

Implants for General Dentists

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Abstract

The practice of general dentists placing dental implants is popular and is constantly increasing. However, the abundant amount of research and numerous studies based on implants can be overwhelming, as can be the abundant varieties of methods for placing implants. Therefore, this article eliminates confusion by focusing on the most popular and accepted procedures. Dr. Pfundheller reviews the basics, highlighting the most important information needed for a dentist who is considering or has just begun to place implants. The article provides the reader with background for understanding further information and for discussing dental implants with others in the dental profession.

Keywords: *Dental Implants; Crowns; Cement; Screw*

Implants are a “newer” technology compared to the traditional procedures of extractions, crowns, and root canals, which have been around for hundreds of years. As a result, most dental schools in the United States do not teach implant procedures to their dental students; however, schools in several other countries have begun training their dental students in both placing and restoring implants.

American dental schools require the teaching of root canal treatments. Many schools even teach molar root canal therapy, but a root canal can end up being a very difficult procedure involving curved roots, accessory canals, file breaking, and calcified canals [8]. Additionally, the decay can be very deep and extensive, requiring crown lengthening and adding a post or core to a crown on a tooth that may not have a chance to survive more than ten years. A bridge is another treatment used; however, a bridge is not the best option if the adjacent teeth are healthy, as the bridge puts extra pressure on the healthy teeth, increasing the chance of cavities and making flossing more difficult. Increased bone resorption in the area of the missing tooth occurs since there is no root or implant to stabilize the bone. In these and other cases, an implant is often a better option. As implant technology is improving, implants are becoming the best choice for treatment.

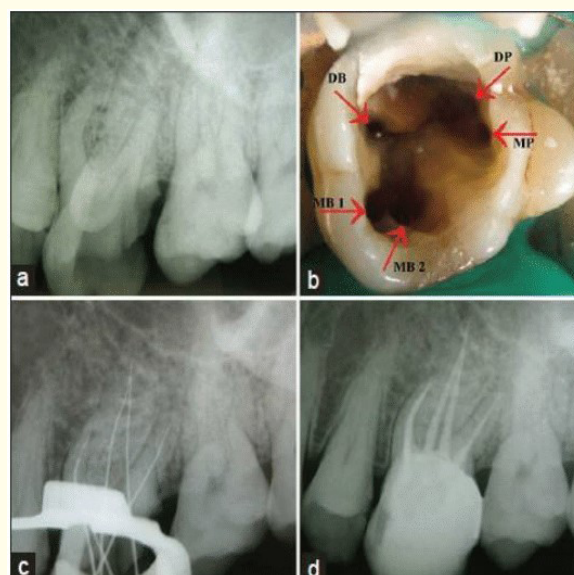


Figure 1: Root Canal for #26.

Types of Implant Crowns

The majority of implants have only 3 or 4 parts [1].

Cement retained

1. Implant
2. Screw
3. Abutment (screwed onto the implant)
4. Crown (cemented onto the abutment)



Figure 2: Parts to a Cement Retained Implant.

Screw retained

- 1) Implant
- 2) Screw
- 3) Crown (screwed directly to implant)

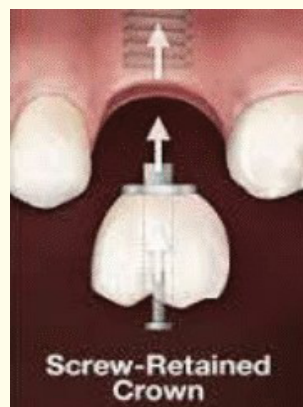


Figure 3: Screw-Retained Crown.

Advantages of Screw Retained

Risk of Peri-Implantitis [1-3]: Screw retained will have no remaining cement resulting in less of a risk to pre-implantitis.

Ease of Retrieval [3]: Removing a screw retained implant is easy – just unscrew the implant. Removing a cement retained implant crown is difficult. There is a chance of damaging the implant. If the porcelain is cracked, the entire crown may need to be cut to replace it.

