

BruxZir® Solid Zirconia:

Moving Beyond the Traditional Hybrid Denture



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The use of osseointegrated implants as a foundation for fixed and removable prostheses has substantially enhanced the quality of life for edentulous patients.¹ For many years now, when a patient presents with an edentulous arch or with conditions warranting the removal of their existing natural dentition, we have had the option of placing dental implants to retain an implant-supported prosthesis. The superiority of implant-supported restorations compared to conventional dentures cannot be overstated. By dramatically increasing prosthetic stability, implant-supported full-arch restorations significantly improve masticatory and speech functions.² The

positive impact of implant-supported prostheses on the oral health, comfort and esthetics of edentulous patients is accompanied by social and psychological benefits as well as improved personal confidence.³ At the same time, dental implants mitigate gingival recession and bone loss, helping to preserve the shape of the patient's mouth and facial structures.⁴

Acrylic hybrid dentures take the retentive concept of implant overdentures a step further by attaching to the implants through a titanium substructure, offering patients a fixed restoration that maximizes prosthetic stability. High quality denture teeth

and an acrylic base are added to the titanium framework to establish form, function and esthetics that are remarkably similar to those provided by natural dentition. The titanium framework is typically fabricated with CAD/CAM technology, and the passive fit needed for a screw-retained restoration is often achieved by splinting the impression copings together before the final impression is taken.

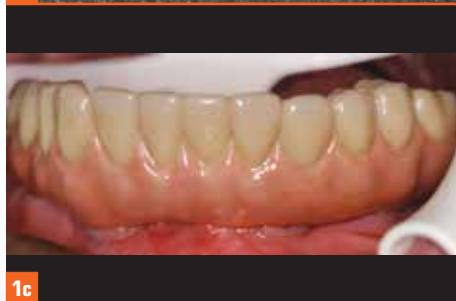
While both removable and fixed implant-supported prostheses provide wide-ranging benefits for edentulous patients, fixed restorations have demonstrated superior impact on oral health, dental function, patient

satisfaction, and quality of life.^{5,6} For this reason, the acrylic hybrid denture has long been considered the optimal choice for full-arch restorations. There has been only one downside: The acrylic base and prosthetic teeth that form the body of the hybrid denture are prone to wear, chipping and fracture (Figs. 1a-1c).⁷ In many cases, a high degree of maintenance is required over the life of the restoration. This is because fixed full-arch implant restorations are subject to substantial forces associated with masticatory function, parafunctional habits, and bruxism. In the long term, this often causes hybrid dentures to break down, requiring ongoing maintenance and replacement of the prosthetic teeth or acrylic base (Figs. 2a-2c).

A New Standard in Durability

Thanks to improvements in material science and advancements in CAD/CAM technology, full-arch prostheses can now be precisely milled from monolithic zirconia, offering the esthetics and functionality of an acrylic hybrid denture with the added benefit of long-term durability. The BruxZir® Solid Zirconia Full-Arch Implant Prosthesis is constructed from 100 percent solid zirconia, attaching to the implants through titanium copings (Figs. 3a, 3b). Exhibiting exceptional fracture toughness and flexural strength of up to 1465 MPa, BruxZir® Solid Zirconia has the ability to withstand the functional stresses that full-arch implant restorations are subject to over time (Fig. 4).

Unlike hybrid dentures, the entire body of the BruxZir Full-Arch Implant Prosthesis including the gingival and tooth areas is constructed from the same robust material (Figs. 5a-5e). This singular construction avoids the dislodging of prosthetic teeth that can occur with traditional hybrid dentures, minimizing the chances that edentulous patients will ever have to go without their prosthesis while the restoration is replaced or repaired (Figs. 6a-6d).



Figures 1a-1c: After several months of wear, the patient was disappointed with his acrylic hybrid denture, which had fractured in different locations along the prosthesis. The acrylic hybrid denture was thus replaced with a restoration fabricated from monolithic zirconia, providing the patient with function and durability.



Figures 2a-2c: This patient's fixed hybrid prosthesis broke on multiple occasions over the course of several years. After the most recent fracture, he was transitioned into a BruxZir Solid Zirconia Full-Arch Implant Prosthesis to avoid the frustration and inconvenience of future repairs or replacements.



