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DENTAL IMPLANT : A REVIEW

[1]Mr.Ashish S. Ghuge, [2]Prof.Ambika D. Nagarbhadiya, [3]Ms.Sanjana S. Nagalkar, [4]Mr.Vaibhav V. Magar

[1]B pharmacy, [2]M Pharm Pharmacology, [3]B Pharmacy, [4]B Pharmacy

[1]Student Of Ishwar Deshmukh Institute Of Pharmacy, [2]Assistant Professor (Department Of Pharmacology), [3]Student Of Ishwar Deshmukh Institute Of Pharmacy, [4]Student Of Ishwar Deshmukh Institute Of Pharmacy, Digras, Maharashtra, India.

ABSTRACT: Recent years have witnessed a consistent trend toward the introduction of patient assessment of different treatment outcomes in dental practice. Patient satisfaction with dental implants was considered among these treatment modalities. Few literature reviews have been published on this topic. This article critically analyzes the concerned topics related to patient satisfaction with dental implant. Dental implants provided promising and predictable results regarding patient satisfaction and various aspects of life assessment. Dental implants are widely used and are considered to be one of several treatment options that can be used to replace missing teeth. A number of implant-supported treatment options have been used successfully to replace a single tooth and multiple teeth, as well as a completely edentulous jaw. However, as the number of patients who have dental implants is increasing, dental personnel are more likely to see patients with implant-supported restorations or prostheses.

Keywords: Dental implant, Edentulous jaw, Implant-supported restorations, Prostheses.

INTRODUCTION:

Implants have been used to support dental prostheses for many decades, but they have not always enjoyed a favorable reputation. They are the nearest equivalent replacement to the natural tooth, and are therefore a useful addition in the management of patients who have missing teeth because of disease, trauma or developmental anomalies. There are a number of dental implant systems which offer predictable long-term results backed by good scientific research and clinical trials. In the first place it may be helpful to clarify some of the commonly used terms in implant dentistry.

Oral diseases such as dental caries, periodontal disease, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) related oral disease and orodental trauma are major public health problems worldwide. Poor oral health may have a profound effect on general health, and several oral diseases are related to chronic diseases. Tooth loss in adult life may also be attributable to poor periodontal health. Severe periodontitis, which may result in tooth loss, is found in 5–20% of most adult populations worldwide Dental caries and periodontal disease have historically been considered the most important global oral health burdens. Numerous epidemiological studies have shown that caries is the main reason for tooth loss. More recent epidemiological data seem to show an increasing trend of tooth loss due to periodontal reasons rather than caries; the presence of initial attachment loss, bone height and the habit of smoking significantly increase the risk of tooth mortality. There is a strong correlation between smoking, the severity of periodontal disease and tooth mortality. The other common

causes for tooth loss include poor oral hygiene, trauma, sports injury, bruxism, jaw surgery, traumatic occlusion, eating disorders, root perforation, genetic predisposition, congenital defect, systemic disease (like diabetes) and lack of nutrients. The complications associated with tooth loss.

DEFINITION:

A prosthetic device or alloplastic material implanted into the oral tissue beneath the mucosal or/and periosteal layer and/ or in the bone to provide retention and support for the fixed and removable prosthesis.

TYPES OF IMPLANTS

- Homoplastic: An implant from the same species
- Autoplastic: An implant from within the same individual
- Hetero-plastic: An implant from a different species
- Alloplastic: An implant from a non-living material

1. CLASSIFICATION BASED ON IMPLANT DESIGN

1) Endosteal Implant

a) Blade/Plate Implant
b) Ramus Frame Implant
c) Root Form Implant

2) Subperiosteal Implant

3) Transosteal Implant

4) Intramucosal Implants

5) Endodontal Implant

2. CLASSIFICATION BASED ON ATTACHMENT MECHANISM OF THE IMPLANT

a) Fibrointegration

b) Osseo-Integration

3. CLASSIFICATION BASED ON MACROSCOPIC BODY DESIGN OF THE IMPLANT

a) Cylindrical Dental Implants
b) Threaded Dental Implants
c) Plateau- Dental Implants
d) Perforated Dental Implants
e) Solid Dental Implants (They Are Of Circular Cross Section Without Vent Or Hollow In The Body)
f) Vented Dental Implants
g) Hollow Dental Implants

4. CLASSIFICATION BASED ON THE SURFACE OF THE IMPLANT

a) Smooth Surface Implant
b) Machined Surface Implants

5. CLASSIFICATION BASED ON THE IMPLANT MATERIAL

IMPLANT MATERIALS

- mechanical strength
- biocompatibility
- structural bio-stability

BIOLOGICAL CLASSIFICATION

Based on tissue response and systemic toxicity effects of the implant

- Biotolerant
- Bioinert
- Bio active stability

Indications and Contraindication of Implants:-

- **Indications:**
  - Complete edentulous patient
  - Patient with oral deformities
  - Partially edentulous
- **Contraindications:**
  - Systemic disease (uncontrolled diabetes, pathological disorders)
  - Smokers/tobacco chewers
  - Immune compromised patients
  - Poor oral hygiene
  - Stress/ Psychological problems

