

## Background and Aim

Several long-term prospective and retrospective studies have reported high survival and success rates for full-arch rehabilitations of atrophic jaws with implant-supported prostheses<sup>1,2</sup>.

Thus, the use of tilted implants are considered a feasible option in the treatment of edentulous jaws, whilst avoiding bone augmentation procedures and damage to critical anatomical structures during surgery. The All-on-4 procedure has been validated by the scientific literature in terms of implant success and survival, both in short- and medium-term<sup>3</sup>, demonstrating that the use of tilted implants is not related to increased bone resorption.

Nevertheless, there is a relative lack of data about the incidence and management of technical complications. Therefore, the aim of this retrospective single center study was to evaluate the incidence of prosthetic complications of immediately loaded full-arch fixed bridges anchored to a combination of tilted and axially-placed implants.

## Methods and Materials

Patients treated between November 2003 and January 2015 that received at least one full-arch fixed bridge following the All-on-4 treatment concept (NobelSpeedy Groovy or Brånemark MkIV implants, Nobel Biocare AB, Göteborg, Sweden) were initially selected.

An acrylic temporary prostheses with 10 teeth and no cantilever was placed over the abutments within 48h from surgery.

In the absence of pain and inflammatory signs, patients received the final prosthesis after three or six months of loading for mandibular and maxillary rehabilitations, respectively. The definitive prosthesis was composed of a CAD/CAM titanium framework (NobelProcera, Nobel Biocare), acrylic resin, and composite teeth (Figure 1).

Only patients that attended follow-up visits at 6, 12, 18 and 24 months, and yearly up to 13 years were included. Onset and frequency of every technical complication were recorded.

Minor complications (MiC) were fracture or detachment of acrylic teeth (FDT) (Figure 2 and 3), minor acrylic fractures (MAF), prosthetic screw loosening (PSL), prosthetic screw fractures (PSF) (Figure 5 and 6), and wear of the abutment connection screw thread (WAST). Major complications (MaC) were titanium bar fractures (TBF) (Figure 4) and implant fractures (IF).



**Figure 1:** Frontal view of the definitive prosthesis



**Figure 2:** Detachment of a tooth in a temporary prosthesis



**Figure 3:** Fracture of a tooth in a definitive prosthesis



**Figure 4:** Fracture of the titanium bar



**Figure 5:** Fractured prosthetic screw in the abutment



**Figure 6:** Fracture of a prosthetic screw

## Results

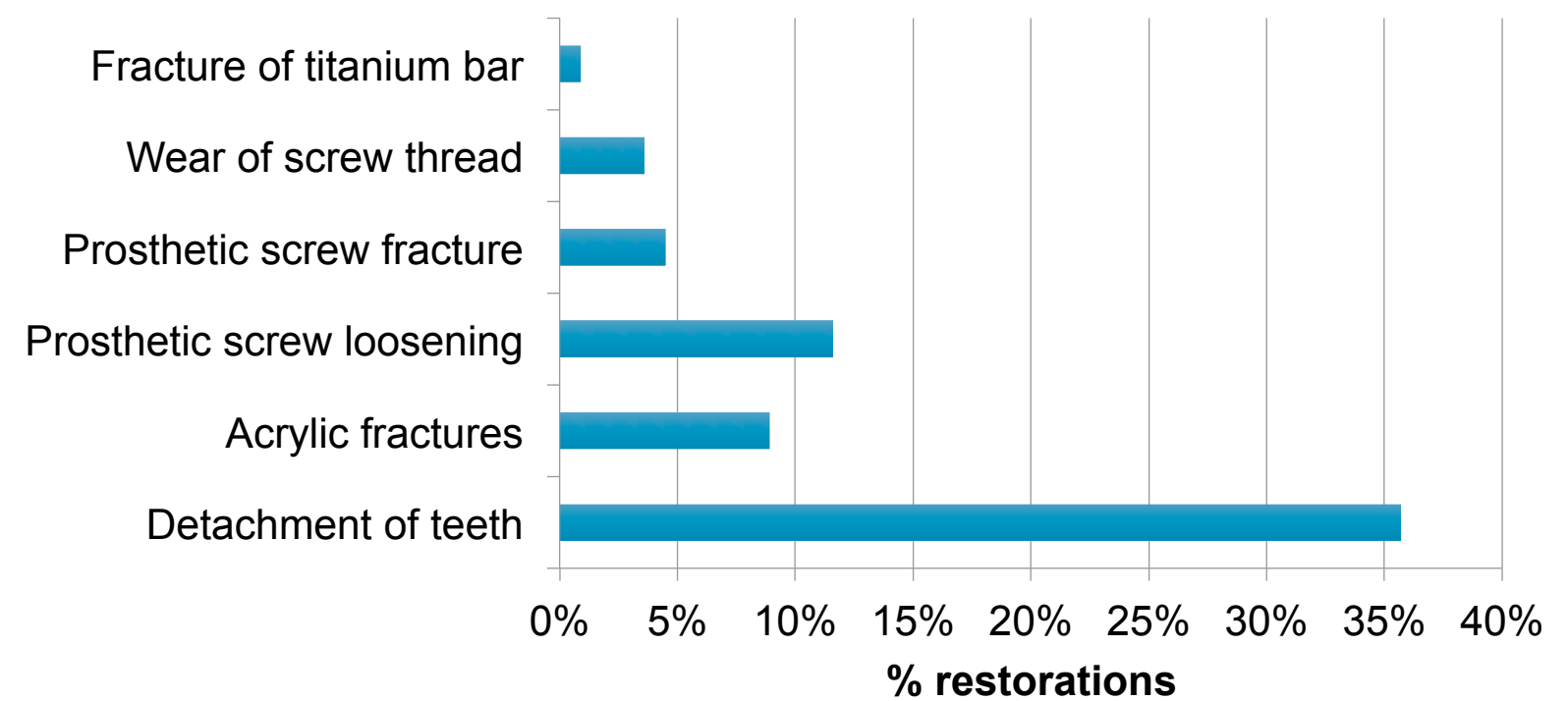
Clinical records of 94 patients (55 women and 39 men; mean age 57.6±12.5 years) were included in the study. Among them, 50 patients were rehabilitated in the mandible, 26 in the maxilla and 18 in both arches, giving a total of 112 full-arch restorations.

