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periimplantitis –  
a problem in  
implant dentures

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Findings from  
25 years of  
manufacturing  
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# Denture initiated periimplantitis – a problem in implant dentures

Findings from 25 years of manufacturing dentures

WOLFGANG BOLLACK, MARIUS STEIGMANN



## Introduction

Retrospectives by dentists in the area of the author, on dentures on implants from the last 15 years, have shown that fixed, cemented dentures with attached pink ceramic bring a higher risk of periimplantitis than e.g. removable dentures.

## Denture after bone loss

The first case presented here relates to the patient's wish for a secure denture on implants. She previously wore a telescopic restoration, where all of the teeth had been lost apart from one, whereby significant bone loss occurred (fig. 1 to 7).

In image 1, it is clearly visible how big the vertical gap between the implant exit point and the incisal edges of the anterior maxilla was. To resolve this situation somewhat aesthetically, it was necessary to burn gingiva from ceramic.

In the maxilla there is the problem that it is not always possible to manufacture sufficiently large cleaning channels in the implant positions, because otherwise patients spit through the holes, and are impeded in articulation. This was also

the case here. The patient wanted to have everything as tight as possible, and the practitioners and technicians agreed to this.

The restoration was fastened with temporary cement, and the patient was taken into close recall. During regular check-ups, the denture was removed, cleaned and the implant checked. Unfortunately, the authors' experience shows that patients sometimes become a little more negligent with care and check-up appointments. This patient also stopped coming to routine check-ups after a while. After almost seven years, she came back into the practice. Unfortunately, the periimplantitis was already very advanced by then.

Due to osteoporosis treatment with bisphosphonates started in the meantime, and the advanced bone loss already caused by the periimplantitis, all implants had to be removed to avoid a bisphosphonate related osteonecrosis. Today, the patient is a total denture wearer again, with no chance of ever being able to get new implants. That was a shock to the practitioners and technicians, as they were directly involved in this

## Summary

Many experts fear that there will be a wave of periimplantitis in a few years, especially in fixed and cemented dentures. Alongside surgical problems and risks, there are two main reasons from a denture point of view: so-called cementitis, i.e. cement residues have not been sufficiently removed, and limited cleanability, e.g. in the case of extensive restorations with attached pink ceramic. The authors report from their own experiences and findings.

## Indices

Cementitis, periimplantitis, implant denture, cleanability



**Fig. 1** Initial situation. **Fig. 2** Old denture.



**Fig. 3** Abutment situation in the mouth. **Fig. 4** Pink ceramic design on the model. **Fig. 5** Transition from pink ceramic to mucous membrane. **Fig. 6 and 7** The aesthetic situation in the mouth.

problem. Since then, the authors only produce removable constructions with galvano technology, if large parts of the jaw and/or mucous membrane have to be replaced.

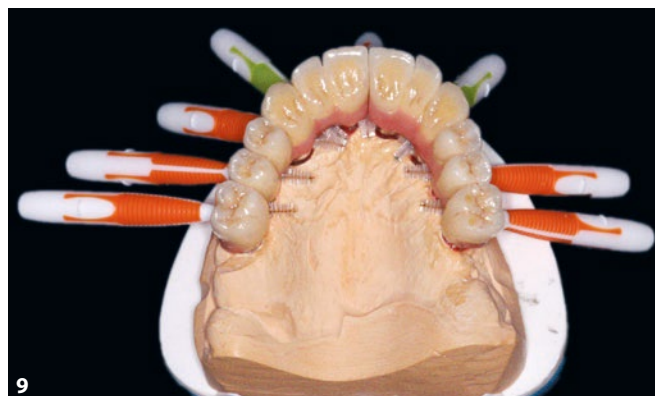
### Basic design

The next case has been in situ for five years now. To create the best possible

conditions for cleanability, the following basic design is necessary: all contact surfaces with the gingiva should be convex and high-gloss attached and/or polished. The size of the cleaning channels is checked in the laboratory, and again in the practice. Until now, there have been no notifications of periimplantitis in this case. As older patients become a little lax with cleaning, are

often manually impeded, and in care homes the fixed restorations can no longer be reliably cleaned, removable restorations become obligatory from this point (fig. 8 to 14).

