

# Vertical dimension increase in immediate loading of full-arch implant prosthetic rehabilitation guided by electromyography

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## Abstract

## Methods and Materials

## Results

This study reports a vertical dimension increase in immediate loading of full-arch implant prosthetic rehabilitation guided by electromyography. The patient was edentulous and wore removable prosthesis since 3 years. He is a 54 years old ex-smoker with a history of heart attack who experiences bruxism daily. We used an electromyographical protocol (EMG) which revealed the necessity of a vertical dimension increase. The goal was getting a repeatable and reliable treatment protocol to support full-arch implant prosthetic rehabilitations while checking the restoration of biomechanical oral functions.

The rehabilitation was carried out through prosthetic-driven design and immediate loading protocol. The positioning of copaSKY Bredent implants was prosthetically guided using surgical templates (Fig 2). The prosthetic framework was made with ceramic-reinforced PEEK, ensuring excellent mechanical resistance and an outstanding shock-absorbing effect on masticatory loads. The superstructure was made of a highly aesthetic composite material. Muscle activity was analyzed through surface electromyographic exams using electrodes adhered to the skin overlying the anterior bundle of the temporal and masseter muscles.

The first electromyography was performed at time zero, then pre-intervention, and finally at two and six months post-loading.

The first EMG indicated good muscular adaptation in the patient over time, but with right torsion and left muscle predominance (Fig. 3-a). The outset status with reduced VDO initially required a period of observation and adjustment of his complete removable prostheses.

After two weeks, the second EMG revealed high impact due to the stomatognathic system's attempt to adapt quickly to the new condition (Fig. 3-b). It was decided to increase VDO by 3 mm anteriorly and 1.5 mm posteriorly. EMGs were repeated at two and six months post-loading. After just two months, the impact was significantly reduced, the barycenter (BAR) posteriorized, and no torsions (TORS) were observed (Fig. 3-c). The patient reported cessation of day-time bruxism.

At six months, the impact was balanced, with no significant torsions or asymmetries (Fig. 3-d), while clinically a slight shift of the midline to the right was observed, providing objective evidence of the neuromuscular readjustment (Fig. 3 e-f)

