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Hygiene practice in implant dentistry

A Project Submitted
The College of Dentistry, University of Baghdad, Department of Prosthodontics

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بسم الله الرحمن الرحيم

صدق الله العظيم

سورة المجادلة الاية 11

Certification of the Supervisor

I certify that this project entitled **" Hygiene practice in implant dentistry "** was prepared by the fifth-year student **Amna Thaer Kazem** under my supervision at the College of Dentistry/University of Baghdad in partial fulfillment of the graduation requirements for the Bachelor degree in dentistry.

Supervisor's Name: **Assistant Prof. Dr. Firas Abdulameer Farhan**

Date: / /2022

Dedication

To my family, the great people who helped me in my path of success and stand for me every time I needed them. Also, I dedicate it to everyone helped us and stand against covid19 pandemic, and never forget to dedicate it to my great supervisor who helped me to Make this project, as he stand in every step and helped me to reach the best of what I could do regarding my graduation project**.**

Amna Thaer

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Introduction

The treendous advances in dental fields have made osseointegrated dental implants a prevalent treatment option for edentulous spans in the contemporary practice of dentistry due to their conservative nature and predictable clinical successes. Systematic reviews demonstrate significant rates of plaque-induced peri-implant pathology, namely peri-implant mucositis (weighted mean prevalence of 43–46.83% at a patient level) and peri-implantitis (weighted mean prevalence of 19.83–22% at a patient level), while healthy peri-implant status has rarely been reported upon **(Lee et al., 2017)**

The increasing employment of dental implants, the peri-implant diseases have increased substantially, and considered a major cause of implant system failure. Such issues dictate the necessity to develop evidence-based protocols for long-term implant maintenance **(Resnik, 2020)**

A dental implant is a structure made of alloplastic materials implanted into the oral tissues beneath the mucosa and/or periosteum and/or within or through the bone to provide retention and support for a fixed or removable dental prosthesis **(Gupta et al., 2017)**

A firm understanding of the mucoepithelial implant attachment is essential before commencing maintenance procedures. There are fundamental anatomic and histologic differences between the attachment apparatus of teeth compared with implants that are osseointegrated. Complications may arise when clinicians fail to comprehend these differences, because they may adversely impact the implant's outcome, increasing the morbidity of treatment. The anatomic differences of peri-implant tissues necessitate a change in diagnostic protocol for the determination of health or disease. The

rapid evolution of implant technology yielded innovative theories for diagnosis and management of peri- implant diseases, however, those are constantly subjected to criticism and controversy. It may be challenging for clinicians to select correct protocols, procedures, armamentarium, and techniques **(Linkow et al., 1990; Wingrove, 2022).**

Aims of the Study

The study aims to review the available literature for different hygiene methods used by patients with dental implant restorations and evaluate their efficiency, safety, and superiority inorder to ensure the longevity of the implant.

Chapter One
Literature Review

1.1 Dental Implantology

dental implants are one of the most popular tooth replacement options for missing teeth. In fact, dental implants have quite an extensive history that helped them become what dentists now call the "gold standard" of tooth replacement options **(Brånemark et al., 1964; Kurtzman & Silverstein, 2007)**

Various factors influence the process of osseointegration of dental implant which include biocompatibility of the implant material, surface topography of the implant, the surgical protocol followed and on the loading of the implants. However, the more teeth a patient is missing, the more challenging this task becomes. As a result of continued research, diagnostic tools, treatment planning, implant designs, advanced materials, and techniques, predictable success is now a reality for the rehabilitation of many challenging clinical situations **(Abrahamsson et al., 2001; Resnik & Misch, 2021)**.

The increased need and use of implant-related treatments result from the combined effect of several factors, including (1) patients living longer, (2) age-related tooth loss, (3) patients are more socially active and esthetic conscious, (4) a higher incidence of partial and complete edentulism, (5) conventional prosthesis complications, and (6) the inherent advantages of implant-sup- ported restorations **(Resnik, 2021)**.

1.2 Concepts of Osseointegration

Osseointegration is a direct bone anchorage of an implant body, which can provide a foundation to support prosthesis. Dr Per-Ingvar Branemark, Sweden Professor developed the concept of osseointegration and coined the term. In

his study, microcirculation, Prof. Branemark surgically inserted the titanium chamber into the tibia of a rabbit. The initial concept of Osseointegration stemmed from vital microscopic studies. Then studies that followed involved titanium implants placed into jaws of dogs. Insufficient osseointegration can lead to the formation of fibrous tissues and ensuing loosening of the prostheses. Factors such as the design, chemical composition, surface roughness, and surface chemistry of the implants and loading conditions are important to good osseointegration of implants. The high success rates for the dental rehabilitation of patients with endosseous implants have resulted from many research approaches with the aim of enhancing and accelerating bone anchorage to the implant, thereby providing optimal support for the intraoral prosthetic devices **(Mavrogenis et al., 2009)**.

Typically, an implant is considered to be osseointegrated whethere is an absence of movement between the implant and bone under normal conditions of loading following a defined healing period. Osseointegration is currently accepted as a general term for bone-implant surface contact. However, the quality of the host bone/foreign implant interface is mostly affected by the characteristics of the material **(Smeets et al., 2016)**.

