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Prosthetic Requirements for Full Arch Implant-Supported Fixed Prostheses: A Review

Ines Azouzi[1, 2*], Oussama Ben Younes[1], Emna Boudabbouss[2, 3], Yosra Gassara[2, 3], Jilani Saafi[2, 3], Belhssan Harzallah[2, 3], Dalenda Hadyaoui[2, 3]

[1]Department of Dental Medicine, Military Hospital of Tunis, Tunis, University of Monastir, Tunisia
[2]Research Laboratory of Occlusodontics and Ceramic Prostheses LR16ES15, 5000 Monastir, Tunisia
[3]Department of Fixed Prosthodontics, Faculty of dental Medecine, University of Monastir, Tunisia

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***Corresponding author**: Ines Azouzi
Department of Dental Medicine, Military Hospital of Tunis, Tunis, University of Monastir, Tunisia

Abstract | **Review Article**

The objective of this work is to review the prosthetic particularities of complete implant-supported rehabilitation. Indeed, conical internal connection abutments are the reference abutments for totally edentulous patients. They allow the masticatory forces to be disturbed and reduce the micro-movements generated at the interfaces with the implants. An accurate impression provides a passive fit that is essential for successful treatment. The choice of the direct open pick-up technique is specific to totally edentulous patients. The splinting connection of the transfers provides a higher degree of precision, particularly if the implants have divergent axes. It is recommended to design the complete arch bridge in segments of three or four elements to ensure the passivity of the framework. At the anterior level, it is essential that the implant axis be compatible with the prosthetic axis to obtain the appropriate emergence profile. The main objective is to obtain a passive adaptation of each abutment on each corresponding implant.

Keywords: Prosthetic phase, clinical steps, laboratory steps, total edentulous implant, abutment.

1. INTRODUCTION

In the realm of modern dentistry, the evolution of implant prostheses has been remarkable. Fully implant-supported fixed prostheses changed the lives of patients who have faced the challenges of tooth loss.

Complete implant-supported fixed prostheses represent an achievement in the quest for providing patients with functional, aesthetic, and comfortable solutions to restore their smiles and enhance their quality of life [1].

Through a comprehensive understanding of the components, procedures and clinical considerations associated with fully implant-supported prostheses, both clinicians and patients can grasp the potential of these advancements and make informed decisions that transcend the limitations of traditional dental solutions [2].

The convergence of CAD/CAM (computed-aided design/computer-aided manufacturing) technology with implant-supported prostheses has ushered in a new era of excellence in dental rehabilitation. This dynamic synergy combines the precision of computer-aided design and manufacturing with the stability and permanence of implant-supported solutions. Many authors have published reports on this subject [3-5].

Indeed, CAD/CAM technology enables comprehensive treatment planning by considering factors such as bone density, implant angulation and occlusion. In addition, it helps dental professionals to meticulously design prosthetic components that mimic the natural appearance of teeth and gums [6].

This work addresses the topic of implant-supported fixed prosthetic rehabilitation. It is a review of the literature that describes the determinants of pre-prosthetic analysis, the surgical phase, the features of the implant impression and finally the latest updates in prosthetic design.

2. Pre-prosthetic analysis in totally edentulous patients

The definitive preoperative prosthetic assessment of an implant-supported fixed prosthesis is a multifactorial process. Steps in this process include surgical, medical and laboratory consultations, transfer of facial and occlusal records for analysis, x-ray templates, scanning procedures and subsequent interpretation, as well as development of a comprehensive written plan including potential complications and treatment alternatives [2].

Some clinical and radiographic determinants of the patient must be taken into account for a successful implant reconstruction of the edentulous maxilla. They include anatomical, functional, aesthetic, phonetic, hygienic factors [2].

Anatomical Factors

An anatomically-based approach known as "13-23-30" is a particularly useful guide for the initial selection of implant sites in the anterior maxilla and between the maxillary sinuses. Using this technique, 6 implants (3 on each side) are inserted at predefined positions on the alveolar ridge: 13, 23 and 30 mm from the midline of the edentulous maxilla on both sides. These distances are derived from natural dentition measurements [7].