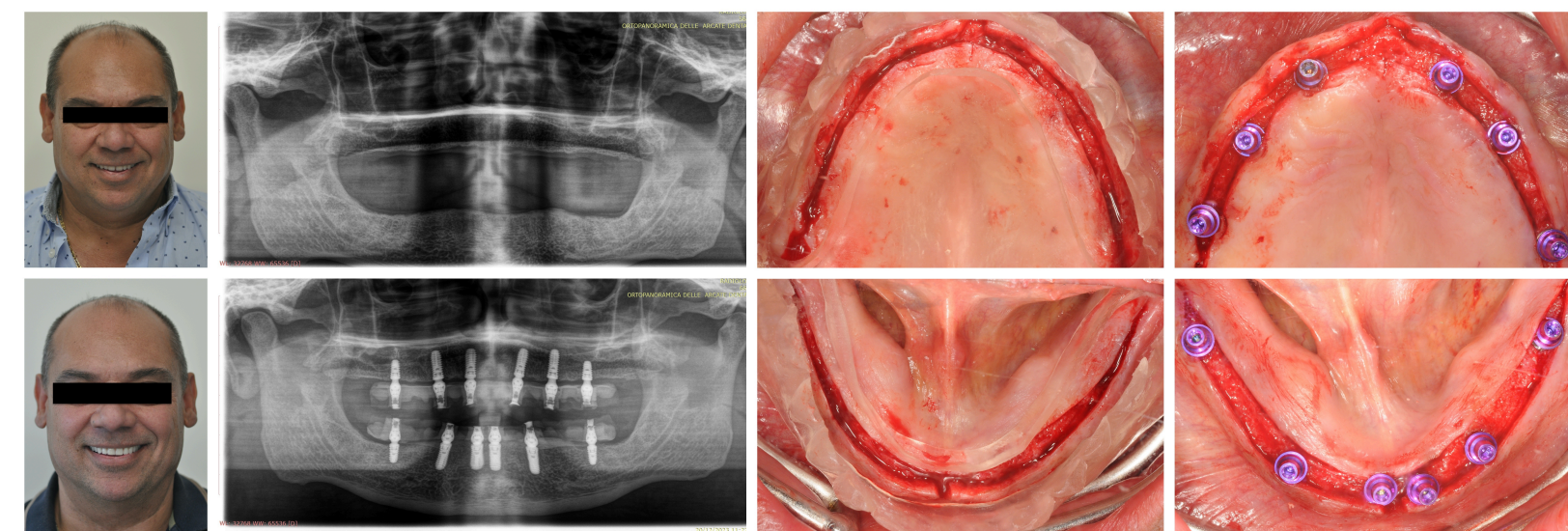


Fig. 1

Fig. 2

## Background and Aim

In many dental clinics today, immediate loading and implant-prosthetic rehabilitations are practically routine procedures. How can the restoration of function be evaluated impartially?

We performed a complete rehabilitation of the dental arches with immediate loading on a patient who is a daytime bruxer and has been wearing removable prostheses for several years without ever having them checked. The combination of both led to a significant reduction in the Vertical Dimension of Occlusion (VDO)(Fig 1).

The aim of the research is objective observation of decreased muscular stress in a daytime bruxer using electromyographic examination post immediate bimaxillary fixed full-arch implant-supported rehabilitation with the restoration of VDO.