They found this accidentally in 1952 while studying blood flow in the rabbit femur using titanium chambers inserted into the bony tissue; over time the chambers became firmly affixed to the bone and could not be removed **(Tagliareni & Clarkson, 2015).**

Osseointegration is also referred to as secondary stability. When implants are surgically placed, they rely on the macrostructure, or overall shape of the implant, combined with the surgical protocol to provide primary stability, which is an initial level of mechanical or frictional stability in the bone. As the bone heals, the process of osseointegration produces secondary stability,

which is responsible for the long-term success of the implant. During the bone remodeling process after implant placement, primary stability decreases while secondary stability increases from new bone formation **(Smeets et al., 2016).**

Albrektsson et al. (1986) proposed the following criteria for an implant to be regarded as clinically successful:

1. The unattached implant exhibits no clinical mobility.
2. Radiography demonstrates no evidence of radiolucency between implant and bone.
3. Marginal bone loss is less than 0.2 mm annually after the first year of service.
4. Absence of persistent pain, discomfort, or infection. Albrektsson and colleagues proposed that these criteria (with a success rate of 85% at the end of a 5-year observation period and 80% at the end of a 10-year period) should be the minimum acceptable levels for a treatment method to be considered successful **(Albrektsson et al., 1986)**.

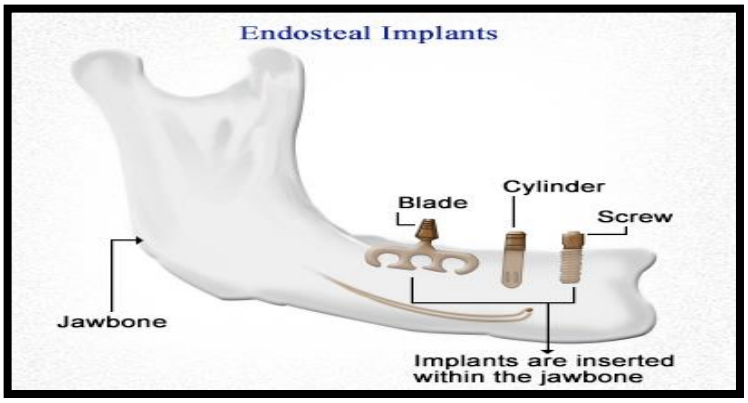
1.3 Types of Dental Implants

Based on the site of implantation, there are three main types of dental implants:

1.3.1 Endosteal Implants

The tooth roots are replaced by screws, cylinders, or blades that are usually made of titanium or ceramic material. The implant is surgically drilled into the jawbone that helps to hold the artificial teeth in place In this type, the tooth roots are replaced by screws, cylinders, or blades that are usually made of titanium or ceramic material as shown in Figure (1.1). However, artificial teeth are not directly connected to endosteal implants. So, once the dental

implant is inserted into the jawbone, a post is connected to the implant. The artificial tooth is then securely placed over the post **(Steigenga et al., 2003)**.



Fig(1-1) Endosteal implants

Indications of endosteal implants:

1 Single unit toothless gap with healthy adjacent teeth: When a single tooth is missing, an implant supported crown will preserve the adjacent natural teeth by avoiding the need to prepare them to restore as shown in Figure (1.2).

Fig (1-2) Single missing tooth replace by dental implant.

2 Partial edentulism with the back (posterior) tooth missing These conditions imply the absence of several posterior teeth (molars and/or premolars) on one or both sides of the dental arch (Kennedy class 1 or Kennedy class 2). In these cases, traditional dental bridges (supported by

natural teeth) are difficult to design because the back support tooth is missing Figure (1.3) (Ashok Panda , 2017).

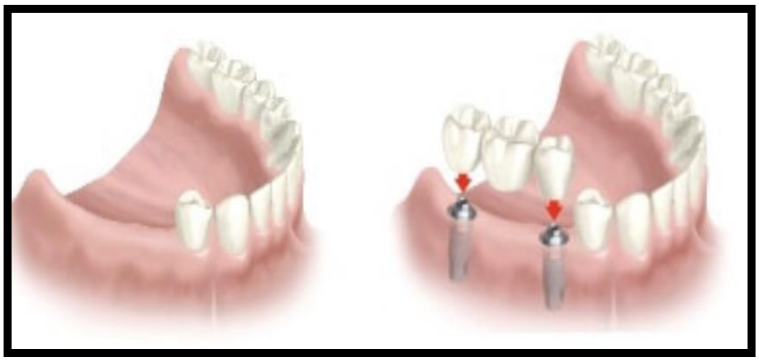


Fig (1-3): Partial edentulism with the back posterior tooth missing replace by implant supported bridge.

1.3.2 Transosteal Implants

Transosteal implants are a group of implant designs that pass completely through the bone. The transmandibular implant (TMI) refers to a design in which posts are inserted through the mandible in an inferior-superior direction to fixate a metal frame- work on which the prosthesis is attached as shown in Figure (1.4). Smooth Staple is the most common example of this implant system. These systems were developed specifically for the extremely atrophied mandible. However, these implants are not available at a pocket-friendly price as they have to be customised according to the width and height of the jawbone. This will ensure that the implant fits correctly on the individual. restorations **(Steigenga et al., 2003; Gupta et al., 2017)**

