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REVIEW ARTICLE

Implant Hybrid Prosthesis- A Comprehensive Review

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ABSTRACT
Implants have become the treatment of choice in many, if not most, situations when missing teeth require replacement. With appropriate diagnosis and conscientious treatment planning, the use of implant hybrid prosthesis enjoys good prognosis. Hence; in the present review, we aim to highlight some of the important aspects of implant hybrid prosthesis.
Key words: Dental Implants, Hybrid

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INTRODUCTION

The treatment options for partially edentulous patients with missing single or multiple teeth range from a provisional removable partial denture, a definitive cast partial denture, a resin bonded prosthesis, fixed partial denture or osseointegrated prosthesis. Clinical decision making is critically dependant on the status of the abutment teeth, which are often periodontally involved themselves.[1- 3] Treatment for partially edentulous patients with advanced periodontal disease involves selective retention of few strategically located key abutments for subsequent overdentures, or for extensive FPD treatment or for implant supported fixed prostheses.[2] Dental implants have become increasingly important in oral reconstruction. The high rate of success of rehabilitation with implant-supported prostheses has increased esthetic demands of patients and clinicians.[4, 5]To obtain satisfactory functional and esthetic results, it is essential to achieve osseointegration and the ideal location of implants to support the intended restoration.[6, 7]

Hybrid prostheses have a great number of advantages including reducing the impact force of dynamic occlusal loads, being less expensive to fabricate and highly esthetic restorations. Furthermore, they may be successfully used by a combination of tilted and axially placed implants in partial edentulism in the posterior part of resorbed maxillae. However, food impaction, speech problems or difficulties in dealing with hygiene were reported by authors.[8]

Implant supported hybrid prosthesis can provide satisfactory results where esthetic and functional requirements are demanding and challenging as in increased intra-arch space that remains following conventional implant replacements, the dentist needs to plan for an alternative treatment procedure that best suits the situation.[7]Hence; in the present review, we aim to

highlight the important aspects of implant hybrid prosthesis.

Prosthetic Options in Implant Dentistry

Implant dentistry is unique because additional foundation units may be created for a desired prosthodontic result. Thus, a range of treatment options are available to most partially and completely edentulous patients. In the past, greater emphasis has been placed on the bone available for implant insertion which determines the position and number of implants and consequently, the final prosthesis design. However, the implant treatment plan of choice is both patient and problem centered and requires a shift in this traditional approach. The benefits of implant dentistry can be realized only when the full range of available options for the final prosthesis is first evaluated by the practitioner and then presented to the patient. Thus, it is important to first visualize the intended final prosthesis based on which the existing bone is evaluated to determine the type and number of implants necessary to support the intended prosthesis.[8- 10]

Influence on prosthetic treatment planning

Elimination of premature contacts

An occlusal analysis should be carried out to identify any premature contacts during mandibular excursions. An elimination of eccentric contacts may allow recovery of the periodontal ligament health and muscle activity within 1–4 weeks.[11]

Night guard

A night guard should then be given with even occlusal contacts around the arch in centric occlusion and posterior disocclusion with anterior guidance in all excursive movements. The patient is advised to wear the device for a period of 4 weeks at night. The night guard is then re-fabricated with 0.5–1 mm of colored acrylic resin on the occlusal surface. [12]

PROSTHETIC OPTIONS IN FIXED FULL-ARCH RESTORATIONS

Porcelain-metal restoration

The main problem encountered with this restoration is related to the added bulk of metal used in the substructure to keep porcelain to its ideal 2 mm thickness. This amount of metal acts as a heat sink during casting procedures which results in porosities and increases the risks of fracture after loading.[13]

Hybrid prosthesis

An alternative option in such situations is the hybrid prosthesis. Because acrylic acts as an intermediary between the porcelain teeth and metal substructure, the impact force during dynamic occlusal loading also may be reduced. Hence, hybrid prostheses are indicated for implant restoration in large crown height spaces as a general rule. [13]

IMPLANT PERMUCOSAL POSITION: PROSTHETIC CONSIDERATION

An implant placed in the improper position can compromise the final results in terms of esthetics, biomechanics, and maintenance. The most compromising position for an implant is too facial because no prosthetic ' "trick" exists to mask it, resulting in compromised esthetics, phonetics, lip position, and function. The permucosal position of the implant abutment is of particular importance for FP-1 prostheses. The ideal position is directly under the incisal edge position of the anterior natural tooth and under the central fossa of posterior natural teeth to be replaced.[14]

Dental implant hybrid prostheses have a great number of advantages which includes:[15- 18]

- Reducing the impact force of dynamic occlusal loads,
- Being less expensive to fabricate
- Highly esthetic restorations
- They may be successfully used by a combination of tilted and axially placed implants in partial edentulism in the posterior part of resorbed maxillae.