The overall follow-up range was 18 to 156 months (mean 92.6 months). The most common technical complications were the FDT that occurred in 40 restorations (35.7%), of which 25 occurred only in the definitive restoration, 1 only in the temporary restoration, and 14 in both. MAF were recorded in 10 restorations (8.9%), of which 7 were in the temporary restoration, 2 in the definitive, and 1 in both.

The incidence of those technical complications were higher in patients with implant-supported full-arch fixed restorations in both arches (p=0.006, Chi-squared test).

These minor prosthetic complications were mostly readily solved by having the damage repaired in the dental laboratory, and analyzing the functional and parafunctional forces to adjust the occlusion contacts.

PSL was recorded in 13 restorations (11.6%), PSF in 5 restorations (4.5%), and WAST in 4 restorations (3.6%). TBF occurred in one restoration while no IF were recorded. Forty-nine patients (52.1%) experienced no technical complications, 45 patients (47.9%) experienced MiCs and only one patient (1.1%) experienced both MiCs and MaCs.



**Graph 1** - Graphical representation of the complications' incidence related to the total number of restorations.

	Opposite dentition	
	Fixed implant-supported full-arch	Other
Detachment of teeth	52,78%	26,32%
Acrylic fractures	8,33%	6,58%
Prosthetic screw loosening	13,89%	10,53%
Prosthetic screw fracture	2,78%	5,26%
Wear of screw thread	5,56%	2,63%
Fracture of titanium bar	2,78%	0,00%

**Table 1** – Distribution of the complications' incidence related to the opposite dentition.

## Conclusions

The occurrence of prosthetic complications in full-arch rehabilitations supported by a combination of tilted and axial implants is lower in this study than previously reported<sup>4</sup>, particularly given the long-term follow-up range. Therefore, this technique could be considered a viable treatment option from a prosthetic point of view.

Moreover, the majority of complications were easily handled and solved. However, the amount of observed complications is not irrelevant and the clinician should be prepared to manage them.

Further studies are needed to achieve a better understanding of risk factors.

## References

1. Ekelund JA, Lindquist LW, Carlsson GE, Jemt T. Implant treatment in the edentulous mandible: a prospective study on Brånemark system implants over more than 20 years. *Int J Prosthodont.* 2003 Nov-Dec;16(6):602-8
2. Astrand P, Ahlqvist J, Gunne J, Nilson H. Implant treatment of patients with edentulous jaws: a 20-year follow-up. *Clin Implant Dent Relat Res.* 2008 Dec; 10(4):207-17
3. Patzelt SB, Bahat O, Reynolds MA, Strub JR. The all-on-four treatment concept: a systematic review. *Clin Implant Dent Relat Res.* 2014 Dec;16(6): 836-55.
4. Papaspyridakos P, Chen CJ, Chuang SK, Weber HP, Gallucci GO. A systematic review of biologic and technical complications with fixed implant rehabilitations for edentulous patients. *Int J Oral Maxillofac Implants.* 2012 Jan-Feb;27(1):102-10.

Poster preparation was partially supported by Nobel Biocare (grant 2017-1511).