

# Prosthodontics: An Overview Prosthodontics indications, differences, Prognosis and Complications

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## Abstract

**Background:** Prosthodontics is known to be the science of skills and crafting art. It is an advanced branch of dentistry that involves more supportive biomechanical or absolute surgical interventions regarding external and internal structural restoration, either by maxillofacial rehabilitation prosthetics, or teeth implants that can be subdivided into removable or fixed prostheses. **Objectives:** This review highlights and analyzes different aspects of prosthodontics embracing the indications, divisions and branches, approach, and decision making while following up on the prognosis and sudden complications to assist professional practitioners in managing prosthodontic procedures. **Methodology:** This literature was conducted and assessed by (Google Scholar, PubMed) database research, and used the following terms within abstract or title (“Prosthodontics”[Mesh] AND “Indications” [Mesh] AND “Dentures” Mesh] AND “Prognosis”[Mesh]AND “Complications”[Mesh] AND “Removable”[Mesh]AND “Fixed”[Mesh] “Prostheses”[Mesh] AND “Maxillofacial”[Mesh]AND “Implants”[Mesh])). **Conclusion:** Despite the limited and sufficient knowledge and background regarding prosthodontics It is essential to understand that the key to outstanding tooth restoration and masticatory function is based on fulfilling prosthetic treatment requirements and a better approach in decision making in prosthetic interventions.

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## Introduction

Prosthodontics is an advanced branch of dentistry that involves more supportive biomechanical and surgical interventions regarding external and internal structural restoration, either by maxillofacial rehabilitation prosthetics, or teeth implants that can be subdivided into removable or fixed prostheses. Prosthodontics is not a very usual dental practice and deserves a unique dental approach. It is important to note that not every patient with tooth depletion is a candidate for prosthodontic protocols. (Briggs and Eliyas, 2019)

Selecting and deciding prosthodontic intervention is a crucial part of the practitioner's professional responsibility. On the other hand, patients are divine to judge the flow of the procedure either by stating their fears and desires or their preconceived expectations. Ideal intervention is needed to avoid possible risks, litigation, and ethical problems in prosthodontics care. (Carlsson and Omar, 2006)

Teeth Prostheses is a standard therapy in the dental field that notably provides delicate service for patients struggling with oral health and cosmetic issues that affects their mental and physical performance (Alanazi et al., 2019; Alamri et al., 2019; Bulgakova et al., 2019). This requires accredited research quality and proper reporting of interpreted clinical trials and scientific investigations that serve evidenced-based guidelines for providing more accurate clinical practice. However, there was limited and constrained groundwork in terms of research to assist in further forms of educational and clinical purposes. (Olley and Frost Bem, 2019)

This review contemplates different aspects of prosthodontics embracing the indications, divisions and branches, approach, and decision making while following up on the prognosis and sudden complications to assist professional practitioners in managing prosthodontic procedures.

## Methodology:

This literature was conducted and assessed by (Google Scholar, PubMed) database research using (“Prosthodontics”[Mesh] AND

“Indications” [Mesh] AND “Dentures” [Mesh] AND “Prognosis” [Mesh] AND “Complications” [Mesh] AND “Removable” [Mesh] AND “Fixed” [Mesh] “Prostheses” [Mesh] AND “Maxillofacial” [Mesh] AND “Implants” [Mesh])). The paper summed eligible systemic reviews, clinical trials, articles, and journals carried out in the English language only.

## Review:

Prosthodontics is known to be the science of skills and crafting art. Since esthetic services are highly requested by patients to improve their looks and appearance, prosthodontics has been the greatest most advanced dental implantation therapy provided by the specialty. Different modalities in prosthodontics have wildly changed in the past years, dealing with the newly imposed and revolutionary dental biomechanical technologies despite the limited information on many educational views and clinical research that is done in this field. (Olley and Frost Bem, 2019) However, dental faculties strengthened their efforts in preaching preclinical courses and supervised clinical practice for the dental student during dental medicine school to prepare dental students for greater challenges later in their post-graduate clinical experience. (Dulčić et al., 2017) Furthermore, Prosthodontists who are adopting the Prosthodontics specialty are obligated to attend intensive postgraduate training for at least 3 years to refine their skills to offer adept and expert service.

Restorative dentistry emphasis providing delicate prosthetic options after confirming the diagnosis. This can enable practitioners to take preference from simple dental procedures such as fixed or removable prostheses and be involved in more complex repair methods as in Maxillofacial prosthetics. (Phasuk and Haug, 2018; Hong DGK and Oh, 2017)

### *Maxillofacial prosthetics:*

Maxillofacial prostheses contribute to complex rehabilitation after surgical reconstruction and correction as in the left cleft and palate. In addition to the replacement of missing areas to restore normal oral functions like chewing, speech, and other cosmetic and psychosocial purposes. (Shi and Losee, 2015)

Maxillofacial prostheses are generally classified into complementary and restorative. Complementary usually contributes during and after major cosmetic surgery and after radiotherapy sessions. On the other hand, Restorative prostheses are used to reserve for missing bone or mend malformations of the face. Restorative prostheses are classified according to their anatomical location into internal and external prostheses. Moreover, external prostheses are done when internal restorative prostheses are contraindicated. External prostheses can be found as buccal, facial, and ocular prostheses. The mandibular, palatal obturator, and tongue prostheses are used in terms of treatment in external prostheses. (de Caxias et al., 2019)

