

# Meeting the challenges of temporary full-arch rehabilitation in patients with bruxism: a step-by-step approach

## Abstract

Bruxism, poses significant difficulties for implant rehabilitation, particularly in full-arch cases. With the emergence of immediacy concept as a pivotal focal point within the domain of implant dentistry, immediate loading of dental implants has gained widespread. However associated with bruxism, temporary full-arch rehabilitation may be challenging. This case report demonstrates a structured, step-by-step approach to temporary full-arch rehabilitation in patients with bruxism. The use of digital work flow starting by implant planning and provisional prosthesis design can effectively address the challenges posed by bruxism, leading to improved clinical outcomes and patient satisfaction.

**Keywords:** bruxism, dental implant, digital, dental restoration, temporary

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## Introduction

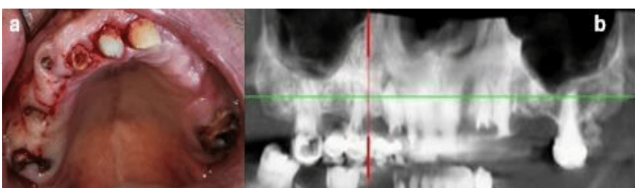
Currently, the concept of immediacy has emerged as a pivotal focal point within the domain of implant dentistry. Immediate loading of dental implants has gained widespread acclaim due to its capacity to shorten treatment durations and enhance aesthetic outcomes.<sup>1,2</sup> However, it is crucial to carefully assess the absence of mechanical stress on fixed prostheses, particularly in cases involving patients with bruxism.<sup>3</sup> Immediate loading of dental implants in individuals with bruxism can pose serious mechanical and/or biological complications.<sup>4</sup> It underscores the importance of adopting a cautious approach in such cases to ensure the long-term success of implant therapy.

The aim of this article was to outline the clinical steps involved in a digital workflow that enables the fabrication of dental and implant fixed provisional prosthesis for patients with bruxism.

## Case report

A 58 year-old man presented to our attention with esthetic and functional issues. The patient main complaint was the diminished masticatory capacity and the compromised retention of his upper dental fixed prosthesis. Subsequent esthetic and functional analyses revealed an imbalanced smile line, coupled with a history of bruxism.

After clinical and radiographic examinations, treatment of the upper maxilla with a full-arch implant prosthesis with immediate provisional prosthesis was proposed (Figure 1a-b).



**Figure 1** a) Buccal view of the maxilla after removal of the non-retentive bridge,

b) Panoramic view of the residual teeth.

## Treatment plan

### (a) Digital planning and fabrication of the first provisional prosthesis

Digital implant planning was performed using a dental implant planning software (Implantation). Our treatment plan was established after analysing various axial and coronal views to assess the volume of residual bone and the remaining teeth condition. Six implants (Neodent implant system- grand Morse) were virtually positioned in the upper maxilla based on the final prosthetic project.

Implant dimensions and positions were specified as follows

- Site 23 and 14: 3.5/11.5, Site 25 and site 12: implants 3.5/11.5 with immediate implant placement protocol and gap filling with 0.25 g bovine xenograft, Site 26: 4.3/10 and Site 16: 4.3/8 with crystal sinus lift using osteotomes (Summers technique).

### (b) Design of a temporary dental-supported prosthesis made of PMAA resin

- Due to the patient's history with bruxism, we chose a dental fixed provisional prosthesis as there were some residual teeth (11-21-15-17-27).
- Temporary restoration design was based on the STL file obtained from the first scan performed with an intraoral scan (Medit i600) and reinforced with a metal wire to avoid any risk of fracture (Figure 2).



**Figure 2** First temporary restoration design.

### (c) Implant surgery and immediate placement of the first provisional prosthesis

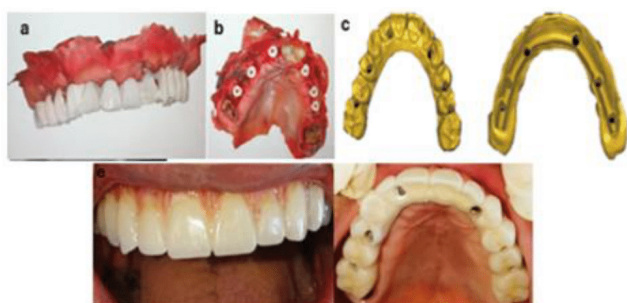
Good primary stability was achieved for all implants placed according to the digital planning allowing for an immediate loading protocol. However, to avoid excessive mechanical forces caused by bruxism, cover screw abutments were placed and dental fixed provisional prosthesis was cemented (Figure 3).