Figures 3a-3b: The full-arch prosthesis attaches directly to the implants through titanium copings. Note the all-zirconia construction of the mandibular restoration and the metal substructure of the opposing acrylic hybrid denture.

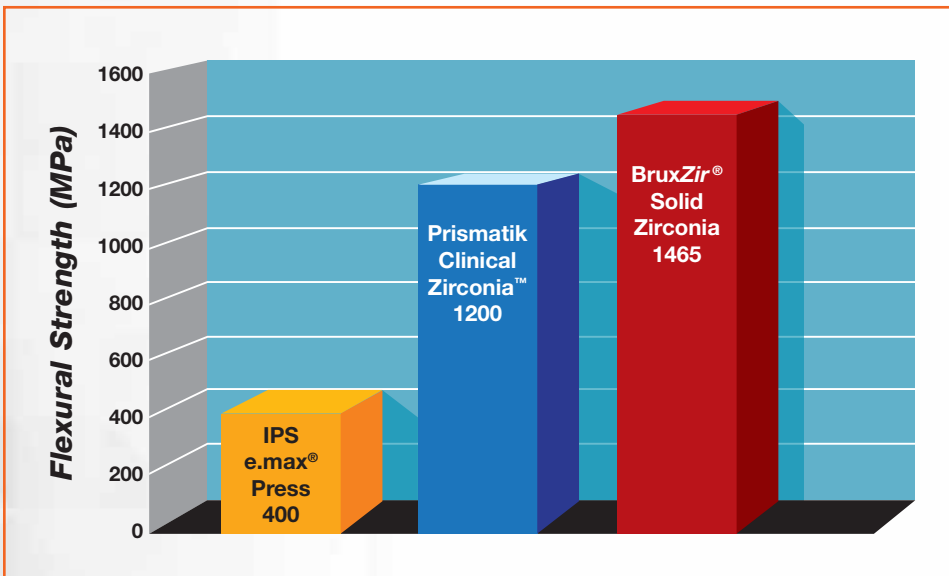


Figure 4: Lithium disilicate ceramics have a flexural strength of 400 MPa, and typical zirconia materials have more than 1200 MPa. However, because of post-powder processing, BruxZir Solid Zirconia dental restorations are able to exceed those levels, with flexural strengths up to 1465 MPa.



Figures 5a-5e: BruxZir Solid Zirconia makes up the teeth, gingival areas and body of the full-arch restoration, eliminating the need to bond material to a metal framework and thus minimizing the possibility of breakage or dislodged prosthetic teeth.



Figures 6a-6d: An edentulous patient with severe bruxism was originally treated with a traditional hybrid denture, which proved unable to withstand the constant bruxing and grinding. The hybrid was replaced with a prosthesis fabricated from BruxZir Solid Zirconia. Because of its robust, singular construction, there is a very small likelihood that the patient will ever have to go without his new prosthesis.

The strength and durability offered by BruxZir Solid Zirconia is complemented by lifelike esthetics and excellent translucency. The teeth of the prosthesis exhibit color very similar to natural dentition, and advanced staining techniques are used to establish gingival areas that blend well with the patient's soft tissue (Figs. 7a, 7b). Additionally, BruxZir Solid Zirconia is biocompatible, hypoallergenic and wear-compatible with the enamel of opposing teeth.⁸

The BruxZir Full-Arch Implant Prosthesis is a superior option for edentulous patients with sufficient bone volume for the placement of implants. The All-on-4 concept can be used in cases where two or more of the posterior implants must be angulated to ensure placement in a maximum amount of bone or to accommodate the mental foramen, alveolar canal or sinus. Multi-unit abutments can be used in cases where a level restorative platform must be established, correcting for divergent implant angulation, tissue depth and occlusal clearance issues (Figs. 8a-8c).

The clinical steps involved in the fabrication of the BruxZir Full-Arch Implant Prosthesis are straightforward and essentially the same as those for the traditional hybrid denture, so there is no added chair time to the procedure. After preliminary impressions, conventional denture techniques are utilized to produce centric jaw relationship records. This is followed by try-in and approval of the wax setup. As with the titanium framework of acrylic hybrids, it is crucial that full-arch prostheses fabricated from solid zirconia exhibit a passive fit. Thus, an implant verification jig is used when the final impression is taken, facilitating a passive fit for the definitive restoration by ensuring the titanium connections are positioned in precise alignment with the implants (Figs. 9a-9c).