### *Fixed and removable prosthetics:*

As teeth serve vital roles in human life on personal and community levels choosing between having fixed or removable dentures relies on the patient’s preference and comfort. The local indications for fixed or removable prostheses are mainly to restore the abutment of the missing tooth. The patient undergoing this type of prostheses is in excellent health with good oral hygiene and his preference to apply dental prostheses. Removable dentures are requested for patients according to their financial efforts as this type of prostheses is considered reasonable in price. (Campbell) et al., 2017

Moreover, implanted prostheses materials are primarily ‘alloplastic’ that are embedded beneath the mucosa or bone. Fixed dental implants have been remodeled to be the very best trusted solution as it has a high success rate, as well as its infrequent complications. (Hong DGK, Oh, 2017; Gupta et al., 2020) Metallic Titanium implants are modified to promote osseointegration that depends on the surface roughness as it is designed in different ways to display the osteoblast activity. Different routes are identified for surface roughening modifications and are confined into Plasma spray coating (titanium and hydroxyapatite -HA- coating), sandblasted and acid etching (SLA), Grit-blasting, anodizing, acid etching, and biomimetic coating. (Hong DGK, Oh, 2017; Jemat et al., 2015) Evidence-based reports show data on short and long-term survival rates of surface modification. These data are listed in table 1. ( Hong DGK, Oh, 2017)

**Table 1:** Survival rates of modified surface implants. ( Hong DGK, Oh, 2017)

Modification materials of surface roughening implants	Follow up and possible survival rates
SLA (Sandblasted and acid-etched)	Follow up of 10 years and a possible 98.8%-99.7% survival rate.
TPS(Plasma sprayed titanium)	Follow up of 20 years 89.5% survival rate
Hydroxyapatite(HA)	Follow up to approximately 4-10 years and a possible 82-98.5% survival rate.
Anodized surface	Follow up for about 10 years with a possible 96.5% survival rate.
Oxidized surface	Follow up for about 10 years with a possible 100% survival rate.

However, over the years there have been highly requests for more esthetic metal-free implants. Recently, Ceramics' popularity as a restorative material has taken the spotlight in past years, because of their cosmetic influence, biocompatibility, and constancy. (Zhang and Kelly, 2017)

Ceramics are defined to be metallic and nonmetallic restorative materials. They are used for preparing different types of tooth restoration such as inlays, veneers, crowns, inlays, and posts. Restorative ceramics are grouped into “glass matrix ceramics” that are inorganic and are composed of glass, “polycrystalline ceramics” that are inorganic and are composed of crystalline, and “resin matrix ceramics” that are inorganic and are composed of the polymer matrix. (Bajraktarova-Valjakova et al., 2018) Table 2 lists a detailed and complete classification of ceramics that are used. (Rashid et al., 2016; Denry, 1995)

**Table 2:** Classification of ceramics. (Rashid et al., 2016; Denry, 1995)

Processing technique	Ceramic form	Phase of Crystallization
<b>Sintered Ceramics</b>	-Leucite re-enforced feldspathic porcelain -Aluminous -Magnesia based porcelain -Zirconia based porcelain	Sanidine Alumina Forsterite MirageII
<b>Castable ceramics</b>	-Mica based porcelain - Hydroxyapatite type porcelains - Lithia based porcelain	Tetrasilicic fluoromica Oxyapatite Lithium disilicate
<b>Heat pressed ceramics</b>	- Cerestore - Lecite based porcelain - Lithium-based porcelains	Spinel Leucite Lithium disilicate
<b>Machinable ceramics</b>	-Lava CAD-CAM system  -CAD-CAM Based -Procera -Celay system  -Cerec system	Yttrium-stabilized tetragonal zirconia (Y-TZP) Leucite Alumin Sanidine Alumina Alumin Tetraciliciflourmica Sanidine

Although many studies suggested ceramics vulnerability is due to physical, chemical, and biomechanical properties. Various strategies were developed to enhance ceramics strength and prevent micro cracks and complete crown fractures. (Zhang and Kelly, 2017) In 2016, about 14 articles were selected to study, calculate, and evaluate the clinical success and survival rates on zirconia ceramics oral implants. Hence, the study revealed that oral zirconia implants have an overall capability of 1year survival after placement. However, due to sufficient information and supporting evidence-based studies, no further studies were identifying long-term outcomes or detecting late biological complications. (Hashim et al., 2016) Furthermore, the most common complication while placing dental implants is the unintended injury done to vital vascular structures resulting in a messy performance and patient discomfort. Hence, Bleeding and nerve damage while anesthesia injection is common. Postoperative procedural complications during the healing period are not very common. However, in some cases signs of implant failure as unexplained pain and irritation, mobility of the implant is more than 0.5mms that might lead to poor positioning of the implant, radiolucency around the implant, uncontrollable exudates, these complications affect the stability of the prostheses. Enthralled approach via defining and evaluating anatomical structures should be taken into consideration. (Gupta et al., 2020)

**Conclusion:**

Despite the limited and sufficient knowledge and background regarding prosthodontics, It is essential to understand that the key to outstanding tooth restoration and masticatory function is based on fulfilling indications requirements, classifying the types of

prostheses suitable for the patient, identify the complications, and monitoring the prognosis. There is an obvious need for more evidence-based guidelines in dental prostheses practice that aids in prosthetic management and planning.

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