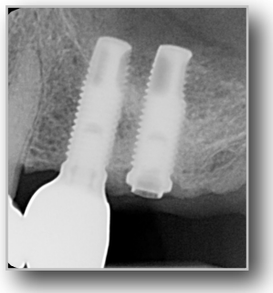
Tooth and Implant Overload

The issue of overload on teeth and implants as it relates to the supporting bone over time is one that has been studied as best as it can. Studies in a laboratory where certain factors can be isolated as well as can be, do not always translate well to reality. Studies in vivo, and in humans in particular, can be difficult because of the inability to standardize bacterial load and occlusal load, and can be further complicated by differences in individual responses based on genetic susceptibility to periodontitis.

In dogs, studies have shown occlusal overload on teeth did not progress to bone loss unless bacterial microfilm was allowed to accumulate. For implants, differences have been found regarding bone homeostasis and occlusal load. Bone is maintained on implants at loads of 2kg/mm^2. Physiologic overload occurs at forces of 6kg/mm^2. But under pathologic overload at 12kg/mm^2 bone is destroyed. This falls in line with prior studies where occlusal force alone caused no bone loss with forces of 2.6kg even with biofilm present, but forces of 20kg showed bone loss even when biofilm was well controlled.

In humans, the consensus for teeth is that there is no evidence for periodontal bone loss or recession from overload alone, although adaptive mobility and a widened PDL are normal responses, as well as possible tooth fracture or failure of restorations if mobility does not develop. However, in presence of periodontitis, trauma can cause bone loss.

Implants, similar to teeth, do not necessarily undergo bone loss in patients with good oral hygiene or who are not susceptible to periodontitis, or in those with good bone quality that is not susceptible to micro-damage. Instead, in these patients, the overload will cause fractured porcelain, broken abutment screws or even fractured implant collars requiring removal of the implant. However, in the presence of periodontitis or the genetic propensity for it, bone can be lost (see front panel).



Fractured abutment screw

Fractured Implant platform

This issue of ProbeTips will focus on **a single case of an implant that was maintained beautifully for 11 years, and was lost in a shockingly short 3 month period once placed under overload in a periodontally susceptible patient.** The hope is to generate awareness of the rapid and severe consequences that overload has the potential to exert in periodontally sensitive patients.

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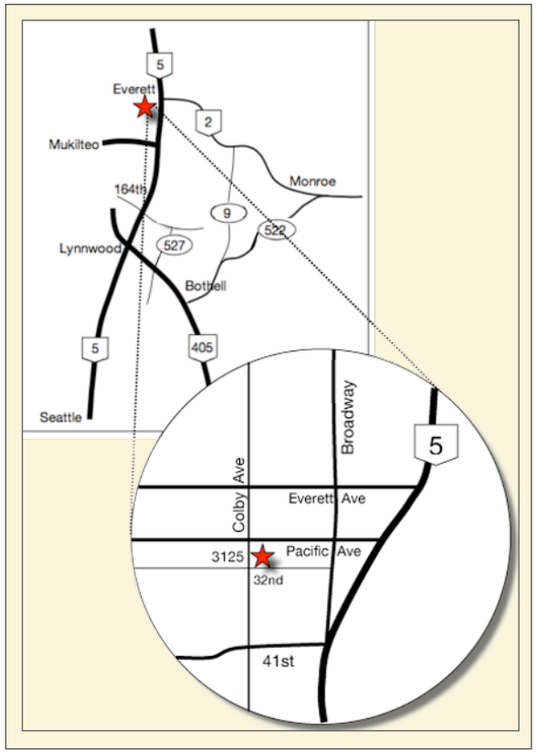

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Probe Tips

A Quarterly Periodontal Newsletter

By Pamela Nicoara DDS MSD

Implant Overload

Aug 2011 to May 2021

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Implant Overload in Periodontitis Susceptible

General Considerations

I first met 'John' in 2009. He had nearly all his teeth, but had generalized severe chronic periodontitis with probings in the 7-9mm range on all but the mandibular anterior teeth (see charting adjacent). Treatment began with traditional scaling and root planing and 3 month periodontal maintenance. His initial response was very good, and probings improved significantly to a 4-5mm range at worst.

However, tooth #19 was lost early on due to infection that was both periodontal and endodontic. The prognosis was poor. It was removed and replaced with an implant the following year, and restored with a screw retained crown a few months later.

Nov 2010

Aug 2011

As with any chronic condition, maintenance is key. Regular professional cleanings help reach problem areas and alert the patient where to focus more attention, and proper regular home care keeps biofilm in check.

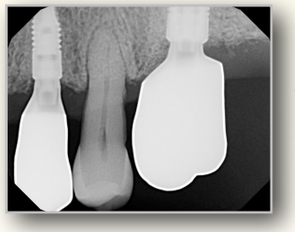
For this patient in particular, besides irregular care, periods of stress also played a role in his systemic response to periodontitis. In addition, any deep probing often also became coupled with an endodontic infection. And lack of finances further contributed delaying care.

Implant Placement

Regardless of the storms in the rest of his mouth, and teeth which were slowly lost due to combined periodontal and endodontic infection, implant #19 seemed to have no issues.

Perio/Endo Lesions

Over the years, teeth #3, 5, 12, 14, 21 and 30 were lost. 'John' felt most comfortable chewing on his left where his solid implant #19 resided, and wanted to improve chewing function there. Because implant #19 seemed to do so well compared to his natural teeth, it was decided to replace teeth #12 and 14 with individual implants, and maintain #13 as long as possible. Should #13 be lost at some time, a fixed partial denture off of the existing implants could span the gap.



May 2021

Implants #12 and 14 were restored in May of 2021. Three months later, implant #19 was class III mobile and was removed. 'John' shared that after the crowns were placed on #12 and 14, he could no longer touch his teeth on the right side. But he was so overjoyed to be able to chew so well on the left, that he didn't think it was a problem.

It is shocking to me that a perfectly healthy implant can go from a complete lack of inflammation and bone loss, to such a degree of destruction that it is class III mobile in as little as 3 months. Unlike the patients in the introductory panel who broke screws or implants, this patient, who is absolutely periodontitis susceptible, lost bone instead.

Class III mobile #19

Conclusion

Be aware of the risks that certain patients carry. This patient did not speak up when something didn't feel right. But we are also obligated to avoid situations that patients may not understand are a problem. For some where it is obvious occlusal overload is an issue, refusal to follow guidance such as wearing a bite guard may warrant having the patient refuse in writing.

References

Bertolini, et al. Impl Dent. 2016.
Sheridan, et al. Braz. Oral Res. 2019.

Complete References Available on Request.

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