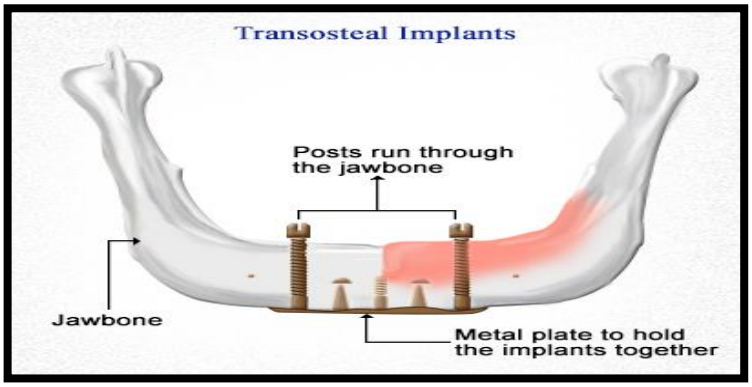


Fig (1-4) Transosteal implants

1.3.3 Eposteal Implants

Eposteal implants receive their primary support from contact against the remaining bone of the jaw. The subperiosteal implant is the main example of this system. Subperiosteal implant is a Cobalt/Chromium casting custom made for an edentulous bony ridge and placed subperiosteally with integral transmucosal posts for prosthesis attachment Figure (1.5). The predominant treatment method involves two surgical interventions. During the first surgery, the operator reflects the oral mucosa and periosteum to uncover the bony edentulous alveolar process and the surrounding basal mandibular bone. While this tissue is reflected, an impression is made of the denture-bearing area.

The surgical incision is then sutured, and a custom frame is fabricated, usually from a cobalt-chromium alloy. In a second surgical procedure, this frame is placed subperiosteally with several projections through the mucosa for attachment of the prosthesis. Fixed or removable prostheses can then be connected to these transmucosal posts. Subperiosteal implants have been used for treatment of the edentulous mandible and maxilla **(Steigenga et al., 2003; Zitzmann et al., 2005)**.

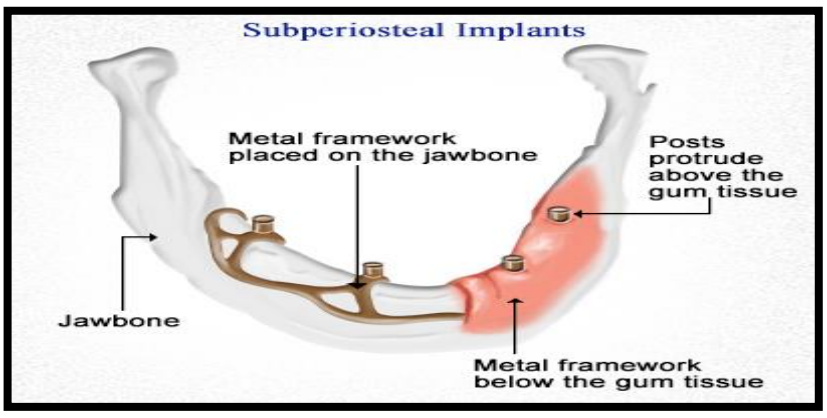


Fig (1-5): Subperiosteal Implants.

1.4 Dental Implants materials

Different materials used in manufacturing of dental implant which can be classified into two types non-metallic materials an metallic materials.

1.4.1 Non-Metallic Materials

These are further subdivided according to biocompatibility into bio-inert and bio-active materials. Bio-inert materials: these materials are non-reactive with minimal interaction between implant material and the surrounding tissue like: polymers, vitreous carbon, nonreactive types of ceramic (e.g., aluminum oxide and zirconium oxide). Bio-active materials: these materials used to enhanced osseointegration, e.g. hydroxyapatite and bioglass **(Ehrenfest et al., 2010; Al-Johany et al., 2017)**.

1.4.2 Metallic Materials

The conventional metals and alloys used for medical devices belong to three main metallic systems: stainless steel, cobalt chromium alloys and titanium alloys. These systems exhibit an excellent combination of high strength, relative workability and good resistance to corrosion. Currently, titanium or titanium alloy implants are widely used for their superior properties of biocompatibility **(Ehrenfest et al., 2010; Al-Johany et al., 2017)**

1.5 Component of Dental Implant

Dental implant systems consist of a dental implant body, dental implant abutment and abutment fixation screw. The dental implant body is surgically inserted in the jawbone in place of the tooth's root. The dental implant abutment is usually attached to the implant body by the abutment fixation screw and extends through gums into the mouth to support the attached artificial teeth **(Resnik, 2020)**.

1.5.1 The Implant Body (Post)

The implant post or screw is inserted into the jawbone during short surgical procedure using advanced computer guided surgery. The actual post looks a little like a natural tooth root, which is precisely the way it's designed, so if you see an implant post, you may notice its end is tapered just like a real tooth root. An implant post may be up to 18 mm in length, and for example, mini dental implants tend to have longer posts for greater strength and stability. A conventional dental implant post is hollow so that the abutment can be screwed onto the post as shown in Figure (1-6). A three-piece implant design allows the implant posts to becovered up for osseointegration, so it isn't necessarily restored immediately with the prosthesis. Instead, the abutment is attached later when the implant dentist is ready to fabricate and fit the implant prosthesis **(Resnik, 2020)**.

1.5.2 Implant Abutments

There is a huge range of implant abutments dependent on the implant system used to restore teeth. For example, implant abutments that secure implant crowns and bridges are verydifferent compared to abutments used to support dentures. An implant abutment used to secure a crown or bridge looks a little like a tiny tooth stuck, protruding above the gum line as shown in Figure(1-6) .Abutments used to support a denture are very different, as the denture implants can have special attachments on its fitting surface and which clip onto the abutments, or the abutments are used to support a bar. The denture then clips directly onto the bar **(Resnik, 2020)**.