Another case shown here was also in situ for five years. Unfortunately, this patient was not committed enough to cleaning their dentures thoroughly and meticulously and going to check-ups.



**Fig. 8 and 9** Cleaning channels are inspected in the laboratory.  
**Fig. 10 and 11** Good basic design for fixed denture.  
**Fig. 12** Abutment situation in the mouth.  
**Fig. 13 and 14** Inspection of the cleaning channels in the mouth.



After just five years, periimplantitis occurred, and the patient lost two implants. The rest were able to be saved. He now wears a removable galvano work (fig. 15 to 21).

As a first summary, the authors determined that fixed, cemented crowns and bridges with attached gingiva made of ceramic were at best risky. In their opinion, patients find this type of restoration hard to cope with. A survey by the authors of specialist implantology practices, which have been on the market for more than 25 years, and have inserted between 500 and 2000 implants, showed that 90% of them had the same experiences.



**Fig. 15** The bridge design. **Fig. 16** Inspection of the cleaning channels on the model. **Fig. 17** Bridge design on the gingiva. **Fig. 18** Abutment situation in the mouth. **Fig. 19** Inserted bridge with sufficient space for cleaning.



**Fig. 20 and 21** The aesthetic situation in the mouth.

Yet how can ideal conditions be achieved for fixed dentures? This is described in a case from the practice of Dr. Steigmann from Neckargemünd. Dr. Steigmann gives courses worldwide on the topic of soft tissue management ([www.steigmann-institute.com](http://www.steigmann-institute.com)). The authors, who have worked together for over 25 years, always try to work on natural gingiva, instead of burning on pink ceramic. The surgeon must therefore retain the gingiva and also develop it if necessary.

In the opinion of the authors, a gold

standard can be achieved in this. They have not yet experienced any cases of periimplantitis with these restorations (fig. 22 to 26).

Extensive preliminary work is required for such highly aesthetic results. First and foremost, the surgeon must be an expert in soft tissue management. The laboratory also needs extensive knowledge of this, as well as abutment design and model management. Otherwise, the work of the surgeon will be negated by the wrong denture. All of this is underestimated by many

prosthodontists, because it seems easy to simply apply the knowledge from classic dentures on natural teeth to the implant denture. However, implant dentures follow their own rules.

With full arch restorations for example, the authors always begin with a metal reinforced temporary implant as an immediate restoration, which will be inserted three days after the operation and then stays in the mouth for approx. six to twelve months. The focus here is primarily on gingiva management, but it is also



**Fig. 22** Temporary implant for the development of the gingiva. **Fig. 23** Gingiva situation at the start of the final restoration.



**Fig. 24** Situation of gingiva and abutment. **Fig. 25** Good gingiva with inserted bridges. **Fig. 26** The aesthetic situation in the mouth.

about the patient having secure teeth as quickly as possible. The final restoration is only started when the gingiva conditions are good.

There are some studies on dealing with screwed-in or cemented crowns. Three studies have been selected here. All of them conclude that there is no significant difference between cemented and screwed-in crowns if everything is done correctly. This means with cemented crowns, the crown edge must be placed 0.5 to max. 1 mm below the gingival line, so that the cement residue can be removed properly. With screwed-in crowns there is no problem with cement residues, but with ceramic spalling around the screw channel. Every now and again there are cosmetic and functional problems. Both methods are equally popular with patients.

