

Dental Implants: Third Generation of Teeth

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Overview

The dental implant is artificial tooth root replacement (made of Titanium), which is surgically positioned in jaw bone beneath the gum line. It allows the dentist to mount replacement teeth or bridge without any visible difference. In addition to this dental implants are immune to decay and are relatively free from developing gum disease. Over last two decades, dental implants have revolutionized tooth replacement and dentistry. Dental implants also benefit general oral health because they are not anchored to other teeth, unlike bridge.

What are dental implants?

The dental or endosseous implant is actually root replacement anchored in the jaw bone which was formerly occupied by a tooth or teeth. Dental implants actually fuse with or integrate with the bone this process is referred as Osseointegration. The actual process of Osseointegration is essentially direct structural and functional connection between ordered, living bone and surface of a load-carrying implant (Figure 1).

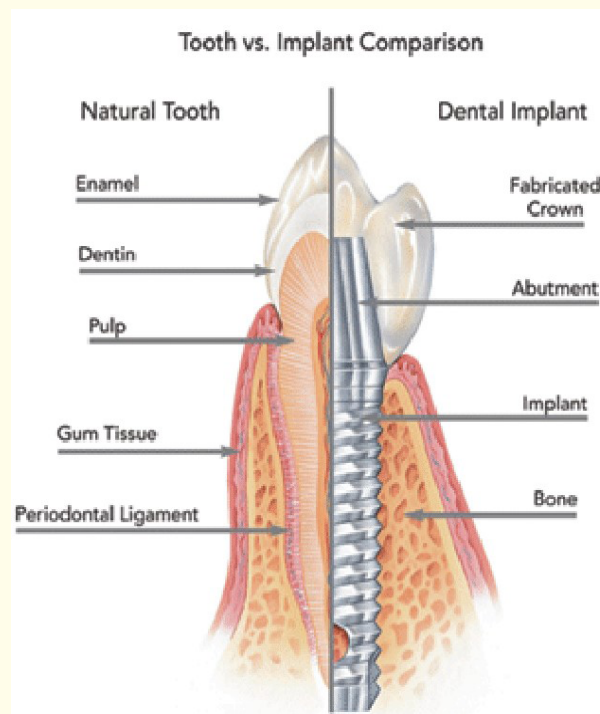


Figure 1: Dental implant versus natural tooth.

How does dental implant work?

Implants provide stable support for artificial teeth, denture and bridges. Implants has secured fit, it feels more natural than conventional ways of teeth replacement like bridges and denture. An advantage of implants is that no adjacent teeth need to be prepared or ground down to hold your new replacement tooth or teeth in place. Basic necessity to receive implant is patient should have healthy gums and adequate bone support. Meticulous oral hygiene and regular dental visits are critical for long-term success of dental implants (Figure 2).