1.5.3 The dental prosthetic

is the visible portion of the dental implant that can either be a dental crown, bridge, or denture. Dental crowns are generally used to replace a single tooth

or multiple missing teeth that are not adjacent to one another, while dental bridges are generally used to replace two or more missing teeth that are adjacent to each other. Finally, dentures are used to replace an entire arch of missing teeth, as well as an entire mouthful of missing teeth. If a crown or bridge is being placed, then your dentist will likely cement the restoration to the abutment. However, if a denture is being placed it will likely be snapped onto the abutments as shown in Figure(1-6) . The prosthetic you plan on using will also affect the number of implant posts that need to be placed. For example, dental crowns require one implant post, dental bridges may require two or more implant posts, and dentures generally require 4-6 implant posts. Ultimately, your implant dentist will advise you on how many implant posts should be placed in order to safely support your chosen prosthetic **(Resnik, 2020)**.

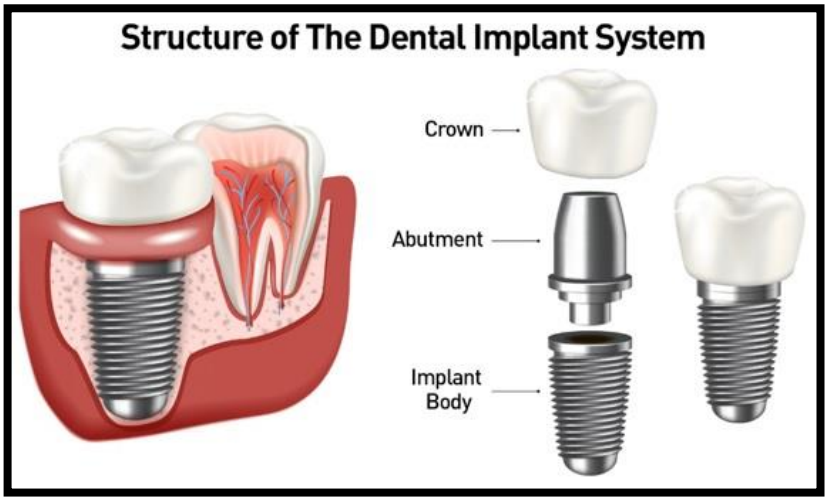


Fig (1-6): structure of dental implant

1.6 Peri-Implant Anatomy

Peri-implant tissues occur around osseointegrated dental implants. They are divided into soft and hard tissue compartments. The soft tissue compartment is denoted “peri-implant mucosa” and is formed during the wound healing

process that follows implant/abutment placement. The hard tissue compartment forms a contact relationship to the implant surface to secure implant stability. Due to their histologic and anatomic features, peri-implant tissues carry out two basic functions: the mucosa protects the underlining bone, while the bone supports the implant **(Cochran & Froum, 2013; Tallarico et al., 2018)**.

For a natural tooth the surrounding soft tissue has an average biological width of 2.04 mm between the depth of the sulcus and the crest of the alveolar bone, composed of a connective tissue attachment (1.07 mm average) above the bone and a junctional epithelial attachment (0.97 mm average) at the sulcus base, and acting as a physical barrier to the bacteria in the sulcus to the underlining periodontal tissues Figure (1.7a). The collagen fibers of the gingival attachment are crucial part of the soft tissue attachment as these fibers run perpendicular to root surface and insert into cementum forming a true attachment **(Resnik, 2020)**.

Unlike natural teeth, the soft tissues attachment of implants consists of an epithelial element only with the absence of connective tissues attachment. In addition, gingival fibers run parallel to implant surface and do not insert into it. Such lack of connective tissue barrier resulted in peri-implant tissues that are more susceptible to infections and prone to periodontal diseases Figure (1.7b) (**Zhao et al., 2021)**.