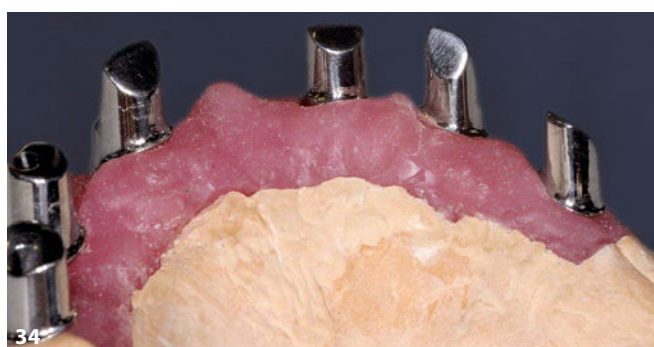
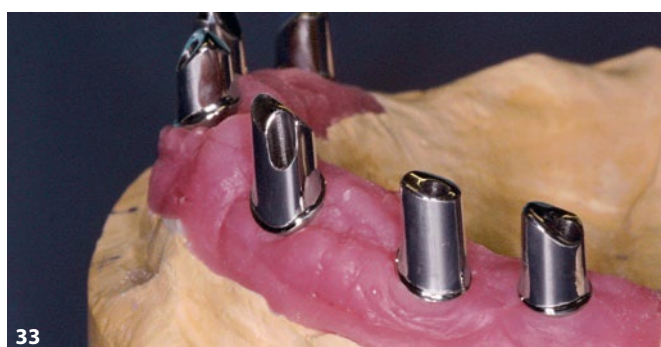
Screwed-in restorations are frequently chosen, when there are fears with cemented restorations that the screws could loosen, and the cement residues are difficult to remove. Above all with regards to temporary implants for full arch immediate restorations, the authors only choose the screwed variant. Simple, metal reinforced versions are offered as temporary implants, and screwed-in bridges for the final restoration, veneered with high-strength composite. For bimaxillary restorations, a jaw is made from ceramic, with the opposing jaw as a screwed-in composite bridge (fig. 27 to 30).

Galvano technology has proven itself for removable restorations in the majority of cases. It distinguishes itself with good fit and high precision, as the restoration is glued directly into the mouth. In addition, it is comfortable to wear, similarly to fixed dentures. The restorations are easy care,

because they are removable, which leads to a higher survival rate in implants.

However, caution should be exercised with galvano works with regards to periimplantitis, if the patients find it hard to clean the titanium abutments. Above all in the final distal abutments, there can sometimes be problems. The following should be noted:

Due to the overall insertion direction, which must be oriented towards the front tooth implants, and due to the perfect fit direction of the abutments under the denture teeth, sometimes there are severe overhangs over the titanium abutments in distal implants, especially if they are facing in another direction. For the most part, these overhangs are below the gingival line which does not seal tightly. This is where the most retention sites appear for plaque, which are hard or impossible to clean. This means that periimplantitis can develop here (fig. 31 to 34).