**Figure 3** Implant placement and cementation of the dental fixed provisional prosthesis.

### (d) Lab workflow for the realization of the second provisional prosthesis supported by the six implants

- Given that an FPI prosthesis was planned, the secondary prosthesis aimed to reshape the gingival contour to achieve an improved peri-implant aesthetic profile. The procedure involved the positioning of multi-unit abutments and conducting a second digital impression. The patient's occlusion was recorded using the existing temporary prosthesis, obviating the need for an additional occlusal registration procedure.
- A titanium cemented to a PMMA esthetic coverage was chosen as the second provisional prosthesis to reinforce the implants, ensuring stability and durability, thus preventing excessive stress caused by bruxism and minimizing the risk of fractures, enhancing the overall resilience of the prosthesis. Finally, extraction of remaining teeth and placement of the second screw retained provisional prosthesis (Figure 4).



**Figure 4** Realization of the second provisional prosthesis supported by the six implants.

## Discussion

The majority of researchers acknowledge the necessity for meticulous and thoughtful planning when undertaking implant prosthodontics therapy in patients exhibiting bruxism. This cautious approach is warranted due to the occurrence of complications and potential reduction in the long-term viability of implants.

In fact, implants with a broader diameter and increased length are recommended.<sup>5</sup> The diameter of implants holds notable significance in influencing stress distribution, surpassing the impact of implant length. This phenomenon is elucidated by the concurrent reduction in crystal bone strain, coupled with a subsequent decrease in bone modelling.

The use of cantilevers is discouraged owing to the non-axial direction of applied forces. This approach not only diminishes screw

loosening caused by para-functional habits but also reduces the risk of overload. In fact, immediately loaded implants are not advised for patients with bruxism, given the elevated failure rate compared to patients without this condition.<sup>6</sup>

However, when immediate loading is necessary, the use of reinforced restorations is encouraged. This choice facilitates a more effective distribution of forces across the dental arch and reduces micro-movements of the dental implants.<sup>7</sup>

In order to satisfy the aesthetic and functional needs of patients with bruxism, we have proposed a fixed therapeutic solution of temporization using digital impression.

In recent decades, according to biomechanical analysis, strong recommendation has emerged advocating the utilization of shock-absorbing superstructure materials, such as acrylic resin, in the first few years of dental implant use.

However it is noteworthy that the predominant complication associated with bruxism is the notable increase in wear on acrylic occlusal surfaces and the high risk of prosthetic fracture.<sup>8,9</sup> Therefore, night guards designed for maxillary teeth serve as a valuable tool to avoid implant restorations fractures. Constructed with a thickness ranging from 0.5 to 1 mm, these night guards feature colored acrylic on the occlusal surface. Monitoring the device's effectiveness can be achieved by having the patient wear it for a month. If the colored acrylic does not wash away, it indicates proper functionality; otherwise, adjustments may be required.<sup>10</sup>

Nevertheless, since clinical trials regarding the influence of bruxism on implant prostheses are scarce<sup>11</sup> the protocol outlined in this case report requires validation through additional studies involving larger sample sizes, while also taking into account various final prosthetic volumes and implant positions.<sup>12</sup>

## Conclusion

Few studies have focused on clinical approaches to temporary implant-supported full-arch rehabilitation in patients with bruxism. In fact, clinicians believe that overload caused by bruxism can cause implant-supported prostheses to fail.

Recent advancements, particularly the integration of digital workflows, have underscored the significance of addressing bruxism in implant prostheses within clinical treatment. Collaboration with clinical research centres and university research institutes is imperative to substantiate clinicians' subjective opinions on the impact of bruxism on implants. This collaborative effort is essential for fostering a more evidence-based understanding of the implications and effective management of bruxism in the context of implant dentistry.

Nevertheless, the protocol outlined in this case report requires validation through additional studies involving larger sample sizes, while also taking into account various final prosthetic volumes and implant positions.

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## Conflicts of interest

The authors declare that there are no conflict of interest in preparing this article.

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