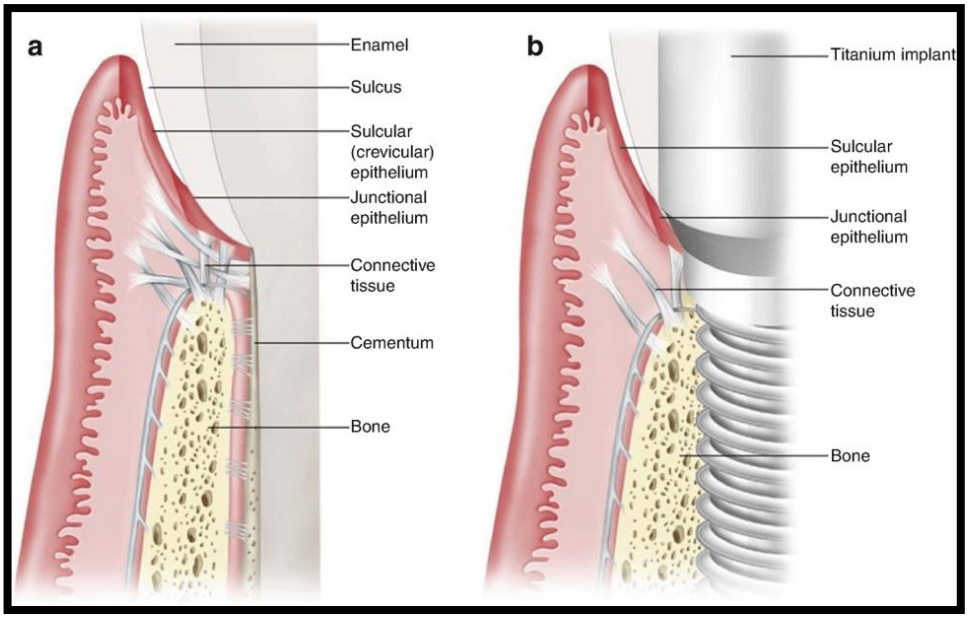


Fig (1-7): Peri Implant Anatomy, a-natural tooth and b- dental implant

1.7 Peri-Implant Disease.

The most common causes of implant failure are poor oral hygiene, history of periodontitis, and smoking. If tooth cleaning is poor, bacteria will build up on the implant surface and cause inflammation of the mucous membrane surrounding the implant – this is known as peri-implant mucositis. If left untreated, mucositis can progress to a more dangerous condition called peri-implantitis as shown in Figure (1-8) , in which there is greater inflammation and bone around the implant is lost. Eventually, the implant loses its anchorage in the bone and becomes loose, which means it will have to be replaced – and this could require additional surgery to restore the lost bone **(Schmage & Platzer, 1999)**

Peri-implant diseases are inflammatory lesions which may affect the peri-implant mucosa only (peri-implant mucositis) or also result in loss of supporting bone (peri-implantitis). Peri-implantitis may lead to loss of the implant as shown in Figure (1-9). Diagnosis of peri-implant disease requires the use of conventional probing to identify the presence of bleeding on

probing, and suppuration, both signs of clinical inflammation. Radiographs are required to detect loss of supporting bone. Baseline probing measurements and radiographs should be obtained once the restoration of the implant is completed to allow longitudinal monitoring of peri-implant conditions **(Heitz-Mayfield, 2008)**.

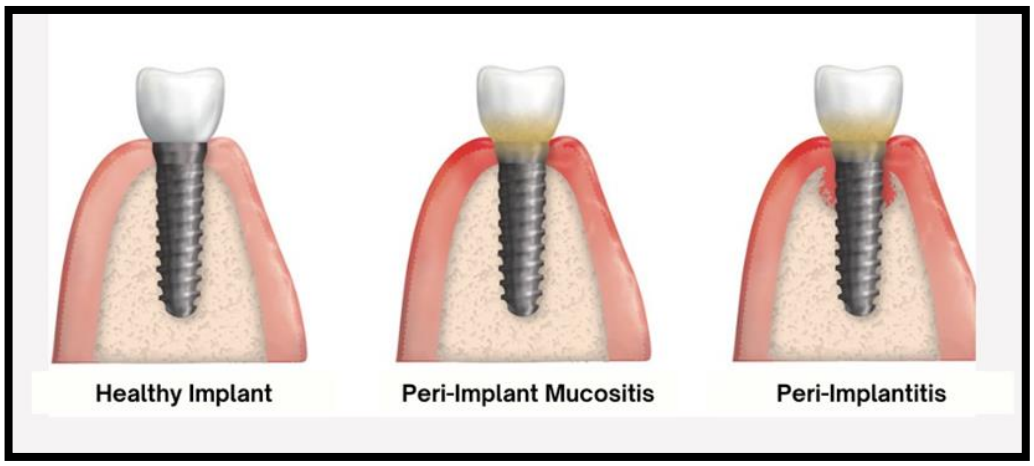


Fig (1-8) Different between healthy implant and peri implant mucositis and peri implantitis.

Fig (1-9) Peri-implant diseases. (A) Peri-mucositis ,(B) Peri-implantitis .

1.7.1 Prevention of Peri-Implant Disease

Because of the high prevalence of peri-implant disease amongst implant patients arrangement of appropriate preventive program is crucial. Much of primary prevention relies on patient home care, which is stressed and educated for patients early before initiation of implant treatment **(Lee et al., 2017)**.

Alongside hygiene practice, assessment and control of riskfactors (smoking and diabetes); ideal prosthetic design; cementation technique; and control of parafunctional habits should be also considered. Following the prosthetic loading of implants, the patient is kept under long-termprofessional implant maintenance program of regular scheduled visits. Recall visits aim to assess patient plaque control and to detect any early signs of peri-implant disease. Monje et al. in a systemic review, confirmed that peri-implantitis may be prevented with a strict peri-implant maintenance program, along with a comprehensive patient, clinical, and implant-related evaluation. They concluded a minimum recall and hygiene program be tailored to the patient's risk profiling and at a minimum of a 5- to 6-month interval **(Monje et al., 2016).**

1.7.2 Managment of peri-Implant Disease

Implants have become a routine treatment option for missing dentition. The biological complications of restored dental implants and associated supra-structures share similarities with the biofilm infections of natural dentition. Our existing paradigms of periodontal disease treatment can partially be applied to management of peri-implant disease **(Oksana, 2014)**.

The dental team must play a critical role in educating patients to control plaque-biofilm associated with peri-implant tissues and associated restorations. Routine assessments at maintenance appointments allow early

treatment intervention to prevent escalation of peri-implant disease. Given the infancy of clinical science surrounding peri-implantitis treatment, further, high-quality evidence based studies are expected. **(Daubert et al., 2015).**

When peri-implant disease occurs around loaded implants, its the duty of dentist to diagnose it as soon as possible and intervene accordingly. Treatment of established peri-implant may be nonsurgical or surgical, and it aims to restore health of both soft and hard tissues surrounding implants and to prevent further compromise with subsequent failure of osseointegration. Throughout treatment of peri-implant disease, the patient must be kept under strict oral hygiene program. The following sections briefly discuss current treatment modalities of per-mucositis and peri-implantitis **(Wingrove, 2022).**

Long-term success of implant predominantly depends upon the long-term maintenance of the health of the peri-implant hard and soft tissues by reviewing the patient's oral hygiene and modifying, if necessary, clinical and radiographic examination of the implants and peri-implant tissues, evaluating implant stability, and removing any implantretained plaque and calculus and setting maintenance intervals.