Interocclusal Distance: Screw retained can be used when interocclusal distance is compromised in the more difficult cases due to having no abutment.

Advantage of Cement Retained

Porcelain Fracture [4]: The access hole in a screw retained implant results in a higher rate of Porcelain Fracture.

Angulation Correction [5]: The access hole in the screw retained implant may face the buccal for anterior implants which would compromise aesthetics - so angled abutment and cement retained would be preferred. Also for any implant that had to be positioned poorly can be more likely fixed with an angle abutment and cement retained crown.

Lab Costs: Cement retained are nearly always cheaper lab bills.

More Popular: Currently over 80% of the implants are cement retained.

Summary: To keep things simple when placing new implants, use screw retained crowns for posterior and cement retained for anterior. After dentists restore a few implants, they will discover their own strategy for when to use cement versus when to use screw retained crowns.

Implant Impression Types

There are two main ways to take an implant impression– closed tray and open tray [7]. With closed tray, the impression coping is attached to the implant in the patient. Make certain impression coping is tight; it should not move at all. After the impression is taken out of the mouth, the remove impression coping from the implant. Then place the impression coping into the patient's impression at the exact same position it was in the mouth. There is often a groove or slit on the impression coping which allows the dentist (or assistant) to place impression coping in the same orientation as the impression was in the mouth. Next, attach the implant analog to the impression coping (which has been placed into the patient's impression). When the cast is poured by the lab, the implant analog will be in the exact location in the cast as the implant is in the mouth. The lab will build the crown based on implant analog.



Figure 4: Closed Tray Impression Coping Attached to Implant in Patient (left), Impression Coping Attached to Implant Analog (middle), Impression Coping Placed into Impression with Implant.



Figure 5: Closed Tray Impression Coping (Left), Open Tray Impression Coping (Right).

In an open tray impression, the impression coping is also attached to the implant. However, this time the impression tray is trimmed so the impression coping tray can extend past the tray during the impression (hence the name: Open Tray). After the impression material has set, the impression coping is unscrewed, and then the tray is removed. The tray cannot be removed until the impression coping is unscrewed because the impression coping is “locked” into the tray. The impression coping is already in the tray when the impression is removed, thus avoiding any errors that could result in the closed tray when the dentist, lab technician or assistant place the closed tray impression coping back into the impression [6].

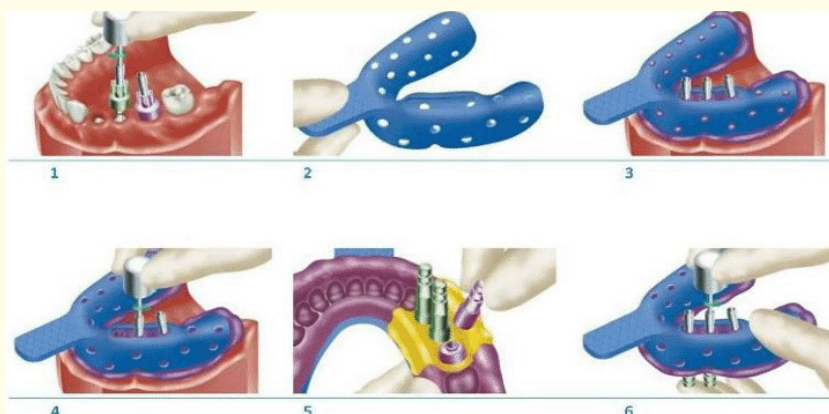


Figure 6: Steps of an Open Tray Impression Technique.



Figure 7: Example of Cutting the Tray for an Open Tray Impression.

Next, the lab analog is then attached to the impression coping (like the closed tray).

Evaluating the Patient Before Placing the Implant

When placing your first implants, it is important to case select and decide the ones that have the best chances of being successful. Important considerations:

Soft Tissue: Attached tissue is important for success and appearance of the implant and is extremely important for anterior teeth and high lip lines. If there is no attached tissue on the buccal of the implant, then recession is likely and the implant can be visually noticeable [9].