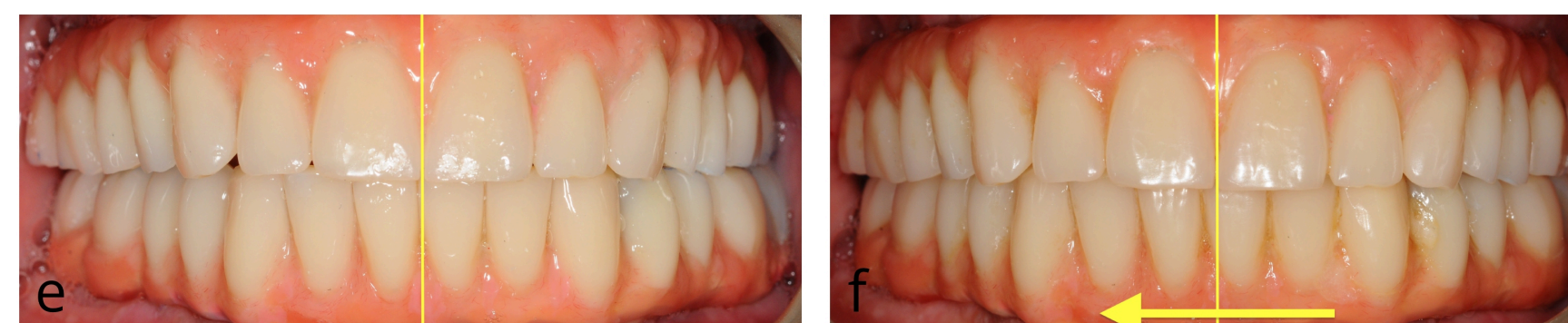
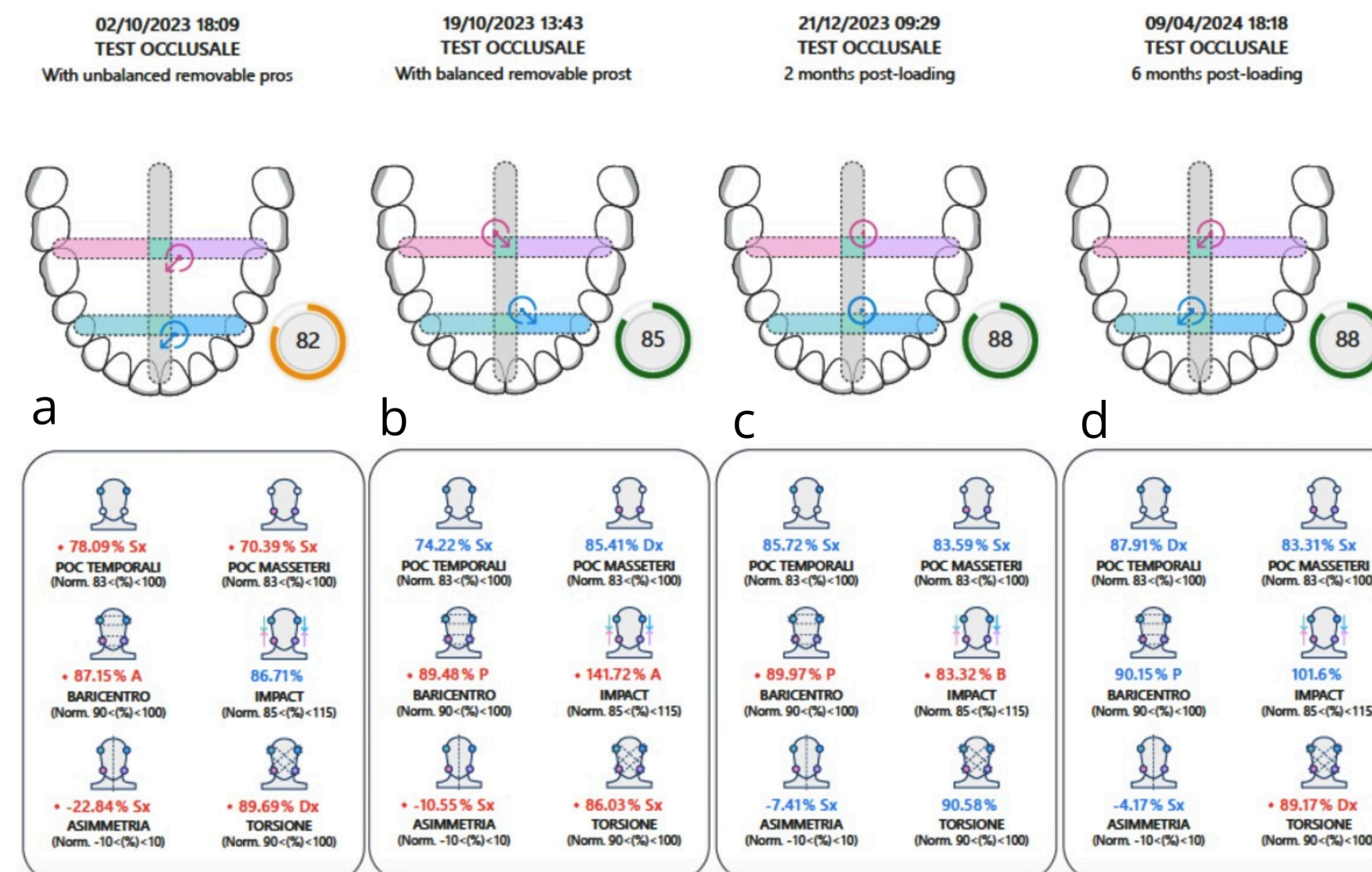


Fig. 3

## Conclusion

The increase in VDO in a more occlusally stable physiologic rehabilitated system favored the restoration of function, protecting muscles and joints. Electromyography allowed us to guide the patient through the adaptation process in a more precise and objective manner. Further clinical studies are required in assessing the use and benefits of electromyography during oral rehabilitation procedures.

## References

von der Gracht I, Derks A, Haselhuhn K, Wolfart S. EMG correlations of edentulous patients with implant overdentures and fixed dental prostheses compared to conventional complete dentures and dentates: a systematic review and meta-analysis. Clin Oral Implants Res. 2017;28(7):765-773. doi:10.1111/clr.12874