

Retrieval of Fractured Prosthetic Screws from Dental Implants: A Case Report

By: E. Dwayne Karateew, DDS, Cert. Perio, Cert. Prosth and Mahtab Sadrameli, DMD, MAGD
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Endosseous implants were introduced to the dental community in 1981 and are becoming increasingly popular in both the dental profession and with patients as a reliable treatment choice for the replacement of missing dentition; there is ample supporting evidence of their long-term success.² With high success rates of between 95-98%³ and low incidence of complications, they can provide both the patient and the dental team a relative incident free years of service. Although implant survival rates are high they do encounter complications involving the peri-implant soft tissue and bone. These complications are relatively rare. In contrast, prosthetic complications are not uncommon.⁴⁻⁶ Generally these complications can be grouped into the following five categories: 1. Veneering material fracture. 2. Prosthetic screw loosening. 3. Prosthetic screw fracture. 4. Implant fracture. 5. Framework fracture.

The following table summarizes the cumulative 5-year occurrence of technical complications in implant-supported fixed partial dentures (FPD) and single crowns (SC).⁵⁻⁶

The highest rate of failures are associated with veneering material fracture and screw loosening, while the lowest rate of failures are associated with implant fracture. Repair of fractured veneer material and retightening of a loose prosthetic screw are relatively simple to accomplish in the dental office within a single maintenance visit. Junge R.E. et al, 2004 reported that prosthetic screw fracture has an incidence rate of 3.9% and the rate for prosthetic screw loosening is 6.7%.⁷ This complication, however, can be quite challenging to manage and the level of difficulty depends on the position of the fracture. If the fracture is sufficiently deep enough on the screw shank, the remaining portion of the screw may be retained in the body of the implant itself. There is no universally acceptable technique allowing the operator to engage the remaining part of the screw so that it can be backed up and retrieved by unscrewing it.

In the traditional implant prosthesis, the prosthetic screw was intentionally designed as the weakest link within the system. If there was any mechanical stress arising from overloading the prosthesis, the screw was engineered to absorb the forces and fail before endangering the bone-implant interface. By propagating the shear forces fracture of the screw is likely attributable to material fatigue.^{8,9}

A fractured prosthetic screw can often be removed by counter clockwise rotation with a sharp dental explorer or a probe. If the position of the fracture is sufficiently coronal, then a narrow beaked mosquito haemostat can be used to grab hold of it and unscrew the retained portion. The most difficult fractured prosthetic screws to retrieve are those which are fractured below the shoulder of the implant where it is not possible to engage it with a haemostat. In addition a phenomenon called "cold welding" precludes sufficient torque to be applied with an explorer or probe. A small round bur can be carefully used in "reverse" (counter clockwise) to prevent seating the fractured screw deeper in the implant in a low-speed hand piece to gently "tease" the fractured screw out. Piezo-electric scalers, which apply a vibrational force to overcome any friction between the screw threads and the inner walls of the dental implant, can be successfully utilized. It is of note that various implant manufacturers offer retrieval kits that can work in specific circumstances. However, these systems utilize a motorized device to facilitate fractured screw removal and carry the risk of damage to the internal threads of the implant.¹⁰ This potential damage to the interior of the dental implant is the most subtle, most critical and most difficult complication to avoid.

The following case report outlines the use of a recent addition to the arsenal of retrieval kits, **Neobiotech Screw Removal Kit SR**.

CASE REPORT

A male patient presented to my office with a loose implant-supported fixed prosthesis replacing teeth #13-23. Examination revealed four implants supporting this six-unit "bridge" in positions 13, 11, 21 and 23. The implants appeared to be well positioned in all three dimensions (mesio-distal, bucco-lingual and apico-coronal) and the radiographic examination did not indicate any damage to the implant bodies themselves. Upon removal of the loose prosthesis it was noted that there was a cement failure of one of the abutments to the prosthesis. However, on three of the implant/abutment connections it was noted that the prosthetic screw had fractured completely and the shank was positioned deeply inside these internally hexed implants. (Fig. 1)

Having been involved with implant dentistry for 20 years, I have encountered this type of complication on numerous occasions. This complication is usually handled by myself with the tools mentioned previously. In the past either a dental explorer, a small round bur or a piezo-electric scaler provided enough external force to dislodge any fractured screw. Utilizing the procedures in my armamentarium, I was stymied by this case as none of the screws were moving/rotating. Eventually in desperation, I even contemplated "trephining" the implants so that they could be removed, the sites grafted and implants subsequently replaced. However, this approach was not optimal and would have been considered only after all other attempts had failed. I then came across the Neobiotech **Screw Removal Kit SR**.

This kit utilizes an ultra small drill (Fig. 2) on the fractured screw interface to prepare a channel in the long axis of the screw. Then a self-tapping, reverse threaded screw removal tool (Fig. 3) is inserted and turned slowly to provide an engaging instrument which grabs hold of the fractured shank and unscrews it. This system is unique in that it has a series of fitted sleeves (Fig. 4) which protect the internal aspect of the implant body from the often unavoidable damaging effects of drills touching the threaded internal surface and thus damaging the walls and the threads.

The Neobiotech Screw Removal Tool SR was successfully used to remove all three fractured screws in this case (Figs. 5, 6, 7 and 8). None of the internal aspects of the implants were damaged, which allowed the implants to be reused for a new prosthesis. Immediately after the successful removal of the fractured prosthetic screws, the implant positions were recorded with a closed tray implant level impression. A six-unit fixed prosthesis was delivered within 3 weeks. The patient and the dental team were satisfied that the clinical complication was handled in a relatively simple manner.

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Dr. Dwayne Karateew DDS, Cert Perio, Cert. Prosth maintains a private practice in Vancouver focusing on advanced dental procedures including Periodontics, Prosthodontics and Implant Assisted rehabilitation. He is a Contributing Consultant to Oral Health. He has no

Photos



Figure 1. Fractured prosthetic screw inside internal hex implant..



Figure 2. Channel cutting drill bit.



Figure 3. Reverse threaded screw removal tool.



Figure 4. Implant wall protective sleeve.



Figure 5. Protective sleeve and holder in situ.

affiliation with and received no incentives from companies distributing any of the aforementioned dental devices.

Dr. Mahtab Sadrameli DMD, MAGD practices in San Francisco Ca.

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Figure 6. Holding the drill bit in position while protecting the implant wall.



Figure 7. Tip of fractured prosthetic screw on removal apparatus.



Figure 8. Three fractured prosthetic screws retrieved successfully (one of the screws had broken into two pieces).