The advantages of the “13-23-30” anatomic concept include:

1. Implant biomechanics: an optimal number of six implants is well-spread along the maxillary dental arch and appropriately positioned for loading or function of mastication (with a full or shortened dental arch);
2. This approach is an extension of the natural dentition ideal teeth position and function and as such can be considered a “natural and balanced anatomic solution” for the initial selection of implant sites in the edentulous maxilla;
3. The 3-cross-arch stabilization principle is preserved and emphasized (all implants are splinted with a metal framework and typically support 10 to 12 prosthetic teeth)
4. Bone grafting and direct sinus lift procedures, as well as complex zygoma implant surgery, can be avoided. Limitations of this approach include cases of severe anterior maxillary bone atrophy and/or extreme pneumatization of the maxillary sinuses [7].

Other approaches have been discussed in the literature. The use of short implants (< 10 mm) in posterior areas avoids the need of a sinus floor lifting technique [8]. Similarly, the use of small-diameter implants (< 4.0 mm) limits the need of apposition grafts. They are highly recommended for thin ridges or replacing narrow teeth, particularly in the esthetic zone [9].

Surgical procedures are then less invasive, and subsequent osseointegration is accelerated, shortening healing and loading times.

Functional Factors

Treatment of the edentulous maxilla poses a number of challenges. Expectations regarding the aesthetics of the final prosthesis can be high. However, achieving adequate phonetics and stable masticatory function are major concerns.

Based on a biomechanical approach, for patients with an edentulous maxilla, an ideal position for endosseous implants is the posterior region, where the main functional occlusal load occurs during mastication. Arslan YZ *et al*., concluded that using the combination of four anterior and two short posterior implants is biomechanically more ideal than an All-on-4 concept to manage the posterior edentulism in severe atrophy cases. [10]

The application of a lateral force to a natural tooth creates, thanks to the conical shape of the root, the desmodont and tooth mobility, a shifting of tooth's rotation center (hypomochlion) towards the apex and a force dissipation away from the crest. In the case of an implant, the absence of mobility and the generally cylindrical shape of the implant lead to a shift of the rotation center towards the implant neck, which, in the presence of lateral stresses, results in cratering around the neck, followed by fracture of the implant [11, 12].

The aim of implant-supported full restorations is therefore to avoid the creation of lever arms that can lead to mechanical and biological complications.

Several authors recommend the use of occlusal contacts to neutralize destabilizing forces, which have harmful effects. Besides, cantilevers should not exceed 10 mm to the position of the most distal implant, in order to achieve a conventional force distribution polygon [13-15].

In addition to accessibility for hygiene purposes, the design of the denture base should exclude any interference with speech. A highly cleanable prosthetic design can lead to air and saliva entering through open spaces, impairing phonetics. Therefore, the base should have a convex design, slightly in contact with the mucosa to admit dental floss and interdental brushes. Concavities in the base must be avoided to prevent irritation of the mucosa due to poor cleaning [16].

It is important to mention that protection of restorations with an occlusal splint is generally

recommended, especially when the patient has parafunctional habits [17].

Aesthetic Factors

Today, with the evolution of technological advances, a wider range of fixed prosthetic designs is becoming available. They mainly differ in retention mode, prosthetic material mix, framework design and use of gingiva-coloured prosthetic materials (Table 1) [18]. Anatomical and financial considerations dictate the choice of fixed prosthetic design. Whatever the design is, it is important that the facial and dental aesthetics conferred by the prosthesis are not compromised. Furthermore, the principles of full denture esthetics should be the basis for all fixed prosthetic rehabilitations in edentulous patients.

Table 1: Different fixed implant-supported prosthetic designs for edentulous arch [18]

Category	Options
Mode of retention	Screw, cement or combination
Prosthetic material blend	Metal, zirconium, porcelain, acrylic resin, composite resin
Framework design	Single, Fragmented or Combined
Use of gingiva-colored prosthetic material	Denture-base acrylic resin, gingival porcelain, gingival composite resin, or none

Several approaches to the fixed implant-supported management of fully edentulous arch have been published. Two main designs have been chosen based on their ability to restore a wide range of soft tissue deficits. These are [19]:

1. Prosthesis with no need for pink material in the cervical region (crown design)
2. Prosthesis with artificial gingiva (hybrid design)

To determine which of these prosthetic concepts is most appropriate, 2 criteria need to be considered: the nature of patient's defect and the visibility of the residual ridge. These results help to tailor the prosthetic design elements depending on the combination of missing structures and patient's unique aesthetic requirements [20, 21].

Radiological Factors

A systematic panoramic radiographic analysis based on support areas can provide an initial indication about surgery difficulties that may be encountered.