Conditions of Neighbouring teeth: If the other teeth are decayed and/or have gum disease, the chance of implant survival is decreased. Also, patients will be unhappy if they paid for an implant and then lose a neighbouring tooth shortly afterwards.

Lip Line: A high lip line shows the gums and the entire implant [10]. A low lip line can be forgiving if the gums aren't perfect since the gums won't show when the patient smiles [11].

Medical Conditions: Medical conditions can have an impact on the success rate of dental implants. Diabetes is one of the most common diseases that dentists will encounter and must consider in their practices. Patients with well controlled diabetes may not be significantly Stopper Drills compromised and can have high success rates, but the success rate and osseointegration of the dental implants on patients with poorly controlled diabetes can be negatively affected [13].

Smoking: Smoking can increase the risk of complications and reduce the success rate [14].

Vertical Bone: Enough vertical bone must be present to avoid the sinus and the IAN. The recommended distance from the IAN is 3 mm and from the sinus is 3 mm.

Horizontal bone: Even the thinnest implants require 4.5 mm width of bone. Patients who previously had surgical extractions or whose tooth has been missing for many years may not have enough horizontal bone.

Patient's Expectation: It is vital to consider a patient's goals. Some patients want a tooth to fill the gap while other patients are concerned about appearance, and they want the shade, shape, and gums to perfectly match their other teeth.

Helpful Tips for Placing First Few Implants

Radiographic and surgical guide: Use of a Radiographic and surgical guide can be extremely helpful to a new dentist. The surgical guide ensures the right angulation on an implant [15,16].



Figure 8: Surgical Guide.

Depth Gauge: Depth gauges are a helpful tool that ensure the angle and depth of the implant is correct. When placing implants for the first few times, go only 4 - 6 mm deep and place the depth gauge; also, take an x-ray (preferably a panoramic). This will verify one's movement in the right angulation. If the angulation is not correct, dentists will be able to correct the angle as they use wider drills and go deeper. If placing two implants, attempt to make the two implants parallel, which is especially important if the two implants will be used as an implant bridge.



Figure 9: Depth Gauge.

Stopper drills: Stopper drills are a helpful tool that prevent dentists from drilling too deep, a common mishap because blood, tissue, and saliva can block vision and one cannot always see the height of the drill.



Figure 10: Stopper Drills.

Primary Closure: Primary closure with the gums is recommended over the implant when placing one's first few implants so nothing can disturb the implant [17,18]. Three months later when exposing the implant and placing the healing cap, one should place an incision that is palatal to the implant to help pull/push more attached tissue to the buccal of the implant. It never hurts to have too much attached tissue buccal of the implant.

If the implant is loose after 3 months, remove the implant, trying first with forceps. If the implant is loose due to infection, the implant driver (drill) could accidentally push the implant into the sinus. If forceps cannot get it, then can use an implant drill and anti-rotate the implant. Replace with a slightly larger and (if possible) longer implant [25].

Periapical X-rays: Be careful with Periapical x-rays. Due to the angulation, it can seem like your implant is much closer to an adjacent tooth than it actually is in reality.



Figure 11: Periapical X-ray of #11.



Figure 12: Implant with Cover Screw Driver used to Show Angulation.

Self Tapping Vs Non-Self Tapping Implants

There are two main types of implants: self tapping and non-self tapping. Non-self tapping implants tend to be cheaper to make, but their cost comes with disadvantages. They are more difficult to place, more difficult to restore, and harder to establish primary stability.

Self tapping implants allows dentists to use different size drills depending on “toughness” of the bone. For example: while cutting with the 3 mm diameter drill for an upper right first molar, the drill cuts the bone very easily and quickly. With a self-cutting implant, one can go directly to placing a 5 mm diameter because the self-tapping implant will help cut the weaker bone as it is placed.