Complications:

The complications associated with dental implants are biological, esthetic, technical and surgical. The various factors associated with each complication are listed below complications and dental failures can be minimized when taking into account certain aspects of treatment such as correct pre surgical planning, the use of adequate surgical techniques, postsurgical follow-up, respecting the osseointegration period, appropriate design of the superstructure, the study and correct distribution of Occlusal loads, and meticulous hygiene during the maintenance phase.

The attachment systems

An attachment is defined as a mechanical device used for the fixation, retention and stabilization of a dental prosthesis.112 It is used with implant supported removable partial dentures and overdentures. The attachment usually consists of two parts. One part is attached to the implant, while the other part is attached to the prosthesis. Five types of attachment systems are available and compatible with the main implant systems. The attachment systems that are commonly used with RISOs include: bar/clip, balls, locators, magnet and telescopic crown.108,112 The use of a bar system allows splinting of two or more implants together.

Screw-joint

When the implants and the restoration/prosthesis are connected together by a screw, the connection is known as a screw-joint.16,77,82 For example, when the single restoration (crown) is screw retained, one screw-joint is usually found to connect the restoration to the implant. When the restoration is cement-retained, there is also one screw-joint, but it is between the abutment and the implant (see below). The screw-joint is also found with the fixed implant-supported prosthesis in a similar way as that described for the cement- and screw–retained single implant-supported restoration. In the fixed implant-supported overdentures (FISOs), there is a screwjoint between the frame-work and the implants, whereas in the removable implantsupported overdentures (RISOs), there is a screw-joint between the attachment system and the implant.6,16 The attachment systems are discussed later in the article. In some situations when a screw-retained restoration is used, there may be two screw-joints: one between the implant and the abutment, and one between the abutment and the restoration/prosthesis. When the screw is tightened, there are two opposing forces that act on the implant platform and the abutment or restoration/attachment that form the joint. One of these forces tries to hold the joint together and is known as the clamping force. The other force is called the separating force as it tries to disengage the screw-joint components away from each other. Hence, the two forces are acting against each other. As a tightening torque is applied to the screw, a tension (pre-loaded) is generated in the screw. Consequently, the screw shank and threads are tense and an elastic recovery is generated, thus creating the clamping force between the mating surfaces.16,77,82 To obtain an effective clamping force, the tension created in the screw material should be less than that of the material's elastic limit (Young's modulus) so no permanent plastic deformation or screw fracture occurs. Maximum screw-joint stability can be achieved with a maximum pre-load when the proportional limit of the screw is approached. Thus, to obtain this, the applied torque should be 75% of the torque required to cause screw permanent deformation. In order to hold the implant components together, a maximum clamping force and a minimal separating force are required. Therefore, the clamping force overcomes the separating force

Placing the implant:

Most important systems have five basic steps for placement of each implant.

1**. Soft tissue reflection:**

An incision is made over the crest of the bone, splitting the thicker attached gingival roughly in half so that the final implant will have a thick band of tissue around it. The edges of a tissue, each reffered to as a flap are pushed back to expose bone. Flapless surgery is an alternate technique, where a small punch of tissue is removed for implant placement rather than raising flaps.

2. Drilling at high speed:

After reflecting the soft tissue and using a surgical guide, pilot holes are placed with precision drills at highly regulated speed to prevent burning or pressure necrosis of the bone.

3**. Drilling at low speed:**

The pilot hole is expanded by using progressively wider drills, care is taken not to damage the osteoblast or bone cells by overheating. A cooling saline or water spray keeps the temperature low.

4**. Placement of the implant:**

The implant screw is placed and can be self-tapping. It is then screwed into place with a torque controlled wrench at a precise torque so as not to overload the surrounding bone.

5**. Tissue adaptation:**

The gingiva is adapted around the entire implant to provide a thick band of healthy tissue around the healing abutment. In contrast, an implant can be buried, where the top of the implant is sealed with a cover screw and the tissue is closed to completely cover it. A second procedure would then be required to uncover the implant at a later date.

Maintenance:

After placement, implants needs to be cleaned with a Teflon instrument to remove any plaque. Because of the more precarious blood supply to the gingival, care should be taken with dental floss implants will lose bone at a rate similar to natural teeth in the mouth but will otherwise last. The porcelain on crowns should be expected discolor, fracture or require repair. Approximately every 10 years, although there is significant variation in the service life of dental crowns based on the position in the mouth, the forces being applied from opposing teeth and the restoration material. When implants are used to retain a complete denture, depending on the type of attachment, connections need to be changed or refreshed every one to two years. A powdered irrigator may also be useful for cleaning around implants.