Dividing the edentulous maxilla into 3 radiographic zones enables systematic evaluation of the residual alveolar bone available for implant placement. In this pre-treatment screening procedure, the maxillary anterior teeth are designated as zone 1. The premolar region is considered as zone 2, while the molar region is designated as zone 3. Analysis of the radiographic results according to this schema can enable the surgical and prosthetic team to develop a preliminary treatment plan [20].

Table 2: Guidelines for optimal implant surgical approach [20]

Bone Present for Implants	Surgical approach
Zone 1,2,3	Conventional implants can be placed. This would allow a favorable arch shape of anterior, posterior and eventually intermediate implants.
Zone 1,2	Tilting implants posteriorly along the anterior wall of the maxillary sinus can allow adequate anterior and posterior distribution of implants to support a fixed restoration in order to avoid the need for grafting.
Zone 1 only	Sinus grafting with autogenous bone (or xenograft) is an option in this situation. If a non-grafting approach is preferred, zygomatic implants may be indicated with traditional anterior implants
Insufficient bone in any zone	4 zygomatic implants or Branemark horseshoe graft followed by traditional implants

Thanks to CT scan data, virtual surgical treatment planning is now possible. Topography and bone volume are assessed, and the appropriate implant size and type is selected for each desired position [22].

The use of computers to manage implant treatment, known as digital workflow, is an innovative approach based on advanced technology. Its aim is to provide computerized implant planning, a virtual surgical simulation of implant placement, reliable transfer of digital data to the clinic by a surgical guide, implant placement identical to the virtual planning, and the production of an upstream implant prosthesis that adapts perfectly to the planned implant positions, ensuring post-surgical function [3, 23].

The aim of the pre-implant radiological assessment is to locate the implant site, to determine quantitatively and qualitatively the bone volume of the implant site, and finally to search for an anatomical obstacle.

Quantitative assessment must provide the three dimensions of bone volume [24]:

- Height to the inferior dental nerve canal in the mandibular region, and to the inferior cortex of

the maxillary sinuses or nasal cavities in the maxillary region;
- Width in the vestibulolingual plane at the midpoint of the alveolar process ;
- Length in the mesiodistal plane.
- Qualitative assessment of bone volume is based on [24]:
- Subjective criteria: cortical thickness and visual appearance of alveolar bone density;
- Objective criteria: densitometry and various techniques using Hounsfield units.

The pre-implant study begins with the creation of a radiological guide derived from the prosthetic model is produced. Either radiopaque commercial teeth are included, or barium sulphate is added to the resin used to produce. The patient receives then a radiopaque radiological guide containing cylindrical cavities centered on the occlusal surface of the teeth to simulate the main axis of the prosthetic tooth [25].

2D, 3D, panoramic or dentascanner reconstructions can be produced. The scan is performed on the patient with the radiographic guide stabilized in position by the occlusal index. It provides a detailed image of the bone and the positioning of the radio-opaque markers on the radiographic guide [24].

The next step is computer-assisted implant planning, a virtual surgical simulation of implant placement [26, 27]. A number of recommendations should be followed:
- Marking anatomical structures;
- Locating the axial emergence on the occlusal table or incisal edge;
- Placing the implant on a lateral view;
- Positioning the guide's anchoring pins and checking that the various axes are not supperposed;
- Checking implant parallelism on panoramic and 3D views;
- Checking bone fenestration;
- Estimating bone volume required prior to tissue grafting surgery.
- Ordering a surgical guide

This surgical guide is produced using a stereo-lithographic system. It is a replica of the radiological guide designed for implant drilling and placement. The surgical guide serves as an impression for the prosthetic laboratory, which casts the working model and fabricates the master model - the first laboratory step in the production of the provisional prosthesis. Surgery is greatly simplified, with no incision, reducing not only the operating time but also the postoperative effects [28].

3. The surgical phase

In the case of sufficient bone support, implants should be placed 3 mm apically from the cervical margin of the planned crowns to create space for a biological thickness of keratinized tissues. 2 mm of vestibular bone are desired after implant placement to avoid resorption [29].

For guided surgery, drilling begins with the placement of the first 2 implants on each side. Once the implant holders have been removed, the stabilizing abutments are placed, helping to hold the guide in place. The insertion torque at the time of surgery is 35 N/cm for all implants [30].