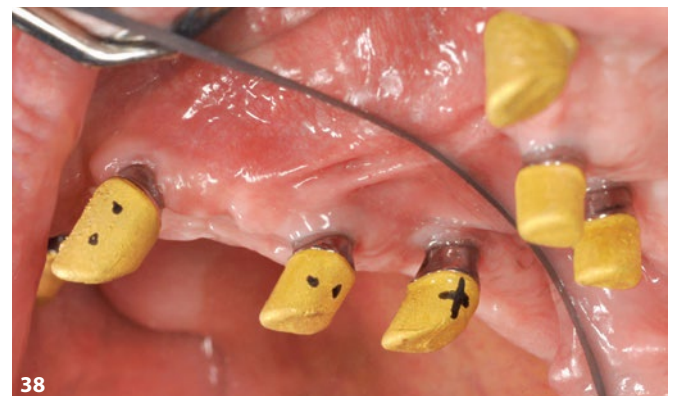
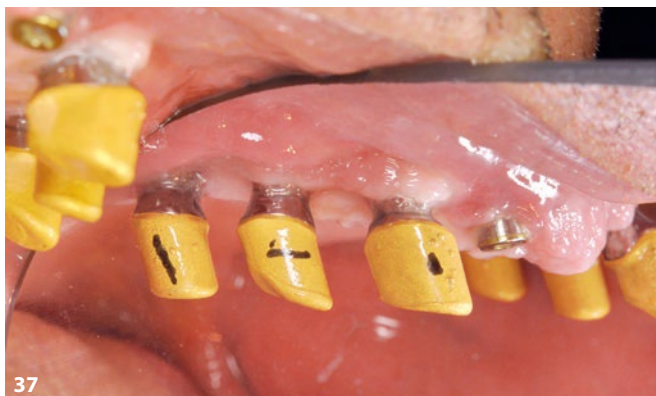
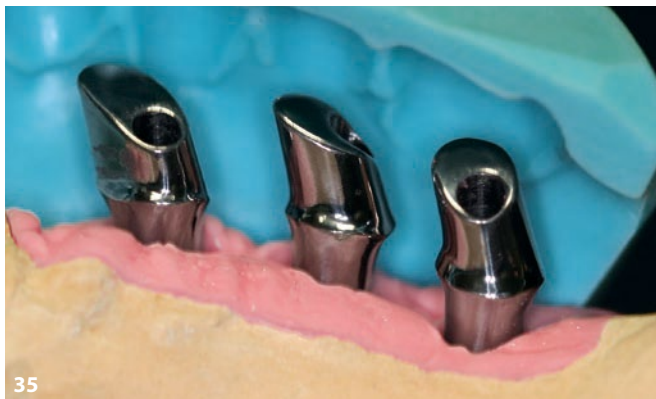
**Fig. 27** Screwed-in bridge. Composite with perfectly fitting screw channels. **Fig. 28** The model situation. **Fig. 29** Bridge design from the basal level. **Fig. 30** The aesthetic situation in the mouth. **Fig. 31 and 32** Significant overhangs over the abutments. **Fig. 33 and 34** Gingiva situation, where the overhangs are below the gingival line.

To solve this problem, the authors place the abutments "on stilts". Due to the slimline design of the abutments on the gingival line, the restoration is significantly easier to clean. This means that periimplantitis can be prevented (fig. 35 to 38).

Another big advantage of removable dentures is that the denture base can be adapted to the gingiva very tightly and practically seamlessly. Patients value the wearing comfort and secure hold, and the restoration has a good aesthetic (fig. 39 to 43). Extreme jaw conditions can also be managed well with galvano technology (fig. 44 to 49).

## Conclusion

In the experience of the authors, denture initiated periimplantitis primarily arises from incorrectly designed abutments or an incorrectly designed denture base, regardless of the implant system. The most important factor is the cleanability. Whenever larger parts of the jaw need to be covered, a removable construction is preferable.



**Fig. 35 and 36** Slimline design of the abutments on the gingival line. **Fig. 37 and 38** Situation in the mouth with galvano copings. **Fig. 39 and 40** Form fitting basic design for removable denture.

There are many studies on periimplantitis, which examine the topic in connection with screwed-in or cemented restorations. The authors are unaware of a study which investigates the frequency of periimplantitis depending on various denture restoration forms at this time. They ask for relevant information to be sent if a similar topic is already being investigated.



**Fig. 41** Natural colouring in pink plastic. **Fig. 42 and 43** The aesthetic situation in the mouth.

**Fig. 44** Big difference between the maxilla and lower jaw in the horizontal, more than a centimetre had to be bridged over.

**Fig. 45** Severely frontal facing abutment direction.



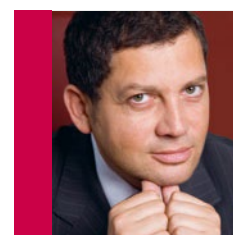
**Fig. 46 to 48** Denture design with individualised pink plastic. **Fig. 49** The smile of the happy patient.

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**ZTM Wolfgang Bollack**  
Bollack Dentaltechnik  
Pfarrgasse 2  
69251 Gaiberg  
E-mail: [info@bollack-dental.de](mailto:info@bollack-dental.de)



**Dr. Marius Steigmann**  
Bahnhofstraße 64  
69151 Neckargemünd



Wolfgang Bollack is the initiator and founder of the Implant Prosthetics Academy (IPA; see also QZ 6/19). You can find further information about IPA at [www.ipa.cloud](http://www.ipa.cloud), contact: [contact@ipa.cloud](mailto:contact@ipa.cloud)