

Study of Management of Prosthetic Complications of Implant-Supported Fixed Restorations

S.Moudni, F Z Amessegher, I Boujoual, and A Andoh

Unit of Fixed Prosthodontics

University Hospital Center Ibn Rochd,

Faculty of dentistry Casablanca Morocco

ABSTRACT

During the rehabilitation of a patient by fixed supra-implant prosthesis, the practitioner can be confronted with many complications both mechanical, biological, aesthetic or even functional. The practitioner must be able to handle the situation, otherwise it would be a fault.

the aim of this article is assess the different complications of supra-implant prosthesis, and to identify the best way to deal with them.

Keywords: Dental implant, Fracture, Complication, Supra-implant prosthesis.

1. INTRODUCTION

The end of the 20th century marked a turning point in the history of implantology. After a long trial period during which many implant designs were tested, the Branemark osseointegrated endosseous implant was born.

Since then, implantology has continued to become more democratic and is now an integral part of our therapeutic solutions for replacing missing teeth. Unfortunately, no treatment is one hundred percent reliable, and fixed dental prostheses are not the exception.

The management of secondary complications is the challenge of the future.

So, what are these complications? and how can we manage them?

1.1 Complications at the level of the prosthesis:

Complications at the prosthetic level include fracture of a prosthetic screw, prosthetic fracture as well as unscrewing or loosening of the prosthesis [1].

- **Fracture of the prosthetic screw:**

The fracture of the prosthesis screws concerns the upper third of the screw, under the head. We find there a narrowing, it is a "point of weakness".

There are two different types of fractures: immediate fractures and stress fractures (table 1)

Table 1 . Comparison between Immediate fracture and Stress fracture

Immediate fracture	Stress fracture
- Initial tightening too strong	- Frequent anterior unscrewing
- Initial tightening performed on an incorrectly positioned screw	- Occlusal overload
- Manufacturing error	- Mobility of the crown
	- Prosthetic design error
	- Manufacturing error

The only possible solution is to remove the fragment. Thanks to their location of the point of weakness, the majority of fractures concern the upper third of the screw, making it prehensible.

The prosthesis must be removed to be able to access the fragment. Then using suture pliers, all that remains is to unscrew the screw. If this fails, the use of a left turn of drills is a possible option for removing.

As a last resort, the removal of the abutment can be considered, and its replacement avoids the removal of the implant. [2]

1. PROSTHETIC FRACTURE:

1.1 Fracture of the framework:

The increase in the patient's masticating power after implant rehabilitation is presented as the main etiology of framework fractures. It can also occur due to a small diameter of the frame, an absence of compliance with the biomechanical principles, an important cantilever extension [3], inadequate use of materials, or an absence of passivity of the frame.

The removal and fabrication of a new prosthesis are inevitable since the reparation of the framework is impossible. Thus, a good analysis of the associated factors and their modification is essential to ensure the durability of the new framework. [2]

2.2 Fracture of ceramic:

In addition to the increase in the masticating power of the patient, other factors can be responsible for the fracture of the ceramic, such as poor support of this latter, a fault in its mounting or firing, a bad occlusal equilibration, or a presence of parafunction. [4]

The management of the fracture or the chipping involves the addition of ceramic or the realization of a new ceramic assembly depending on the location and the extent of the default. The removal of the prosthesis is, thus, necessary.

2.3 Fracture of the antagonist prosthesis:

Fractures of the antagonist prostheses mainly concern prostheses facing complete supra-implant prosthetic rehabilitations.

The increased masticatory power of the patient is presented as the main etiology of fractures and cracks of the antagonist removable prostheses.

As for the treatment of fractures in implant-retained prostheses, the incorporation of a cast grid in the prosthesis is inevitable.

Either the prosthesis can be kept and the grid is added, or a new prosthesis is done and made with a resistant material. [2]

2.4 Unscrewing or loosening of the prosthesis

Unscrewing is the most frequent complication; its probability of occurrence is 8.6% . It occurs following a tightening defect, a problem in prosthetic adaptation [5] (may concern the adaptation of the abutment or the prosthesis), an occlusion problem [6] (an occlusal overload), and the angulation of the abutment [5].

The management of this kind of complication will depend on its etiology.

If the unscrewing happens in the first 2-to 3 months following the placement of the prosthetic element, a simple screwing will be sufficient. In other situations, the screw undergoing greater stress, the risk of fracture is increased. The screw will then have to be replaced, thus the risk factors modified, the occlusal overload eliminated, the occlusal concept reassessed and the prosthesis redone if necessary.

In the case of unsealing, we should consider the type of sealing used: what is the mechanical strength of the cement? Is the use of stronger cement enough to solve the problem? Would a screw-retained restoration be more appropriate?

Very often, the loosening of a prosthetic reconstruction indicates that there is a defect in the design or prosthetic construction likely to generate a more serious complication (screw, abutment, or even implant fracture). [2]

To avoid further damage, it is wise to check the static, dynamic occlusion, and analyze the prosthetic architecture. The existence of a lever arm generated by an extension can be suspected.

5.5 Complications at the level of implant

These complications concern the unscrewing of the abutment, the fracture of the implant, the fracture of the abutment, or also the fracture of a screw in the implant.

2.6 Fracture Of The Implant

A fractured implant is a rare biomechanical complication. It is estimated at 2 fractures per 1000 implants . A bending overload leads over time to a deformation of the metal generating micro-fractures leading to metal breaking. [7]

The preferred treatment for this complication is the removal of the implant. [8] Depending on the location of the fracture, two approaches are possible.