1.8 Oral and Implant Home Care

Good oral hygiene must take place before, during, and after placement of dental implants to ensure the health of the implant. so the tissue surrounding the implant should appear pink, firm, and keratinized with no signs of infection as shown in Figure (1-10) . The peri-implant soft tissues (permucosal seal) that separates the connective tissues surrounding the implant from the outside environment should be keratinized tissue, The absence of keratinized tissue has been documented to be more susceptible to pathogenic bacteria thus leaving the implant vulnerable to peri-implant disease , and the hygienist's goal is to educate the patient on how to obtain

keratinized tissue and maintain a healthy permucosal seal **(Robert Horowitz, 2013; van der Sluijs et al., 2021)**

Fig (1-10): Keratinized tissue surrounding the implant

There is a Correlation between high plaque index and inflammatory lesions around dental implants has been shown and this highlights the importance of patient plaque control. Until now, knowledge of peri-implant home care practices has been based on periodontal devices,so peri-implant homecare plays a role in mucositis and peri-implantitis prevention **(Checchi et al., 2019)**.

The presence of microbial biofilm has been shown to be a leading factor in the pathogenesis of peri-implant disease, implant patients must be educated for appropriate plaque control to minimize risk of developing peri-implant disease. Each patient should have a tailored and customized hygiene regimen that meets patient's performance and specific implant case **(Gulati et al., 2014; Resnik, 2020)**.

Consistent use of the same plaque index is paramount because this will allow an easier determination of the presence of a disease process. **Mombelli et al., (1995)** have reported implant-specific plaque indices to be used at dental implant maintenance appointments. He also suggested a numerical scale from 0 to 3, which is dependent on the amount of visible plaque present or by

running a probe over the implant surface. Other researchers recommended a similar scale (from 0 to 3) dependent on the amount of visible plaque**. (Mombelli et al., 1995; Silverstein & Kurtzman, 2006)**.

1.8.1 Manual and Electromechanical Brushes

The mechanical plaque control by brushing is the mainstay for primary prevention of peri-implant diseases. All other hygiene methods are said to be adjuncts to brushing rather alternatives.

In general most exposed facial and lingual surfaces may be cleaned with a soft, multitufted nylon toothbrush. The implant clinician should recommend to each individual patient which brush angle would be ideal to access all areas within the mouth. The modified Bass technique should be used or a short, horizontal, back-and-forth movement may be incorporated into the hygiene regimen. The brush may be held at a 45-degree angle to the gingival tissue **(Kracher & Smith, 2010).**

Most commonly, patients often prefer electromechanical devices, which have been shown to be superior to manual brushing around dental implants. Studies proved that electric toothbrushes resulted in greater reduction of plaque index compared to manual tooth brushing, however, evidence is moderate **(van der Sluijs et al., 2021; Elkerbout et al., 2020**). Different designs of electro-mechanical devices (i.e., sonic toothbrushes, oscillating-rotating power toothbrushes) are commercially available, these are specially beneficial for those who lack dexterity and in cleaning difficult-to-access areas.

1.8.2. Dentifrices

It is a paste or powder used for cleaning the teeth with brush enhances the brushing efficiency. The selection of a toothpaste should be low abrasive as to not scratch the surface of the exposed implant. Dentifrices should be avoided that contain harsh abrasive ingredients, including stain removers and

smoker's toothpaste. Selective fluorides may result in etching and removal of titanium oxide layer on implant surfaces making it susceptible to corrosion Research supports daily use of fluoride dentifrice for implants. However, both sodium and stannous fluoride dentifrice at low or high pH in fluoride concentrations can cause the oxide layer on the outside of the implant to be removed, making it susceptible to corrosion. A recent study found that both sodium and stannous fluoride dentifrices are safe to use on titanium implants, but the dentifrice needs to be at or near neutral pH composition. **((Matono et al., 2006; Susan Wingrove, 2022)**.

1.8.3 Interproximal Brushes

Interdental brushes serve as an alternative to flossing; they can be used daily and can be more effective for interproximal plaque removal than floss as suggested by a number of studies. Interdental brushes, depending on their size and shape as well as the surfaces of the teeth, can prove to be effective tools for reducing interproximal plaque as shown in Figure (1-11) **(Susan Wingrove,2013)**

Use them to remove the harmful plaque that accumulates all-around your natural teeth and implants. Always use the interdental brush size recommended by your dental professional. Patients should be instructed to insert the tip interproximally in an occlusal direction and use a gentle rotary motion against the gingiva **(Kracher & Smith, 2010)**

