



## DENTAL IMPLANT: CLASSIFICATION SYSTEMS

## Dental Sciences

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## ABSTRACT

A dental implant is a surgical component that interfaces with the bone of the jaw or skull to support a dental prosthesis such as a crown, bridge, denture, facial prosthesis or to act as an orthodontic anchor. The basis for modern dental implants is a biologic process called osseointegration, in which materials such as titanium form an intimate bond to bone. This article is basically a compilation of various classification systems of dental implants.

## KEYWORDS

Implant, osseointegration, classification

**Dental Implants : Classification Systems**

A dental implant is a surgical component that interfaces with the bone of the jaw or skull to support a dental prosthesis such as a crown, bridge, denture, facial prosthesis or to act as an orthodontic anchor. The basis for modern dental implants is a biologic process called osseointegration, in which materials such as titanium form an intimate bond to bone.[1] This article is basically a compilation of various classification systems of dental implants.

**Classification of Implants**

**Dental implants can be classified on the basis of following:[2]**

- A - Depending on the placement of the tissues
- B- Depending on surface texture and cross-section
- C - Depending on the type of materials used
- D- Depending on reaction with bone
- E- Depending on the treatment options

In the following section, different classification systems are described briefly to have better understanding.

**A - Depending on the placement of the tissues:**

**1- Endosteal dental implant:** These implants are embedded with the bone. These are of three types :

**A-Root form:** root form implants are the most common type of implant used. Basically, a root form implant is used to replace the root of a missing tooth, and with the help of an abutment and a crown is placed over the implant. Root form implants are made of titanium and are 100% biocompatible with your body. These are the gold standard to replace missing teeth[3].

**Root form dental implants have different shapes:****\* Screw or Thread type Implants**

Use threads for primary stabilization. For the placement of the threaded implant, the site is tapped or threaded with a former thread drill, to create the threads on the wall of the osteotomy site.

**\* Cylindrical or Press fit type Implants:** Uses friction for primary stabilization. The placement of a cylindrical implant depends on the friction between the Implant surface and the bone. Thus no tapping is required [4].

**\* Tapered Implants**

Resemble a tooth root, designed for both threaded and press fit type implant. Initially these were used mainly for immediate placement into extraction socket [4].

**B-Blade (plate) form**

Blade implants can be used in any alveolar crest, but are particularly useful in the thinnest, where the use of root-form implants is difficult and needs bone regeneration procedures. When the ridge is thin, tricortical anchorage is the most suitable technique [5].

**C-Ramus frame dental implant:** in this a horse shoe frame is fixed with the ramus and then loaded.

**2-Subperiosteal implant:**

This is a type of implant where the artificial tooth is placed beneath the periosteum that overlies the cortex. Here the jaw bone is not necessarily drilled. Much of the support is provided by the gums and how the implant lies on the bony cortex, it may be unilateral, complete or circumferential[6].

**3-Transosteal implant:**

This type of implant can, also, be referred to as staple bone implant, mandibular staple implant or transmandibular implant. This type of implant is a combination of both the Endosteal components and those of subperiosteal. The implant penetrates the two cortical plates. It can be staple, single pin or multiple pins [7].

**4-Intramucosal dental implants**

As the name suggests, this type of implant is inserted directly into the oral mucosa. In this case, the mucosa is used as the site for attachment and the metal inserts, usually made from titanium.

**B-Depending on texture and cross-section:****1-Cylindrical dental implants:**

The dental implants are available in different shapes, and cylindrical is one of them. The cylindrical implant can be conical, straight or tapered and is tapped or pushed into the bone site that has been prepared.

**2-Threaded dental Implants**

The main purpose of the threaded surface is to increase the implant's surface area hence providing a more solid contact with the jawbone. The threads result in the implant being in contact and subjected to force over a greater bone volume [8].

**3-Vented dental implants**

This type of implant is a cylinder that has been coated with hydroxyapatite. They have a vertical groove that connects to the apical veins. This facilitates seating, and the bone growth into the groove prevents rotation [9].

**4-Hollow dental implants**

The hollow dental implants have a hollow design in their apical portion. There are

perforations on the implant's sides that have been arranged systematically. The perforations are meant to increase the anchoring surface and prevent the implant from twisting and moving [10].

**5-Smooth, machined, textured and coated surface implants**

These have a smooth surface. Machined surface implants are those whose surfaces have been machined for better anchorage. Textured surface implants have a rough surface for increased surface area, and the coated surface implants are those whose surfaces have been

covered by a porous coating, usually titanium or hydroxy apatite [11].

### C- Depending on the materials used:

#### 1-Metallic dental implants

These are implants that are made of metal. The most common metallic dental implants today are those made of titanium. However, stainless steel, Vitallium and an alloy of cobalt chromium molybdenum can be used [12].

#### 2-Ceramic dental implants

The ceramics can either be coated or sprayed on the surface of the implant to produce a surface that is bio active. You can also find non-reactive ceramic material [13].

#### 3-Polymeric dental implants

These implants are in the form of polytetrafluoroethylene and polymethylmethacrylate. These have, however, only been used along with implants made from other material as adjuncts stress distribution [14].

#### 4-Carbon implants

These are implants made of a mixture of carbon and stainless steel. They have the same elasticity as the jawbone but are brittle and can fracture much easily as compared to implants made from other material [15].

### D- Depending on their reaction with a bone

Based on the ability of the implant to stimulate bone formation, implants can be classified into:

#### 1-Bioactive implants

Surface modifications of titanium dental implants improve biological surface properties, which favors the mechanism of osseointegration. Machined implant surfaces, representing the starting point of implant surface design, were used for decades according to the classic protocols in which several months were essential to achieving osseointegration[16]. Consequently, topographic and chemical surface modifications replaced machined surfaces to a great extent in clinical application. Various methods have been developed to increase the surface roughness of dental implants, including blasting with ceramic particles/acid etching, titanium plasma spraying, electrochemical anodization, and calcium phosphate coatings[17].

#### 2-Bio-inert implants

The term bioinert refers to any material that once placed in the human body has minimal interaction with its surrounding tissue; examples of these are stainless steel, titanium, alumina, partially stabilized zirconia, and ultra-high molecular weight polyethylene. A fibrous capsule might form around bioinert implants hence its functionality relies on tissue integration through the implant [18].

### E- Depending on the treatment options:

Misch reported five prosthetic options of implants, of the five the first three, are fixed prosthesis that may be partial or complete replacements, which in turn may be cemented or screw retained. The fixed prosthesis is classified based on the amount of hard and soft tissue structures that are to be replaced. The remaining two are removable prosthesis that is classified based on the support derived[19].

FP- 1: Fixed prosthesis; replaces only the crown; looks like a natural tooth.

FP- 2: Fixed prosthesis; replaces the crown and a portion of the root; crown contour appears normal in the occlusal half but is elongated or hyper contoured in the gingival half.

FP- 3: Fixed prosthesis; replaces missing crowns and gingival color and portion of the edentulous site; prosthesis most often uses denture teeth and acrylic gingival, but may be made of porcelain, or metal.

RP-4: Removable prosthesis; overdenture supported completely by the implant.

RP-5: Removable prosthesis; overdenture supported by both soft tissue and implant

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