- If the internal thread is visible: the use of a left turn will be privileged.

- Otherwise, the trephine will be used.

The removal of the implant must always be done in the interests of tissue economy, it will be necessary to know the implant system and the diameter of the implant to choose the appropriate trephine.

2.7 Unscrewing of the abutment

The unscrewing of the abutment in the case of cemented supra-implant rehabilitation is frequent. The removal with a crown extractor should be attempted regardless of the cement used. When possible, a mouth spatula-type instrument can be inserted between the implant neck and the unscrewed abutment, to stabilize the abutment and make the use of the crown extractor more efficient. If the hold is not sufficient, it is possible to achieve retention by milling at the abutment-crown junction horizontally to provide a small opening in which we insert the crown extractor.

If this fails, occlusal milling will facilitate access to the abutment screw for unscrewing the assembly. The prosthetic element can then be screwed back in like a screw-retained crown.

3- FRACTURE OF THE IMPLANT-ABUTMENT:

Abutment fracture can occur after trauma involving a supra-implant crown.

In cone/cone connection, a screwed abutment can be fractured at the implant connection. The use of the implant firm's re-intervention kit is then required. The first attempt consists in milling two perpendicular grooves to engrave across in the abutment, the piece can then be removed using a screwdriver associated with a torque wrench. The alternative requires the use of a drill with a centering guide on the abutment, then unscrewing the abutment using a "left turn" anchoring in the borehole.

We should mention that some abutments are provided with notches to facilitate removal. [9]

Concerning the sealed abutment, its fracture at the level of the implant systematically requires the removal of the implant and its replacement. It is possible to attempt to remove the fractured fragment, recover the central well and perform threading, but these techniques will not lead to satisfactory results in the long term.

At present, the use of a sealed abutment is strongly contraindicated because, apart from the impossibility of returning to the initial thread in this type of situation, an excess of cement not removed can cause irreversible damage at the peri-implant area.

4 - FRACTURE OF A SCREW IN THE IMPLANT:

This type of fracture can occur at two levels:

a. High level:

Managing a fractured screw just below the screw head is simple. With the tension of the screw being released, unscrewing can be done with the Rhein probe. It is also possible to use ultrasound while taking care not to touch critical areas of the connection (beginning of the thread, internal hexagon, or Morse taper). [10]

b. Low level:

Very rare, the screw can be fractured very apically in the implant thread. Depending on the implant systems, "guide" devices locking onto the connectors allow a left-hand drill to be driven in contact with the screw. Vibration or reverse rotation forces the fractured element to unscrew. [11]

5. CONCLUSION

The supra-implant prosthesis reveals many and varied prosthetic complications. In addition, it tolerates fewer fabrication and adjustment errors than the conventional prosthesis. It, therefore, requires particular rigor concerning the main prosthetic principles. The prevention of complications requires a good analysis of the prosthetic project. Mechanical risk-taking linked to patient-specific parameters (overbite, bruxism, prosthetic lever arm) must be evaluated.

The therapeutic decision must be made not according to the area of competence of the surgeon but by considering the entire arsenal: orthodontics, sinus lift, or bone graf .

More than ever, it is the prosthesis that must be at the heart of the project; it is up to all stakeholders to agree to carry out the intervention successfully.

Finally, it is advisable to consider the innovations with the greatest caution and to let evidence-based dentistry judge the durability of the reconstructions.

BIBLIOGRAPHY

1. Jung RE, Pjetursson BE, Glauser R, Zembic A, Zwahlen M, Lang NP. A systematic review of the 5-year survival and complication rates of implant-supported single crowns. *Clin Oral Implants Res.* 2008 Feb;19(2):119-30. Epub 2007 Dec 7.
2. Bert M. *Gestion pratique des complications en implantologie.* EDP Sciences. 328 p.
3. Dominicé E. *L'occlusion en implantologie: le point en 2015.* Toulouse III-Paul Sabatier; 2015.
4. Wittneben J-G, Buser D, Salvi GE, Bürgin W, Hicklin S, Brägger U. Complication and failure rates with implant-supported fixed dental prostheses and single crowns: a 10-year retrospective study. *Clin Implant Dent Relat Res.* juin 2014;16(3):35664.
5. Wasmer N. *Les différents types de connexions implantaire: description, avantages, inconvénients et critères de choix.* Lorraine; 2013.
6. Fillion M, Jakubowicz-kohen B. *Gestion des complications en prothèse supra-implantaire.* Clinic Focus.
7. Capodiferro S, Favia G, Scivetti M, De Frenza G, Grassi R. Clinical management and microscopic characterization of fatigue-induced failure of a dental implant. Case report. *Head Face Med.* 22 Juin 2006;2:18.
8. Sánchez-Pérez A, Moya-Villaescusa MJ, Jornet-Garcia A, Gomez S. Etiology, risk factors and management of implant fractures. *Med Oral Patol Oral Cir Bucal.* 1 mai 2010;15(3):e504-508.
9. Fillion M., Jakubowich-Kohen B, *Gestion des complications en prothèse supra-implantaire* Clinic, Octobre 2010
10. Bert M. *Dépose d'une vis cassée dans un implant.* Fil dentaire 24 juin 2007.
11. Andreiotelli M, Wenz HJ, Kohal RJ. Are ceramic implants a viable alternative to titanium implants? A systematic literature review. *Clin Oral Implants Res.* 2009 Sep;20 Suppl 4:32-47.