- **During Surgery:**

Placement of dental implants is a surgical procedure and carries the normal risks of surgery including infection, excessive bleeding and necrosis of the flap of tissue around the implant. Nearby anatomic structures such as the inferior alveolar nerve, the maxillary sinus and blood vessels can also be injured when the osteotomy is created or the implant placed. Even when the lining of the maxillary sinus is perforated by an implant, long term sinusitis is rare; an inability to place the implant in bone to provide stability of the implant increases the risk of failure to osseointegration.

- **Recovery:**

The prosthetic phase begins once the implant is well integrated and and abutment is in place to bring it through the mucosa. Even in the event of early loading. many practitioners will place temporary teeth until osseointegration is confirmed. The prosthetic phase of restoring an implant requires an equal amount of technical expertise as the surgical because of the biomechanical considerations, especially when multiple teeth are to be restored. the dentist will work to restore the vertical dimension of occlusion, the esthetics of the smile and the structural integrity of the teeth to evenly distribute the forces of the implants.

Examples of Dental Implants:

1. Formulation of dental Implant of Moxifloxacin hydrochloride for the treatment of periodontitis.
2. Formulation of Levofloxacin dental films for periodontitis.
3. Dental implants of Cefuroxime axetil for the treatment of periodontitis.
4. Formulation of Chitason based ciprofloxacin and diclofenac film for periodontitis therapy.
5. Formulation of Ornidazole dental films for periodontitis.
6. Biodegradable dental implants of Ciprofloxacin Cyclodextrin inclusion complex in the treatment of periodontitis.

Applications of Dental Implants:

Dental implants are used to fill in the gap left by a missing tooth or teeth. Dental implants are tiny titanium screws that are surgically placed in the jawbone. These implants are meant to act as replacement tooth roots. Once the implants are in place, they are used as anchors for artificial teeth.

The restorations used with dental implants include dental crowns, dental bridges, and dentures

Dental crowns:

A dental crown is a replacement tooth that is placed over a post (or an abutment) that is attached to the dental implant. Crowns are usually made of porcelain or ceramic material.

Dental bridge:

A dental bridge is generally used for groups of two or three missing teeth. A bridge consists of two crowns (secured to dental implants) on either side of the gap and artificial teeth in between.

Dentures:

Implant-supported dentures are permanently attached to strategically placed implant posts. Because the dentures cannot be removed, many of the disadvantages associated with removable dentures are eliminated. Implant-supported dentures are stable and do not require use of dental adhesives.

BENEFITS:

- Dental implants do not affect your surrounding teeth. While other dental procedures may require grinding down of surrounding teeth, which may be perfectly healthy, this is not the case with a dental implant.
- Dental implants maintain the structure of your mouth. Gaps in your mouth can cause the surrounding teeth to bend in or collapse. The jawbone can also be weakened if a large gap is present. Dental implants preserve the structure of your mouth and can prevent further dental problems.
- Dental implants are convenient to care for. Dental implants are secured to your jawbone and can be cared for just as your natural teeth. There is no need for special care or cleaning as with removable dentures.
- Dental implants are reliable. Dental implants have been used for more than fifty years and have a high success rate with patients. With proper care and maintenance, dental implants can last a lifetime.

Conclusion:

A key advance in dentistry has been the flourishing replacement of lost natural teeth by osseo-integrated implants. Implant dentistry has become successful with the discovery of the biological properties of titanium. The exercise of dental implants for the oral treatment of fully and partially edentulous patients has significantly broadened the scale of clinical dentistry, creating further treatment options in multifarious cases in which functional treatment was previously restricted or poor. The predictability and long-term success of dental implants have been well documented, both in removable and fixed prostheses. The current and future application of implants to support intra- and extra-oral prostheses is a great implication in restoring dental health.There are a number of surfaces commercially available for dental implants. Most of these surfaces have proven clinical efficacy (>95% over 5 years). However, the development of these surfaces has been empirical, requiring numerous in vitro and in vivo tests. Most of these tests were not standardized, using different surfaces, cell populations or animal models. The exact role of surface chemistry and topography on the early events of the osseointegration of dental implants remain poorly understood. Furthermore, comparative clinical studies with different implant surfaces are rarely performed. The future of dental implantology should aim at developing surfaces with controlled and standardized topography or chemistry. This approach is the only way to understand protein, cell and tissue interactions with implant surfaces. The local release of bone-stimulating or resorptive drugs in the peri-implant region may also respond to difficult clinical situations with poor bone quality and quantity. These therapeutic strategies should ultimately

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