Therapeutic alternatives have been developed for patients with insufficient bone volume. The "All-on-4" treatment concept is based on the insertion of four implants in the anterior region of fully edentulous jaws to support an implant-supported fixed prosthesis: the two most anterior implants are placed axially, while the two posterior implants are placed with a distal inclination of up to 45°, enabling the connection of prostheses with up to 12 teeth. This concept maximizes the use of residual bone available in atrophic jaws, enabling immediate function and avoiding regenerative procedures (such as bone grafting) that increase treatment costs and the risk of complications [31, 32].

However, when there is insufficient bone volume in the canine-to-canine region, with a DV or D-VI Cawood and Howell (C&H) classification in the posterior regions, extra-long anchored zygomatic implants should be used. If the bone proximal to the midline is maintained, the rehabilitation can be supported by just 2 posterior zygomatic implants and 2 standard implants in the anterior region: this is the hybrid technique. If, on the other hand, the residual bone crest does not allow the placement of standard implants (beyond C-VI C&H classification), 4 zygomatic implants, 2 on each side, are required for implant-supported total maxillary rehabilitation [33-36].

4. The specificities of the implant impression

The major objective in the manufacture of an implant-supported prosthesis is the production of superstructures that provide a passive fit when connected to multiple abutments.

The first step to achieving a precise, passive-fit prosthesis is to reproduce the intraoral relationship of the implants with an impression.

The required qualities of an implant impression material are [37]:
- Rigidity to hold the transfers in place;
- Dimensional stability: the absence of desmodont around implants requires perfect passivity of implant superstructures, and therefore greater precision than with natural teeth;

- Good elasticity in the case of the indirect method, for repositioning impression transfers;
- The possibility of several model casts

Three families of materials satisfy the above specifications [38, 39]:

- **Silicones or polyvinylsiloxanes**: commonly used in fixed prosthetics, they offer the necessary qualities provided. They are sufficiently rigid after setting. However, they need to be of an appropriate viscosity.
- **Polyethers:** They are the most widely used materials in implant prosthetics; their qualities make them suitable for all clinical situations; They have excellent rigidity, the lowest hydrophobicity of all elastomers, et allow several models to be cast without loss of precision.
- **Plaster**: This is the material of choice for registration of the totally edentulous patient using the pick-up method. Some authors use a mixed polyether/plaster technique to combine the advantages of both materials.

Two solutions were described:

- Preliminary polyether impression cut opposite the impression transfers outside the buccal cavity after disinsertion; placement of the modified impression and injection of plaster into the window;
- Single-stage mixed impression with two materials.

Indirect/"Twist-lock" method

Transfers are screwed onto implants or abutments, and an impression is taken in a single step using an impression tray. Then, the transfers are unscrewed, precisely connected to the replicas and replaced in the impression thanks to their characteristic grooves and flats [40-42].

This simple method is particularly reliable when the implant axes are not too divergent [41].

Direct/"Pick-up" method

A windowed impression tray must be used for transfers placed in the mouth. The impression is made in double-mix, with making that the transfer screws are accessible through the impression material. Once the setting reaction is complete, the transfers are unscrewed and the impression is removed. Replicas are screwed to the transfers [40, 42].

Studies carried out by numerous teams and reviews of the literature give it the best accuracy, particularly when implant axes show a high divergence [41].

Complementary technique: with interlocking transfers

All authors agree that splinting transfers for complete prosthetics provides a higher degree of precision, particularly if the implants have divergent axes. Splinting is achieved using dual- or light-curing resin applied to dental floss stretched between the transfers, chemopolymerizable resin or plaster [40, 42, 43].

The digital impression

Digital impressions have been on the rise for the past ten years. Numerous intraoral cameras are now available on the market, and their technology continues to develop. However, their deployment in dental practices remains marginalized, the investment cost being the main obstacle to their widespread use [3].

As with the conventional method using physico-chemical materials, the idea is to precisely locate the implants in all three planes of space in relation to the mucosal environment. This requires the use of specific transfers compatible with the optical impression and the availability of virtual analogues in the CAD software. A camera with a large enough scanning window is also needed to record the entire edentulous arch [4].

To take a digital impression, these steps should be followed [44]:

- An impression is taken of both arches with the provisional prosthesis in place, and the occlusion is recorded in this configuration.
- The temporary bridge is removed to scan the peri-implant mucosal environment.
- Impression transfers (ScanBodies) are placed.
- A second impression is taken to record the position of the transfers.

The technician indicates three reference points on the surface of each ScanBody and on the surface of each corresponding virtual analog. Instantly, the images are aligned, making it possible to locate the position of the virtual analogs of the implants in the digital model [44].