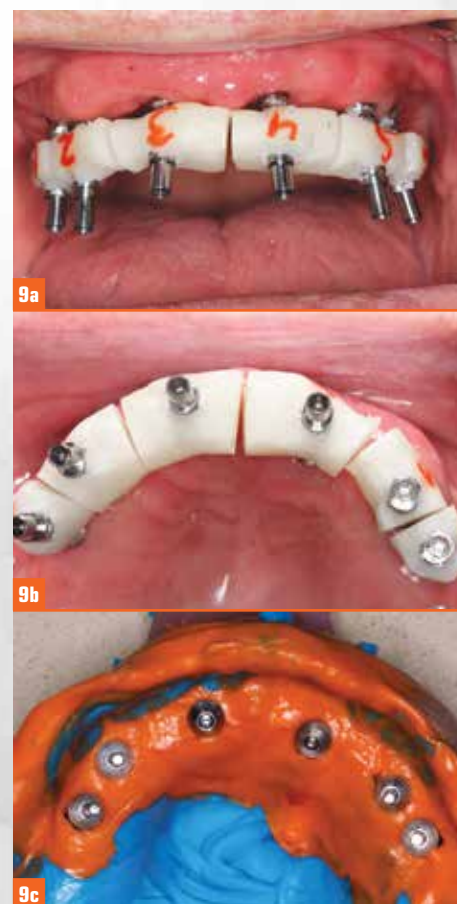
Once the final impression has been taken, the definitive prosthesis is de-



Figures 7a-7b: The color of monolithic zirconia and advanced staining techniques provide for lifelike prosthetic teeth and gingival areas that blend well with the patient's natural soft tissue. Note that the screw access holes have yet to be filled.



Figures 8a-8c: As seen on the master cast, this full-arch restoration was fabricated to seat over a common restorative platform established by multi-unit abutments.



Figures 9a-9c: The implant verification jig is seated in the implants and bonded together before being picked up by the final impression. The final impression will be used to fabricate the master cast.



10a



10c

Figures 10a-10c: After scanning the final doctor-approved setup and master cast, CAD software is utilized to create the definitive prosthetic design. The placement of the titanium copings is determined based on the positioning of the implant verification jig picked up in the final impression, ensuring a passive fit is achieved.



12a



12b



12c

Figures 12a-12c: Final BruxZir Full-Arch Implant Prosthesis in place. Its unique combination of esthetics, function and long-term durability has elicited an extremely positive response from patients.

signed with advanced CAD/CAM technology, and the final doctor-approved setup acts as a blueprint (Figs. 10a-10c). The digital design process results in a prosthesis that embodies the exact morphology, teeth positioning, occlusion, incisal edges, and screw access holes of the final setup, while incorporating the tissue anatomy and implant positioning captured by the final impression.

A provisional implant prosthesis is produced to verify the definitive design prior to fabrication of the final restoration (Figs. 11a, 11b). The provisional is constructed from poly(methyl methacrylate) (PMMA), a uniquely versatile yet durable material that can be adjusted to accommodate any necessary changes, which are typically minor. The provisional is worn during an interim trial period, allowing the patient an opportunity to confirm the proposed restoration. Following completion of the trial period, any changes are incorporated into the prosthetic design.

By the time the final monolithic zirconia restoration is milled, the synergy of attention to detail, advanced materials and technology result in a prosthesis that fits perfectly, fully restores oral function, exhibits natural-looking esthetics, and, most importantly, promises long-term durability to the patients who count on their fixed implant restorations most (Figs. 12a-12c).



11a



11a

Figures 11a-11b: The provisional full-arch implant prosthesis is a functional temporary restoration that allows the patient to verify the definitive design before the final restoration is fabricated from monolithic zirconia.

Conclusion

The long-term viability of dental implants has been proven time and again. While fixed hybrid dentures have made a life-changing impact on edentulous patients, their reliance on an acrylic base and denture teeth makes them vulnerable to breakage and wear. The BruxZir Full-Arch Implant Prosthesis is a superior alternative that maximizes the odds that the restoration will last as long as the implants holding it in place. **IM**

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