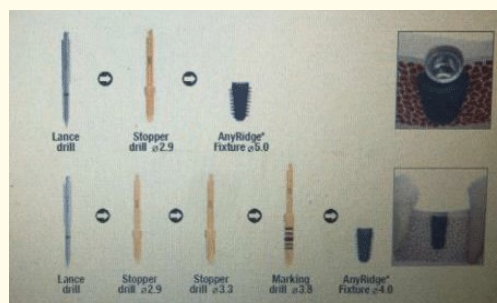


Figure 13: Any Ridge Self Tapping Implant Drill Sequence Guide.

If a non-self tapping implant and the same 3 mm diameter drill is used, the 5 mm implant won't be able to be placed because it cannot cut bone and over torquing is a risk. On the other hand, if you work up to the 5 mm diameter drill and then place the weak 5 mm diameter implant in weak bone, you may not get primary stability (implant is completely stable – no movement, no rotation) because the bone is too weak [19].

For tough bone (like lower mandible) and self-cutting, working up to the 4.8 mm diameter implant may be necessary before placing the 5 mm diameter implant. Both the self-tapping and the non-self tapping should be drilled to same length as the length of the implant, regardless of which type of implant is used.

A non-self tapping implant will not cut into the bone as it goes in; therefore, the guide hole prepared for the implant must be at the exact size of the implant. If the guide hole is too small, the bone could be fractured when the implant is placed. If the hole is too big, the implant will be loose. Self tapping implants, however, do cut or thread their way into the bone as they are placed. Therefore, it is often advantageous to make a hole that is slightly smaller than the implant (i.e. if your placing a 5 mm implant your last drill size would be 4.6 mm). This assures good primary stability as the implant threads its way into the bone when it's placed. The more dense the bone (i.e. mandibular posterior), the closer the final drill size should be to the actual implant size. In some cases (i.e. maxillary posterior), one can make a much larger jump from drill size to implant, such as a 3 mm final drill size for a 5 mm implant.

Important Measurements:

- 3 mm between implants
- 1.5 mm between natural tooth and implant 1
- 1mm short of the sinus
- 3 mm short of IAN (*most important)

Implant Sizes: Every type of implant company has different size diameters for implants. As a general rule, anteriors are usually approximately 3.5 - 4 mm, premolars approximately 4.5, and molars are 5 mm with the optimum length being 11.5 - 13 mm [26].

When placing implants – the most important thing is to avoid hitting the IAN [20] (and/or cutting the lingual nerve). While perforating a sinus can possibly cause problems, this can usually be fixed by referring the patient to an Oral Surgeon. A numb lip, tongue, and/or gums cannot be fixed by an oral surgeon. The only solution is to wait and hope the nerve heals; this nerve injury could affect the patient for the rest of his or her life. It is recommended to stay 3 mm away from IAN – 1 mm due to x-ray error, 1 mm due to operator error; and then 1 mm for additional safety net.

Be very careful with lower second molars. They are closest teeth to the IAN [21]. When extracting the tooth, you often have fussed mesial and distal root which results in no interproximal bone. Drilling past the apex of the tooth to get additional bone can be risky since breaking the apex cortex with too much pressure could result in 3 - 5 mm drop in the drill resulting in damaging the IAN. It may be better to bone graft and place the implant after healing [12].

Speed of Implants

Begin by using the pilot or the starter drill since without a drill, the patient may experience too much pressure and pain; the typical drills are not made to perforate the tough mandibular cortex.

When using the implant drills, limit the maximum speed to 2,000 rpm (as faster use causes overheating and prevents osteointegration); therefore, the clinic must have its own motor. While using the implant drill, make sure the surgical site is copiously irrigated just like a surgical extraction. The implant should be placed at just 60 rpm with no irrigation [22].

Primary stability significantly increases the chance of the implant being successful [24]. Avoid placing an implant without primary stability.

Final Tips for Placing First Few Implants:

- #1) Proceed slowly
- #2) Open Flap and Ideal Case
- #3) Go about half way 4 - 5 mm and check with locator pin
- #4) Take post-operative X-ray to verify everything
- #5) Use temporary bond to cement the crown

Avoid Immediates and Wait Longer for Healing.

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