Several studies and systematic reviews have reported that intraoral scanners (IOS) are not accurate enough to capture impressions for full-arch implant-supported restorations via a fully digital workflow [45, 46].

These difficulties can be explained by the absence of stable reference points for the intraoral camera, which works using the stitching principle.

Scan Bodies are designed to be easily recognized by intra-oral cameras. These digital transfers will then constitute the only recognizable markers in an edentulous arch. However, the multiplicity of the same geometric shapes of digital transfers spread over an edentulous arch has an impact on the stitching of the

acquisition software algorithm, with certainly recognizable landmarks, but not discriminating. As a result, the impression is often deformed, or even impossible to produce [47].

Passivity of the framework in implant-supported full dentures is an important condition for the mechanical and biological durability of the implants and the prosthesis. In fully-fixed prosthesis, it is essential to check the working model by making a plaster beam that is screwed into the mouth without fracture. This is an essential and systematic step [44].

5. The choice of prosthetic abutment

The choice of an implant abutment is mainly governed by [48]:

(1) Patient's smile line (low, medium, high or gingival smile),
(2) Nature of peri-implant mucosa (thick or thin),
(3) Implant angulation,
(4) Choice of crown material,
(5) Availability of prosthetic space,
(6) Type of restoration (screw-retained or cement-retained),
(7) Clinician preference
(8) Treatment costs.

Various types of implant abutment have been described in the literature. They can be classified according to the manufacturing method, material, color and the connection method to the restoration (Table 3) [48].

Table 3: Categorization of different implant abutment designs

Category	Options
1. Material	Titanium Cast metal Cast metal with fused ceramic base Alumina Nanoceramic resin Full zirconia Titanium-based zirconia (zirconia-titanium hybrid abutment)
2. Colour	Gold Silver (metallic finish) Pure white Customized white Customized pink/gingival tint in the cervical region
3. Manufacturing method	Prefabricated molded abutment (unmodified or modified) Custom abutment by copying Customized CAD-CAM abutment
4.Connection method to the restoration	One-piece screw-retained abutment crown Two-piece design with screw-retained crown above the abutment Two-piece design with crown cemented over the abutment

(CAD-CAM = computer-aided design–computer-aided manufacturing)

Titanium abutments restored with metal-ceramic crowns are known to be the standard treatment option in implant dentistry with high survival rates.

However, when using titanium, the aesthetic results of the final restoration can be compromised by a grey color that can be transmitted through the peri-implant tissues giving an unnatural bluish appearance [49].

Due to its well-documented high fracture resistance, good aesthetics and superior biocompatibility, zirconia ceramic is becoming an interesting option, leading to its use as an implant abutment. Zirconia abutments manufactured using computer-aided design/computer-aided manufacturing (CAD/CAM) technology is one of the most popular treatment options in implant dentistry, particularly in the esthetic zone [50].

The whitish color of the zirconia abutment offers favorable esthetics compared to the grayish color of titanium in clinical situations of thin peri-implant mucosa or all-ceramic crowns [49].

Lithium disilicate glass-ceramics have proven to be successful aesthetic options compared to zirconia, which has lower translucency and is often too white for optimal aesthetics.

A recent study evaluated the effect of zirconia and lithium disilicate abutments bonded to the titanium base on bone and soft tissue (effect of the material as well as the adhesive seal between superstructure and base). It was found that abutment material and the use of a two-piece abutment did not influence bone loss or soft tissue around the implant, with the exception of a longer junctional epithelium around zirconia and single-piece titanium abutments [51].

Today, a new composite resin block is available for implant crowns. According to the manufacturers, this material is called ‘Nano Ceramic Resin’ and is composed of around 80% nano ceramic filler (silica and zirconia)

and 20% resin matrix. Like a glass ceramic, the material has excellent aesthetic properties. Unlike ceramics, the material is not breakable and features favorable resin bonding, easy shade matching, an easy milling procedure, a higher fracture toughness and strength compared to glass-ceramics and composites [52].

When studying the fracture resistance of different implant abutments, the maximum bite forces must be considered. A great deal of research has focused on bite forces during mastication.

Studies have shown that all zirconia abutments tested have the potential to withstand physiological occlusal forces in the anterior and posterior regions. In nanoceramic resin abutments, a wall thickness greater than 0.8 mm showed the potential to withstand occlusal forces in the anterior regions [52, 53].

