

From Our Office to Yours...

Complete edentulism is becoming a more common condition in patients over the age of 50.

Changing lifestyle habits, including lack of dental care, poor oral hygiene and diets rich in carbohydrates, lead to dental caries and periodontal disease.

Fewer visits to the dental office prevent early intervention for patients who face terminal, non-restorable dentitions.

Subsequently, patients who become edentulous, or who have a terminal dentition, suffer a significantly decreased quality of life with impaired oral functions, unhealthy changes in food consumption, poor esthetics, and reduced self-esteem.

Institute of Health studies report that 47 million adults people will face total edentulism by 2020.

*This issue of **The PerioDontaLetter** addresses the various fixed prosthetic treatment options for totally edentulous patients and patients facing total edentulism.*

As always, we welcome your comments and questions.

Fixed Prosthetic Treatment Options for the Completely Edentulous Patient and Patients Facing Complete Edentulism

Historically, the conventional treatment for complete edentulism has been removable complete dentures.

However, clinical studies have shown that patients with removable complete dentures have a considerably decreased quality of

life when compared with patients with a fixed prosthesis.

The main causes of patient dissatisfaction with complete dentures are lack of proper mastication, inability to eat different types of food, loss of taste, impaired speech, and poor denture stability.



Figure 1. *A partially edentulous patient presents with a hopeless dentition in both the maxillary and mandibular arches. (See Figures 2 and 3 on page 2.)*

All these factors lead to a decrease in overall health and diminished lifestyle options. Patients tend to avoid a nutritious protein-based diet, and tend to avoid activities that involve interaction with other people.

Dental implant-supported, fixed prostheses offer a solution to these problems, and can significantly improve the quality of life for these patients.

One alternative to complete dentures is an immediately-loaded, implant-supported, full-arch dental prosthesis.

Clinical longevity and success rates of immediately-loaded dental implants have been well documented as a proven and predictable treatment for edentulous patients. High levels of patient satisfaction in terms of esthetics, phonetics and function have been reported in clinical studies.

Three main types of implant-supported, full-arch prostheses are currently in use:

1. Metal-framework, reinforced acrylic hybrid prostheses
2. Screw-retained, full-arch zirconia prostheses
3. Cement or screw-retained, full-arch porcelain-fused-to-metal prostheses

The primary determining factor which must be considered before selecting one of these restorations is

the patient's desires and needs for a removable or non removable restoration — what they want to eat need to eat — and the amount of intra-arch space

In addition, other clinical parameters such as lip support, high maxillary smile, low mandibular lip line, and the patient's greater esthetic demands should be evaluated before deciding on a prosthetic treatment plan.

More importantly all implant surgical planning should be prosthetically, as opposed to surgically, driven.

Implant-Supported Hybrid Prostheses

Complete implant-supported, metal and acrylic fixed dental prostheses — or hybrid prostheses — were introduced to address the problems caused by unstable and uncomfortable mandibular dentures.

Hybrid prostheses have a number of advantages over acrylic and zirconia prostheses. They reduce the impact of dynamic occlusal loads, are less expensive to fabricate, and are highly esthetic restorations.

Some of the disadvantages that have been reported include: food impaction,

speech problems, and hygiene difficulties.

Material-related problems have also been reported, including acrylic deterioration over time due to water absorption, discoloration, and ultimately, fracture. Furthermore, the excessive porosity of acrylic decreases clinical survival.

Clinical studies recommend 12 to 14mm of restorative inner arch space to accommodate sufficient thickness of acrylic to prevent fracture.

Achieving this space, especially in patients with terminal dentition, will almost always require surgical reduction of alveolar bone.

Hybrid prostheses have been conventionally fabricated with a rigid metal framework and acrylic resin for artificial teeth and gingiva.

This design remains a popular choice because of its low fabrication cost, easier reparability, and the clinician's comfort level with this material.