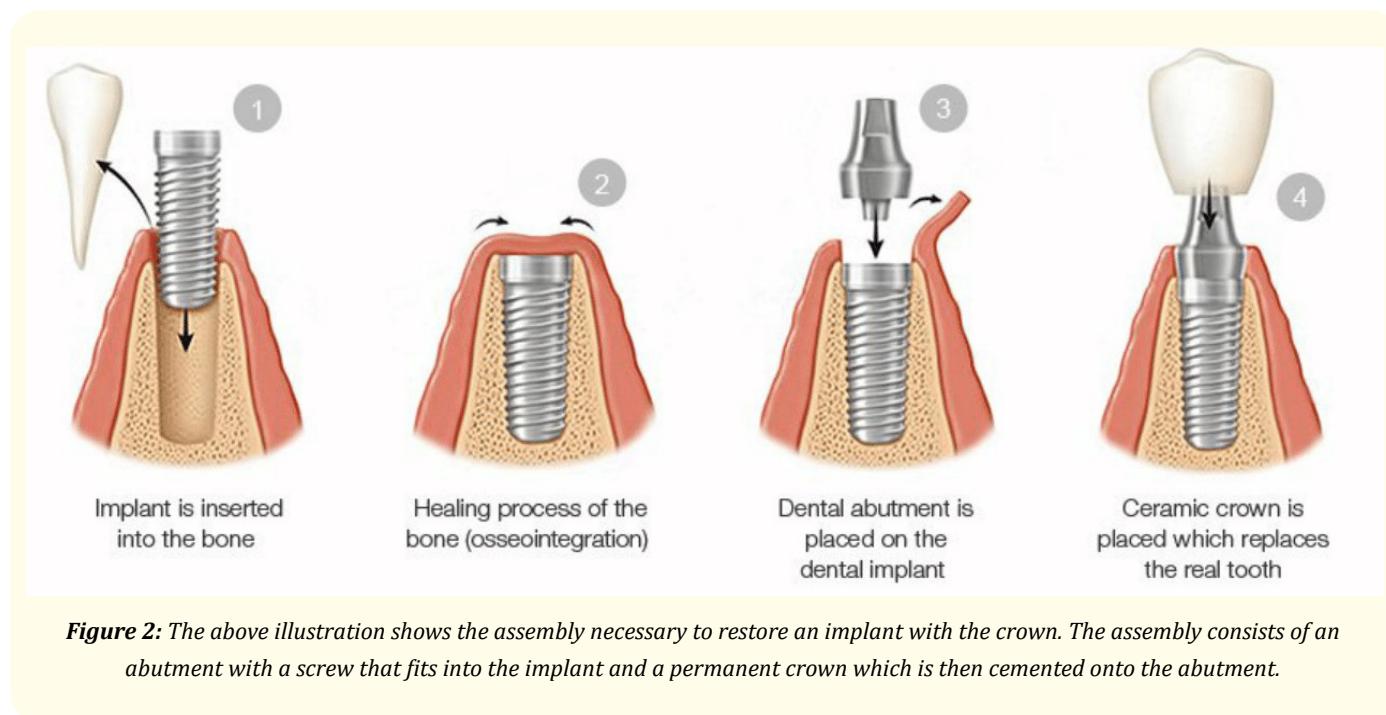


Figure 2: The above illustration shows the assembly necessary to restore an implant with the crown. The assembly consists of an abutment with a screw that fits into the implant and a permanent crown which is then cemented onto the abutment.

Implant Treatment: A Collaborative Approach and Team Work!

Implant placement requires planning and involves collaborative efforts between the implant surgeon, dentist and laboratory technician who is responsible for building a crown on the successfully integrated implant.

Diagnostic Steps

The dentist must follow routine procedures to assess patient medical status and general health, carefully examine patient’s mouth and the site where potential implant or implants will be placed. Document the case with all possible preoperative records like Photograph’s, Study models, Special radiographs (X-ray, OPG and CBCT) of the site to assess bone quantity and quality. This will be followed by surgical guides or templates to ensure accurate surgical implant placement.

Implant Positioning

Implant placement is prosthetically driven; basic idea is to establish the position of an underlying implant within the confines of opposing dentition. The implant positions can be predetermined using a combination of specialized radiographs, imaging technology and study models. This systematic procedure assures success and avoids injuries to vital structures like nerve and sinus. Fabricating surgical guides will be of great help to the surgeon in precise implant placement.

Surgical Placement

Dental implant surgery is relatively comfortable and minimally invasive procedure. Depend on anatomy and morphology of surgical site, sometimes it needs an extensive procedure like sinus lifting, ridge augmentation and complete site reconstruction with bone graft soft tissue grafting. Implant need to be left for a period of 2 - 6 months to integrate with bone in most circumstances. The healing time depends upon the bone density of site, denser the bone integration will be quicker. After successful integration, the crown is made which will simulate a normal tooth both in form and function.

Criteria for Successful Implant

The dentist should evaluate implant on the basis of the following characteristics to confirm that it is successfully Osseointegrated.

- Clinically immobile.
- No radiographic evidence of any Peri-implant radiolucency.
- Vertical bone loss of less than 0.2 mm following the first year of function.
- The absence of any symptoms like pain, numbness, infection, maxillary sinus or nasal symptoms.

Factors Affecting Choice of Implants

There are varieties of the dental implant system and each system has some unique features. The dentist should choose implant system very meticulously depending on implant system characteristics, based on bone and aesthetics requirement, patient systemic condition and financial factor.

Types of Implant Restoration

Dental Implant is a prosthetic procedure preceded by a surgical step. Prosthetic treatment planning is the key to success in the dental implant.

Classification of Implant Restoration and Indication

Single Tooth Replacements: Use of single implant supported by single crown.



Figure 3: Illustration showing an example of a full crown restoration placed on an individual implant.