Within the limits of these studies, one-piece zirconia abutments showed significantly lower fracture resistance than titanium abutments. The mode of fracture is specific to the abutment material and design. The zirconia abutment may fracture before the retentive abutment screw; this suggests caution when prescribing full-size monobloc zirconia abutments [54].

Other studies have concluded that the titanium-reinforced zirconia abutment behaves in almost the same way as the titanium abutment, so that it can be recommended as an anterior esthetic substitute [55].

6. The design of full-arch implant-supported fixed prostheses

Superstructural/ substructural design

Various types of substructure materials are now available for use in implant-supported full-arch fixed prostheses. However, choosing the most appropriate prosthetic material for each patient is essential.

Studies have compared the biocompatibility and biomechanical properties of five commonly used prosthetic materials: chrome-cobalt Cr-Co, zirconia Zr, titanium Ti, polymethyl methacrylate PMMA and polyetheretherketone PEEK [56].

The highest modulus of elasticity was found for Zr and the lowest for PMMA, followed by PEEK. PEEK's low modulus of elasticity makes it a suitable substructure material for implant prostheses, particularly in overloaded areas, thanks to its cushioning effect [57].

Despite the high stresses exerted on prosthetic substructures, rigid substrate materials transmit less stress to other components, which is why the use of harder materials in the prosthetic substructure is recommended to avoid failure of the implant support system [58].

Other studies have indicated that prosthetic complications are more frequent in metal-PMMA than in metal-ceramic-fixed prostheses. They conclude that it may be appropriate to reinforce PMMA material with a metal substructure in permanent restorations or to use it as a temporary prosthetic material in immediate loading protocols because of PMMA's low fracture resistance [59, 60].

The fracture resistance of the materials was tested and it was found that Zr, Ti and Cr-Co had significantly higher resistance than PEEK. PMMA showed the lowest fracture resistance [56].

These results also suggest that, if PEEK and PMMA are used as final restorative materials in implant-supported prostheses, their thicknesses should be increased to enhance fracture durability [61].

Monobloc Prostheses

All-ceramic restorations are becoming increasingly popular due to their high aesthetic potential and exceptional biocompatibility. Zirconia combines all the positive characteristics of ceramics, although it has limited aesthetic appeal due to its high opacity. Recent research has shown that variations in sintering temperature can influence the translucency of yttria-stabilized zirconia. When higher sintering temperatures were used, the material showed higher translucency, leading to better aesthetic results [62].

It is generally admitted that the full-arch zirconia fixed prosthesis lacks the resilience seen in conventional acrylic metal implant-supported fixed prostheses.

The lack of elasticity resulting from the absence of a periodontal ligament in implant-supported restorations necessitates the use of highly sophisticated materials in an attempt to overcome the fatigue resistance caused by occlusal loading. In a complex biomechanical system, implants, abutments, frameworks, screws, masticatory muscles, temporomandibular joints and esthetic lining materials share the conduction of masticatory stresses. As a result, acrylic prostheses or ceramic veneering materials are more susceptible to fracture.

A retrospective study by Cappare *et al.*, analyzed the differences in complications and failures of definitive full implant restorations made with metal-acrylic versus monolithic zirconia. The results showed that predominantly monolithic zirconia is a feasible alternative to the conventional metal framework acrylic for full arch implant-supported prosthesis. The restoration material did not influence the failure rate and complication risk of both prosthesis and implants [63].

Therefore, it is certainly clear that one-piece zirconia prostheses have a very low failure rate in the short term and may offer promising results. However, it

will need to be validated by future long-term studies [64].

In the last few years, authors have turned their attention to composite materials. Fiber-reinforced composite (FRC) materials have been shown to achieve better functional-esthetical result and a good biocompatibility. According to Passaretti A *et al*., [65], FRC allows better distribution of occlusal loads, while performance is comparable to other materials. The FRC may absorb energy from the masticatory cycle, because of the lower flexural modulus of the material compared to metal alloys [56]. This effect becomes an advantage as it contributes to the maintenance of the peri-implant bone and soft tissues

7. CONCLUSION

The complete dental rehabilitation of patients with a failing dentition using fixed implant-supported prostheses is a clinical challenge and requires carefully planned and well-sequenced treatment.

To reduce the risk of failure, a comprehensive pretreatment diagnostic work-up, including defining the prosthetic goal with the aid of a wax-up or set-up and the associated ideal, prosthetic-oriented three-dimensional implant position, is crucial. Furthermore, selection of the ideal type of prosthesis, including the correct implant components and materials, is important for the clinical long-term success of the reconstruction.

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