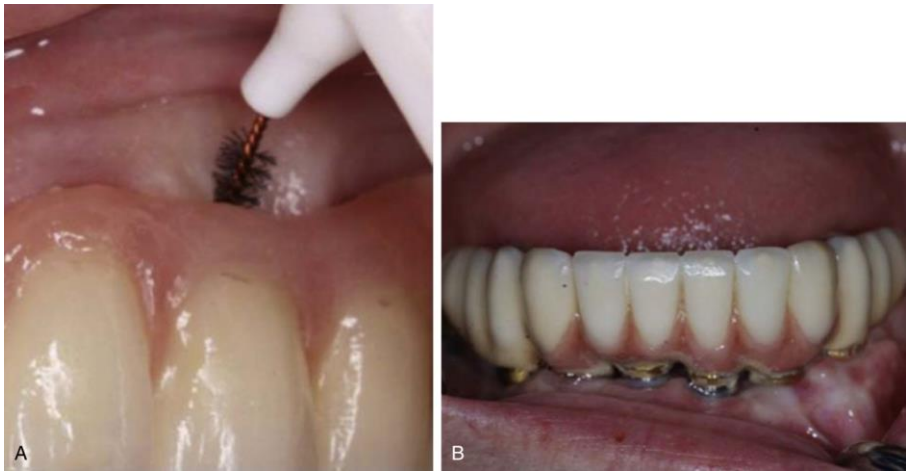


Fig (1-11): Interproximal brushes. (A, B) interproximal brushes

1.8.4 Floss Aids

One commonly prescribed home-care recommendation is to use dental floss at least once a day in a "shoeshine" motion around the implants. Although floss is believed to prevent disease around natural teeth, the opposite may be true for the tissue surrounding implants. Here are the top three reasons why flossing may not be ideal for the patient who has dental implants.

Dental implants lack a self-limiting process that exists in the tissues around natural teeth. Instead of being attached to the implant, the surrounding tissue creates a protective seal that can be easily broken with aggressive flossing **(Shavonne R. Healy,2018)** as shown in Figure (1-12)

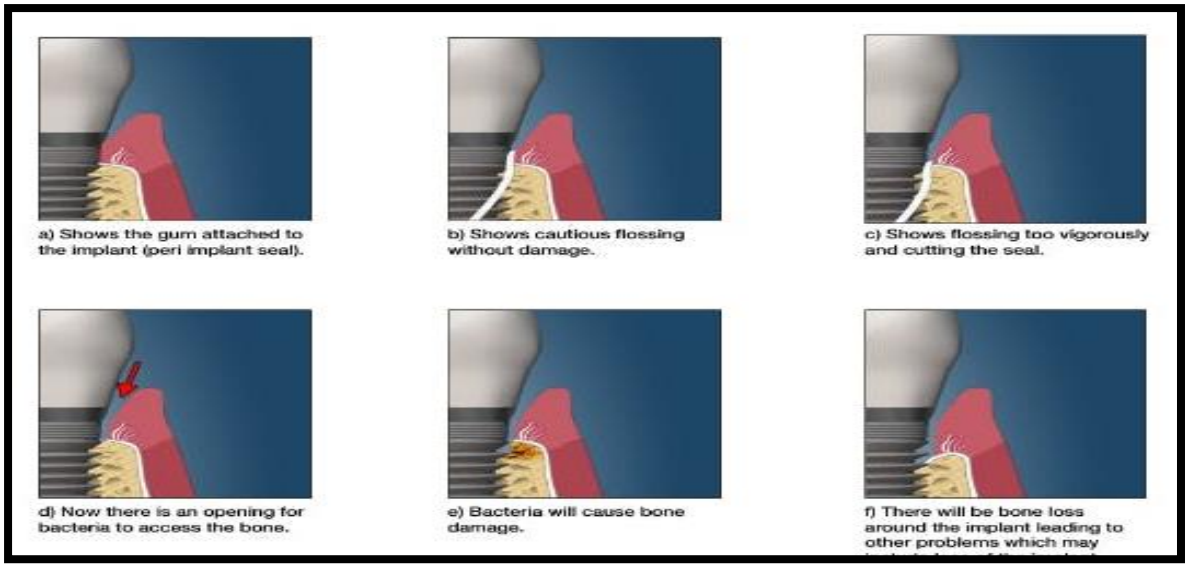


Fig (1-12): Aggressive flossing

1.8.5 Oral Irrigator

The oral irrigator (e.g., Air Floss Ultra, Philips) is proved beneficial in removing bacterial biofilm especially in areas that are difficult to reach because of the prosthesis design. Numerous studies have shown an oral irrigator to be superior in reducing gingival bleeding, inflammation, and plaque thickness **(Kato et al., 2012; Gorur et al., 2009)**.

Magnuson et al (2013) demonstrated the superiority of the use of oral irrigators compared to the use of dental floss over an observation period of 4 weeks and found oral irrigators to reduce bleeding around implants by 81% in contrast with 33% for flossing as shown in Figure (1-13) .

Fig (1-13) Oral Irrigator

Caution must be exercised in using an oral irrigator because excessive force (i.e., high pressure) may damage the junctional epithelium, which may lead to a bacteremia. To minimize complications, patients should be instructed on the proper use of these devices, mainly using a low to medium speed and angulating the tip to be perpendicular to the long axis of the implant body. Patients should be instructed to use a nonmetal tip once to twice daily **(Silverstein & Kurtzman, 2006).**

Oral irrigators are best used with other hygiene methods to achieve optimum plaque control. A recent study concluded that the association of mechanical brushing with oral irrigation was more effective in reducing microorganisms in the subgingival sulci biofilm compared with brushing alone **(Salles et al., 2021).**

1.8.6 Antimicrobial Rinses

Chemotherapeutic agents such as antimicrobial mouthrinses are chemical means of plaque control routinely used in patient hygiene regimes as adjuncts to mechanical plaque control, i.e. brushing. Chlorhexidine gluconate is the most commonly used antimicrobial rinse in dentistry because it is safe, inexpensive, and nontoxic. It is very effective because of its substantivity, which is the binding of the medication to the soft tissues and implant surfaces **(Chye et al., 2019; Silverstein & Kurtzman, 2006).**

