites.
- Prescriptions are given to the patient as needed to aid in post-operative healing and pain management, and home care instructions should be given orally and written prior to patient dismissal.
- The patient should be seen anywhere from 7-10 days post-operatively for evaluation and examination.

Initial Prosthetic Phase

- After a determinant amount of time based on operator experience, time for optimal osseointegration and suggested manufacturer protocol, the implant may be restored.
- If a cover screw was placed, the implant can be accessed in several ways either via a full thickness flap, tissue coring with a tissue punch, or laser.
- Following cover screw or healing cap removal, a cement or screw retained provisional restoration can be placed.
- Full seating should be verified with imaging.

- Unlike a healing cap, a provisional crown offers improved control over the planned soft tissue growth and therefore a more idealized aesthetic result.
- The advantage of a well-constructed and contoured provisional crown in the anterior is that the gingival col will form to an ideal architecture. It truly sets the stage for a highly aesthetic result.

Final Prosthetic Phase

- Once the tissue has healed, a final impression is made and the lab is instructed to fabricate the operator's restoration of choice.
- The two options available for **single unit crowns** are **cement and screw retained**. Upon receipt of the definitive prosthesis, the restoration is torqued to manufacturers' specifications and the occlusion evaluated and adjusted as needed.

Maintenance

- Dependent on a variety of factors including frequency of professional care, dedication to home care and the instruments used for prophylaxis.
- Requires that patients present for hygiene on a regular basis (3, 4, or 6 months depending on need) and excellent home care.

Professional care

- Regardless of the implant restoration type (cement or screw retained) issues such as peri-implant bone loss, screw loosening and fracture, among others, must be constantly evaluated, examined and cared for if they occur.
- The following should also be evaluated and/or performed:
    - A review of health history,
    - Intraoral, prosthetic and osseous examination,
    - Probing,
    - Radiographs (when indicated),
    - Debridement of soft and hard deposits,
    - Selective polishing,
    - Flossing, and
    - Sodium fluoride treatments if teeth are present when indicated.

Home care

- A regimen for thorough oral hygiene, customized according to the condition of the tissue and the extent of plaque and calculus around the implants, should be implemented.
- Home care instructions should be customized according to implant design and accessibility.
- In addition, chemical control of biofilms, as an adjuvant to mechanical oral hygiene, is fully justified by its simplicity and efficacy proven by studies based on clinical evidence.