

A Remarkable Journey: The Evolution of Restorative Materials for Full-Arch Implant-Supported Fixed Dental Prosthesis

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INTRODUCTION

The use of dental implants to restore completely edentulous arches has become a highly reliable and preferred treatment option for patients. Accurate records and meticulous planning are pivotal not only to prepare for the implant surgery but also to determine spacing and select the appropriate restorative materials. Historically, full arch implant-supported fixed dental prosthesis have been made of metal frameworks with acrylic wrapping around the whole substructure. However, the frequent mechanical complications including wear, acrylic teeth fracturing, chipping and debonding necessitated the use of alternative materials. Advancements in restorative materials and engineering have unlocked a broader array of possibilities to reconstruct edentulous arches to acceptable functional and esthetic standards. Zirconia is a material that has been commonly used with veneering porcelain to fabricate full arch implant-supported fixed prosthesis. More recently, there has been an increase in newer and superior materials such as titanium, high performance zirconia leading to newer prosthetic designs, including, metal-composite, monolithic zirconia, metal-zirconia, metal-porcelain, and zirconia-porcelain etc..

In summary, the purpose of this poster is to navigate the extraordinary trajectory of restorative materials within the realm of full arch implant-supported fixed dental prostheses with a review of the literature. The historical challenges spurred innovations, leading to a spectrum of contemporary options. The discussion encapsulates this transformative journey, providing practitioners with insights to make informed decisions in selecting materials to ensure successful outcomes.



Cast Metal – Acrylic Wrap Around: Figure 1



Zirconia - Individual Cemented Crowns: Figure 3



Figure 3a



Figure 1a



Titanium Framework – Individual Cemented Crowns: Figure 2



Zirconia – Veneered Porcelain: Figure 4



Monolithic Zirconia: Figure 5a (Maxillary arch) & 5b (Mandibular arch)

➡ The Future

DISCUSSION

1. Cast Metal with Acrylic Wrap Around

- a. Advantages:
 - i. Reduced costs
 - ii. Metal tissue side for easy cleanability
 - iii. Ease of Repair
- b. Disadvantages
 - i. Chipping or loss of acrylic teeth (Figure 1)
 - ii. Occlusal wear of teeth (Figure 1a)
 - iii. Catastrophic fracture of acrylic resin
 - iv. Staining of acrylic

2. Titanium Framework with Individual Cemented Crowns

- a. Advantages
 - i. More esthetic than metal framework with acrylic veneering
 - ii. Ability to replace crowns
- b. Disadvantages
 - i. Debonding or fracture of crowns
 - ii. Chipping of gingival porcelain veneering (Figure 2)
 - iii. Dark marginal color

3. Zirconia Framework with Individual Cemented Crowns

- a. Advantages
 - i. More esthetic than metal frameworks (Figure 3)
 - ii. Strength of framework
- b. Disadvantages
 - i. Debonding or fracture of crowns
 - ii. Chipping of gingival porcelain
 - iii. Marginal Staining (Figure 3a)

4. Zirconia with Veneered Porcelain

- a. Advantages
 - i. Maximal esthetics
 - ii. Strength of Framework
- b. Disadvantages
 - i. Chipping of veneered layer (Figure 4)

5. Monolithic Zirconia

- a. Advantages
 - i. Ease of fabrication (inexpensive and time saving with digital technology)
 - ii. Strength of Framework (Figure 5a)
- b. Disadvantages
 - i. Catastrophic failure of framework (Figure 5b)

CONCLUSION

The evolution of materials and their uses in full-arch fixed implant supported prosthesis has shown much improvement, but still have their limitations. It is important to understand the benefits of using each material and know the prosthetic complications that may arise.