Disadvantages of implant hybrid prosthesis include:

- Food impaction,
- Speech problems or
- Difficulties in dealing with hygiene
- Surgical complications,
- Implant loss,
- Bone loss,
- Peri-implant soft-tissue complications,
- Mechanical complications, and
- Aesthetic/phonetic complications

LITERATURE

Tang L, Lund JP, Taché R, Clokie CM, Feine JS (1999) conducted a study in which sixteen edentulous subjects participated in a within-subject crossover clinical trial to test the hypotheses that a long-bar overdenture attached to 4 implants gives greater patient satisfaction and masticatory efficiency than a two-implant hybrid overdenture. All subjects were given a new maxillary conventional denture. Ten received mandibular long-bar overdentures first and six the hybrid overdentures. Two months later, psychometric assessments and functional tests were repeated 3 times at one-week intervals. The results suggested that mastication with the 2 prostheses is equally efficient, although clearance of some foods from the mouth is longer with the long-bar overdentures. They also indicated that patients adapt their masticatory movements to the characteristics of different prostheses.[8]

Rodriguez AM, Orenstein IH, Morris HF, Ochi S (2000) conducted a study where 882 prostheses supported by more

than 2,900 implants (687 patients) were placed by the Department of Veterans Affairs Dental Implant Clinical Research Group (DICRG). These prostheses were divided into five research strata based on arch location. The recommended design for each stratum was: bar-supported overdenture (maxillary completely edentulous); screw-retained hybrid denture (mandibular completely edentulous); screw-retained fixed partial denture (mandibular and maxillary posterior partially edentulous); and cemented single crown (maxillary anterior single tooth). The prosthesis designs investigated in this study proved to be reliable, with encouraging success rates for an observation period of 36 months following placement.[9]

Tealdo T, Bevilacqua M, Pera F, Menini M, Ravera G, Drago C, Pera P (2008) evaluated the 12-month implant survival after immediate loading of 4 to 6 implants with fixed screw-retained prostheses in edentulous maxillae. Twenty-one patients, edentulous or with remaining teeth to be extracted in the maxilla, received 4 to 6 implants (n=111). The patients were restored with screw-retained fixed provisional prostheses supported by palladium-alloy frameworks within 24 hours after surgery. Insertion torques for implants were at least 40 Ncm. In this study with 12-month follow-up, 4 to 6 implants were sufficient to successfully support fixed implant screw-retained prostheses in the edentulous maxillae of 21 patients.[10]

Maló P, NobreMde A, Lopes A, Ferro A, Moss S (2014) reported retrospectively on the 5-year follow-up results of the rehabilitation of complete edentulous atrophied maxillae, using extra-maxillary zygomatic implants alone or in combination with conventional implants The long-term outcome (5 years) of rehabilitations performed on patients with completely edentulous, severely atrophic maxillae supported by immediately loaded zygomatic implants alone, or in combination with conventional implants, is satisfactory.[11]

Hyun T, Bain PA, Levin L (2014) investigated the short-term (5–10 year mean follow-up) and long-term (10 year or more) survival and success of fixed full arch dental hybrid prosthesis and supporting dental implants. A total of 18 studies were included for the quality assessment and the systematic review. Within the limitation of available studies, high short-term survival rates of full arch fixed dental hybrid prostheses (93.3–100%) and supporting implants (87.89–100%) were found. However, the availability of studies investigating long-term outcomes seemed scarce. Furthermore, the included studies were subjected to potential sources of bias (i.e. publication, reporting, attrition bias). Despite seemingly high short-term survival, long-term survival of implant supported full arch fixed dental hybrid prosthesis could not be determined due to limited availability of true long-term studies.

