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CLINICAL INNOVATIONS

Workflow of All-on-4 with full-arch prostheses integrating Hi-Fiber technopolymer reinforced bars

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Abstract

Background: Hi-Fiber consists in a technopolymer of continuous pre-tensioned fibers incorporated in 3D printing processes producing a customizable fiber prosthetic structure. Potentially, it represents an alternative to metal infrastructures in implant supported fixed restorations. However, scientific evaluation of this potential alternative is lacking. Aim/Hypothesis : To describe the workflow of full- arch implant-supported restorations integrating Hi-Fiber technopolymer reinforced bars applied to full-arch restorations ad modum All-on-4 concept. **Material and Methods**: Two patients with full-arch rehabilitations in immediate function were included: A female patient (81 years of age) with a bimaxilar All-on-4, and a male patient (62 years of age) with a maxillary All-on-4 Hybrid (2 standard and 2 zygomatic implants). Two lab digital impressions were taken with a scanner (3Shape d2000): a) approved prosthesis screw retained to the working models; b) working models with prosthetic cylinders. The CAD files were integrated in the Hi-Design software (Hi-Fiber) to digitally plan the continuous fiber framework. The digital design was exported to the Hi-Fiber MD01 robot that produced the continuous fiber framework, later incorporated during the acrylization process into the final acrylic resin prostheses. Outcome measures were the time elapsed between prosthesis design and connection and the passive fit of the prosthesis at connection. **Results**: The time elapsed between prosthesis design and connection was on average 60 hours (2.5 days). The digital workflow provided the precise position of the prosthesis assuring passive fit at connection. This tool enabled the connection of functional and aesthetic prostheses in both patients with no incidences of prosthetic failure registered during the follow-up (functional osseointegration period). The main advantages of the present digital workflow include its accuracy, time- and cost-effectiveness, and the ability to connect a customized prosthesis that can be manufactured using a standard protocol. However, it is important to point out that a learning curve is necessary to improve the design ability and the time to produce the design. Suggested improvements include the workflow in English language and the inclusion of structures enabling the assembly of different materials. **Conclusion and Clinical implications**: Within the limitations of this case series, the workflow of rehabilitations ad modum All-on-4 with full-arch prostheses integrating Hi-Fiber technopolymer reinforced bars is predictable. It allowed a reduced time of rehabilitation without compromising function, aesthetics, and passive fit.

Results

A functional and aesthetic prosthesis with perfect fit was connected with an average of 60 hours between design and connection in both cases No incidence of prosthetic failure was registered.

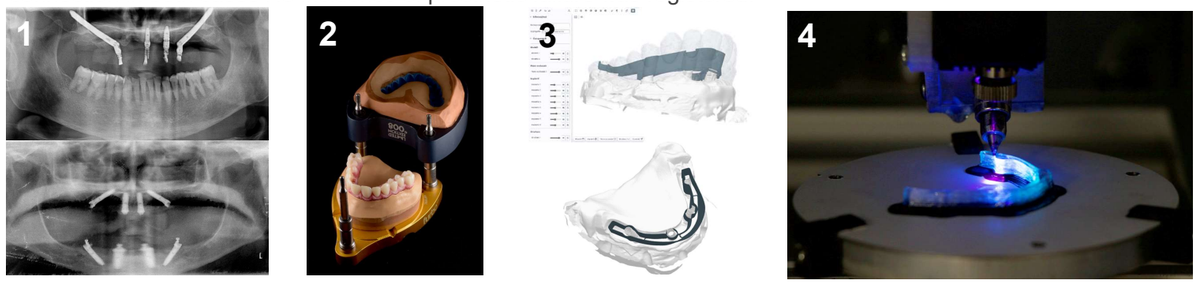

Fig.1- Orthopantomography of both patients with the provisional prosthesis. Fig.2- Two lab digital impressions were taken with a scanner (3Shape d2000): a) approved prosthesis screw retained to the working models; b) working models with prosthetic cylinders; Fig.3-CAD files integrated in the Hi-Design software (Hi-Fiber) to digitally plan the continuous fiber framework. Fig.4-The digital design was exported to the Hi-Fiber MD01 robot that produced the continuous fiber framework. Fig.5-Fiber framework after manufacture; Fig.6-Incorporation of the fiber framework incorporated during the acrylization process. Fig.7-Acrylization process of the final acrylic resin prostheses. Fig.8-Final Hi-Fiber technopolymer-acrylic resin prosthesis. Fig.9-Patient smiling with the prosthesis in function.

Background and Aim

The All-on-4 concept consists in a treatment rehabilitation alternative for full-arch edentulism through immediate function with long term documented success.[1,2] Hi-Fiber consists in a technopolymer of continuous pre-tensioned fibers incorporated in 3D printing processes with high resistance/weight ratio,[3] producing a customizable fiber prosthetic structure and representing a potential alternative to metal infrastructures in implant-supported fixed restorations. The aim of this case series is to describe the workflow of full- arch implant-supported restorations integrating Hi-Fiber Technopolymer reinforced bars applied to full-arch restorations.

Conclusion

The present workflow integrating Hi-Fiber technopolymer reinforced bars to the All-on-4 Concept is predictable with a functional, aesthetical and fit implant supported fixed prosthesis with a reduced rehabilitation time.

Methods and Materials

Two patients with full-arch rehabilitations in immediate function were included: A female patient (81 years of age) with a bimaxillary All-on-4, and a male patient (62 years of age) with a maxillary All-on-4 Hybrid (2 standard and 2 zygomatic implants). Both patients were rehabilitated and in the process of definitive prosthesis manufacture, with approved provisional prostheses. The workflow is described in figures 1 to 9. Outcome measures were the time elapsed between prosthesis design and connection and the passive fit of the prosthesis at connection.

References

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