However, multiple clinical studies and systematic reviews have reported a high rate of fracture and wear of the acrylic resin, requiring repair, replacement, and lifelong maintenance.

This maintenance represents a significant inconvenience, financial



Fig. 2



Fig. 3

Figure 2. Implants were placed and healed in preparation for a full arch zirconia prosthesis in both the maxilla and mandible. Figure 3. The final restoration is both functional and esthetic.

cost, and dissatisfaction with treatment for both patient and clinician. Moreover, patients with distal cantilevers, insufficient prosthetic space, or parafunctional habits report much higher complication rates.

Full-Arch, Implant-Supported Zirconia Prostheses

Zirconia has emerged as an alternative prosthetic material for full-arch, implant-

supported prostheses, and is purported to solve many of the problems related to metal-resin and metal-ceramic prostheses. Implant-supported, full-arch zirconia prostheses are designed using computer assisted design and computer assisted machining (CAD/CAM). Zirconia prostheses are known for their high fracture resistance compared to all other ceramic materials used in dentistry. Moreover, they are also known for their esthetic, lifelike reproduction of natural dentition.

The use of completely monolithic zirconia, or minimally-veneered zirconia with feldspathic porcelain in the gingival region, has multiple advantages for the clinician and patient.

These advantages include:

- Reduced laboratory costs because of the automation involved in fabrication
- Good dental and gingival esthetics
- Superior strength, durability and wear characteristics



Figure 4. Initial examination reveals a fully edentulous mandible arch with a decision to proceed with a fixed, implant-supported bridge. Figure 5. After healing and integration of the implants, restorative abutments were placed.



Figure 6. Try-in of the metal framework. Figure 7. A fixed implant-supported, porcelain-fused-to-metal prosthesis was placed.

- Superior prosthesis fit
- Availability of a permanent digital file for future reproduction
- Opportunity for digital fabrication of a prototype/replica prosthesis in acrylic resin for patient approval and adjustments
- Superior biocompatibility compared with metal alloys, reduced plaque accumulation, and
- Favorable soft tissue response

The disadvantages related to the use of zirconia include the inability to repair fractures, difficulty in adjusting and polishing, and high fracture rates of opposing acrylic prosthesis.

Moreover, the use of a minimum five supporting implants is recommended due to the high stiffness and overall weight of the zirconia full-arch prostheses.

Full-Arch, Implant-Supported Metal-Ceramic Fixed Dentures

Full-arch, implant-supported, porcelain-fused-to-metal (PFM)

prostheses are very similar to typical ceramo-metal fixed partial dentures used for replacing natural teeth.

A substructure is fabricated to provide both the attachment to underlying implants, as well as an ideal porcelain thickness for long-term durability.

When designed correctly with adequate metal support for layering porcelain, they satisfy all requirements for a prosthodontic rehabilitation.

Definitive occlusal surfaces can be created in porcelain, or alternatively may be made in metal if advisable.

A metal-ceramic prosthesis is very esthetic, as ceramic is more life-like than acrylic resin.

However, one disadvantage of a metal-ceramic prosthesis is that ceramic chipping or fracture may occur and may be difficult to repair.

The opposing occlusion should invariably and scrupulously be considered, especially if a parafunctional habit is suspected.

Moreover, six to eight implants per arch are generally recommended to support a PFM full-arch prostheses.

In addition, PFM full-arch prostheses are generally expensive, time-consuming to fabricate, and technique

sensitive, which precludes their use for many patients.

Conclusion

While a full-arch, implant-supported restoration offers a predictable and superior alternative to complete dentures, treating the totally edentulous patient and patients facing total edentulism with such complete prostheses can be a challenging task.

Close collaboration between the periodontist, restorative dentist and the dental laboratory is key to a successful clinical result which is more likely to produce patient satisfaction in terms of comfort, function, phonetics, and esthetics.



Figure 8. Initial examination shows an unesthetic and terminal dentition. Figure 9. Both arches were restored with an implant-supported, hybrid complete fixed dental prosthesis.