Worni A, Kolgeci L, Rentsch-Kollar A, Katsoulis J, Mericske-Stern R (2015) evaluated technical problems and failures of implant-supported zirconia-based prostheses with exclusive screw-retention. Consecutive patients received screw-retained zirconia-based prostheses supported by implants and were followed over a time period of 5 years. This study showed that zirconia-based implant-supported fixed prostheses exhibit satisfactory treatment outcomes and that screw-retention directly at the implant level is feasible.[13]

Maló P, de AraújoNobre M, Lopes A, Ferro A, Gravito I (2016) reported the 5-year outcome of NobelSpeedy design implants in immediate function fixed prosthetic rehabilitations. They concluded that implants of the NobelSpeedy type used in immediate function for support of fixed prosthetic full-arch rehabilitations are a valid option, with a high survival rate.[14]

OguzAhmet BS, SayinOzel G, UsluToygar H (2016) reported the 1-year follow-up of the periodontal and prosthetic rehabilitation of a patient who has presented with symptoms of peri-implantitis due to incorrectly planned implant supported fixed metal ceramic bridge which was later replaced with screw-retained hybrid prosthesis following the treatment of peri-implant defects. Treatment helped to maintain patient's self-confidence and comfort, as well as favorable masticatory function. Rehabilitation with screw retained hybrid prosthesis is an ideal treatment of choice for maxillomandibular skeletal discrepancies.[15]

Menéndez-Collar M, Serrera-Figallo MA, Hita-Iglesias P, et al (2018) evaluated, over a 2-year period, the treatment outcomes for maxillary full-arch fixed dental prostheses (FDPs) supported by a combination of both tilted and axially-placed implants and compared the marginal bone loss (MBL) and implant survival rates (SR) between tilted and axial implants. A retrospective study has been carried out. Thirty-two patients (16 males and 16 females) treated with maxillary full-arch FDPs were included in this retrospective study. A total of 187 implants were inserted to rehabilitate the fully edentulous maxillary arches: 36% of them were tilted (T group, n = 68) and the remaining 64% were axially placed (A group, n = 119). From the total, 28% of the implants (n=53) were immediately loaded with screw-retained provisional acrylic restorations, whereas 72% underwent conventional delayed prosthetic loading 6 months post-operatively. Full-arch fixed prostheses supported by a combination of both tilted and axially placed implants may be considered a predictable and viable treatment modality for the prosthetic rehabilitation of the completely edentulous maxilla.[16]

Zhuang R, Liu C, Han Z, Li J, Geng W (2018) described a sequence of treatments for a severe mandibular defect. Two patients with severe hard and soft tissue defects had physiological function restored in 4 steps, including alveolar distraction osteogenesis, implant insertion based on a prosthesis, application of dermal matrix membrane in reconstruction of attachment gingiva, and the use of a hybrid prosthesis designed via computer-aided design and computer-aided manufacturing, to produce an adequate bone tissue volume, an adequate amount of attached gingiva, and a reliable prosthesis. Their study showed that a

treatment sequence can be predictable and effective for severe mandibular defects, which suggests that it could be considered a potential protocol for patients with severe mandibular defects.[18]

Nevins M, Chu SJ, Jang W, Kim DM (2019) evaluated the safety, efficacy, primary stability, and wound healing of a hybrid dental implant with a unique macrogeometry design in which the coronal section is narrower and cylinder-shaped followed by a wider, tapered apical portion, each comprising approximately one half the length of the implant. Eighteen hybrid macrogeometry-designed dental implants were placed bilaterally into three foxhounds in the mandibular third and fourth premolar and first molar (P3, P4, and M1, respectively) extraction sockets of different dimensions immediately following full periosteal flap elevation and removal of teeth without socket grafting. This preclinical study provided clinical and histologic evidence to support the safety and efficacy of a new hybrid macrogeometry implant design that achieved excellent primary and secondary stability in immediate extraction sockets without grafting.[19]

CONCLUSION

Implant-hybrid prostheses can be fixed, or in the case of the bar-retained overdenture, attached and unmovable. There is a higher cost associated with implant-supported prostheses because they involve more implants and, therefore, more surgery, particularly if significant grafting is required.

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