Chlorhexidine (CHX) is capable of eliminating several bacterial species in oral cavity, thus, reducing the bacterial load available for biofilm formation. The role of CHX in prevention and managment of peri-implant disease is controversial. Several studies with conflicting results evaluated CHX efficiency in reducing bleeding and plaque. (**Peña et al., 2019)** (demonstrated a significant reduction of BOP and Plaque Index through the application of a 0.12% chlorhexidine mouthwash. A study also demonstrated significant short-term improvements for the use of CHX in combination with mechanical debridement in zirconia implants diagnosed with peri-implant mucositis **(John et al., 2017).** However, recent systemic reviews and meta-analyses indicated that adjunctive CHX therapy in patients diagnosed with peri-implant diseases had insignificant effect on BOP and probing depths reduction (**Liu et al., 2020; Zhao et al., 2021**).

Due to lack of evidence and the associated side effects, the routine use of CHX for peri-implant disease prevention cannot be justified. However, CHX could be used in the post surgical phase to enhance healing and control inflammation **(Solderer et al., 2019).**

Chapter Two
Disscussion

2.1 Dental implant

One of the greatest benefits of dental implants is that they behave like natural teeth, providing a strength and function that is unrivalled by other restorations. The basic criteria for implant success are immobility, absence of peri implant radiolucency, adequate width of the attached gingiva, absence of infection. A wider implant has long-term success than a narrow implant. Co-existing medical conditions and smoking also play an important role in evaluating the success of an implant. Dental implants require constant maintenance and monitoring, which further involves assessment of the patient's general and oral health, professional implant maintenance, and diligent patient home care as critical factors that will ensure the long-term success of implants and a predictable replacement for natural teeth. **(Cheung M. et al., 2021)**.

2.2 Causes of Peri-implant Disease

Plaque is considered a primary aetiological factor inthe development of peri-implant disease, with higher plaque levels at the implant or lack of accessibility for cleaning the implant significantly associated with peri-implantitis. Patient-performed home hygiene is therefore a key component of peri-implant disease prevention but the efficacy of specific hygiene methods and their impact on peri-implant outcomes are not established **(Cheung et al., 2021)**.

2.3 Dental implant Maintenance

Placement of implant requires an interdisciplinary approach wherein a team of dental implant specialists including oral surgeon, prosthodontist,

periodontist, and oral radiologist participate in the planning, execution, and maintenance ofthe implants to ensure the best possible outcome. The overdenture: is any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants. (GPT. 9, 2017). The overdenture is also called overlay denture, overlay prosthesis or super imposed prosthesis. Oral Hygiene Instructions. Motivating and instructing the patient in the care of the overdenture is of the extreme importance for its long term success. Learned during the preliminary treatment phase, the oral hygiene procedures practiced by the patient following placement of the overdenture should be an uninterrupted continuation of the home care measures. Overdenture care

1- Ordinary toothbrush or a special denture brush.

2- Tooth pastes with low abrasiveness and non-alkaline soaps.

3- Denture cleansers (mostly peroxide based) are a useful adjunct.

Candidacies can be treated by immersing the denture in a 0.2%chlorhexidine solution for 10-15 minutes every day

(mechanical aid) All abutment teeth with or without root coping must be cleaned on all sides, All exposed root surfaces and gingival area should be brush again with an inter proximal brush, Dental floss is used only to clean under interdental bars and beneath root coping that are solder together. **B-**chemical aid, Fluoride in gel, Fluoride in a 0.025% solution can also be used as a daily rinse. Chlorhexidine: 0.1-0.2% solution as a daily rinse gel to be applied inside the denture base or the female attachment. Prosthodontics follow up care: - to correct. Occlusion (remounting records), Base (relining). Pressure spots, Bar (loose screws), Bar clips (broken, loose). Female retainers

and clips remounted with acrylic resin. **(Silverstein and Kurtzman,2006).**As the number of patients opting for dental implants as a treatment modality to replace missing teeth continues to grow, it becomes increasingly essential for the dental team to accept the challenges of maintaining these sometimes complex restorations**(Kurtzman and Silverstein ,2007) .**The long-term success of implants is fundamentally dependent upon both the patient's maintenance of effective home care and on the dental team's administration of professional prophylaxis procedures in the dental office. Minimizing the incidence of implant loss by regular monitoring of the patient and preventing the recurrence of disease progression in previously treated peri- implantitis, patients along with increasing the probability of locating and treating peri-implant pathology in a timely manner are the main therapeutic goals of maintenance therapy **(Cheung M. et al., 2021).**

Chapter Three
Conclusions and Suggestions

Conclusions

1. The early detection, prevention, and treatment of peri-implant diseases are imperative for dental implant success.
2. Plaque control assessment should be performed in each maintenance visit using the same implant plaque index.
3. Brushing is the mainstay for primary prevention of peri-implant diseases.
4. Electric toothbrushing showed superiority over manual toothbrushing for plaque control.
5. Dentifrices enhance brushing efficiency, however, they should be low abrasive and free of products that could possibly scratch or etch exposed implant surfaces.
6. Interproximal brushes are beneficial in cleaning fixed implant-supported prostheses with difficult access.
7. Oral irrigators are proved superior when used in combination with brushing.
8. Dental floss is difficult to use in implant-supported prostheses, and could possibly traumatize peri-implant soft tissues.

Suggestions:

1. Study the effect of different types of brushing technique in maintaining and improve dental implant success.
2. Study the effect of different mouth wash materials in decrease peri-implant disease.