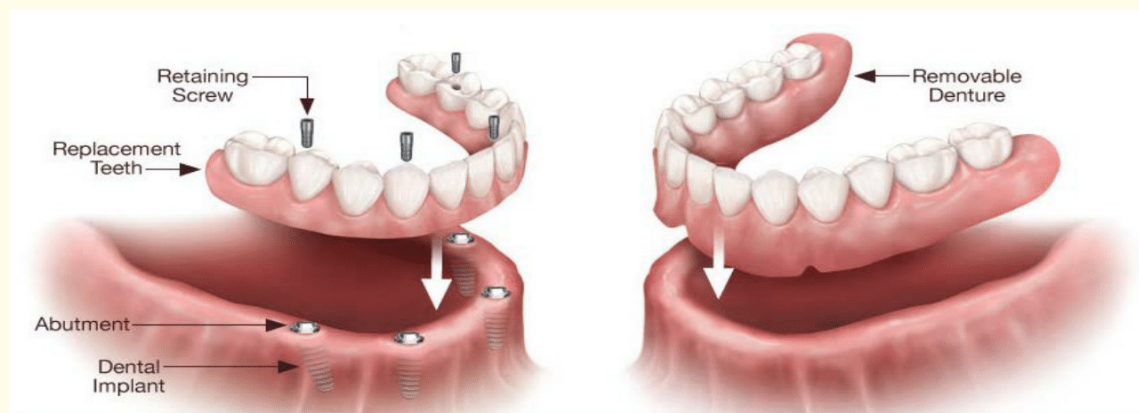
Multiple Tooth Replacements: Multiple missing teeth can be replaced with multiple implants supporting fixed bridgework as small as a 3-unit bridge supported by two implants, or with multiple implants supporting a greater number of teeth. Usually, a minimum number of 4 - 8 implants are needed to replace a full arch (jaw) of teeth, 10 or more crowns by fixed bridgework (Figure 4).



Figure 4: Illustration showing an example of a 4-unit bridge with a pontic (replacement tooth) placed between two implant crowns.

Over-Dentures

Where two or more implants, either standard or mini-implants are placed to provide stabilization of the denture and preserve the underlying bone. Whereas most traditional full dentures press directly on the gum and bone causing bone loss by resorption, implant supported over-dentures protect the bone. Overdentures are now considered the standard of care by the American Dental Association for the patients who have lost all of their teeth in one or both jaws (Figure 5).



Implant-Supported Denture Facts	Removable Denture Facts
Gold standard for tooth replacement	Old technology—the last resort
An investment that can last a lifetime	Least expensive option, at least initially
Preserves bone quantity and quality	Decrease bone quantity and quality
Works and feels like your own natural teeth	Don't feel and function like your own natural teeth
Strong and stable—no slippage	Unstable and unreliable
No need for denture creams or adhesives	Denture adhesives and creams often needed
Provides firm support of facial structures (lips and cheeks)	Support of facial structures decreases over time
Should not ever need replacement or repairs	Will need to be remade or relined eventually

Figure 5: Illustration showing an example of two implants for attachment and stabilization of the mandibular denture protecting the underlying bone.

Anchorage for Tooth Movement (Orthodontics): Standard, mini or micro-mini implants are used to provide very stable and non-movable anchor units to allow quicker and easier tooth movement.

Temporary Bridgework: Utilization of micro and mini implants which are later removed when the permanent implants are healed and teeth permanently replaced. Temporization ensures that patient received teeth immediately and be socially comfortable and functional (Figure 6).



Figure 6: Illustration showing Traditional implants and Mini implant.

Advantages of Implant Supported Prosthesis

- Bone maintenance.
- Restoration and maintenance of occlusal vertical dimension.
- Maintenance of facial esthetics.
- Improved phonetics.
- Improved occlusion.
- Improved proprioception.
- Improved stability and retention of the removable prosthesis.
- Increased survival time of prosthesis.
- Eliminate the need to alter adjacent teeth.
- More permanent replacement of teeth.

Post Treatment Implant Maintenance

Evaluate implant bone level changes annually by periapical radiographs and 6 months follow-up visits. Patients should maintain good oral hygiene.

Implant Success: When and when not to use implants?

A collaborative team approach is necessary to correctly assess the situation and plan the right personalized treatment for the patient. Implant sustainability is around 90%, but it may not be same for everyone or every case. There are many other types of highly successful

dental tooth replacement systems, like fixed or removable bridgework. Sometimes implants can be used in combination with or to support fixed or removable bridgework.

Implant success rate depends on careful assessment, diagnosis and understanding of the site where implant replacement is sought and how the site relates to the function of the rest of teeth. Once integrated and functional, implant supported crown- complete tooth replacement can last for the lifetime.

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