

SHOULD I REMOVE THE FULL-ARCH IMPLANT PROSTHESIS FOR MAINTENANCE APPOINTMENTS?

by Randolph R. Resnik DMD, MDS

With full-arch implant prostheses, adequate hygiene practices provide for decreased complications and increased longevity of the implants and prosthesis. If the prosthesis is inadequately cleaned, the patient will be predisposed to potential peri-implant complications. An often question asked by clinicians is ***“Should the prosthesis be removed, cleaned, and re-inserted on routine maintenance appointments” ?***

Unfortunately, in the dental implant literature, there exist no accepted scientific evidence or guidelines for maintenance of full-arch prostheses.[1] Basically, the ideal technique and protocol to maintain full arch prostheses and supporting tissues are controversial and poorly defined. Therefore, there exist many schools of thoughts on whether it is advantageous or problematic for the continuous removal of full arch prostheses.

Why Are Full-Arch Prostheses Predisposed to Complications?

Because of the inherent design of full-arch fixed prostheses, biofilm accumulation and restricted access for hygiene are common problems. The prosthesis design is strongly dictated by the position of the implants and the teeth, which is often non-ideal because of the bone resorption process. The most common design flaw is the intaglio surface being concave (i.e., ideally convex), which limits access to hygiene procedures. Therefore, biofilm and other debris will accumulate which results in poor tissue health and the development of peri-implant disease. (Figure 1)

cont'd pg.5



Figure 1: (a) Concave intaglio surfaces (red arrows) leading to debris accumulation, (b) when flanges are present, it becomes impossible for patient to clean as depicted by concave open space (red arrow)

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QUESTION OF THE MONTH

Doctor,
Because of my dental implant, can I
have an MRI Exam ?

~ Patient X



CASE REPORT

Upon implant placement in the posterior maxilla, a dental implant was displaced into the maxillary sinus. Shortly thereafter, the patient presented to a local hospital with ocular pain. Upon CT scan evaluation, a dental implant was noted in the infraorbital rim area (red circle). How and why did this happen?



RESEARCH STUDY QUESTION OF THE MONTH

According to a recent systemic review and meta-analysis, does the concurrent use of selective serotonin re-uptake inhibitors (SSRI's) effect the success of dental implants?

- citalopram (Cipramil)
- dapoxetine (Priligy)
- escitalopram (Cipralext)
- fluoxetine (Prozac or Oxactin)
- fluvoxamine (Faverin)
- paroxetine (Seroxat)
- sertraline (Lustral)
- vortioxetine (Brintellix)

SSRI'S

SHOULD I REMOVE THE FULL-ARCH IMPLANT PROSTHESIS FOR MAINTENANCE APPOINTMENTS? *cont'd*

The main documented complication of prosthesis removal is the potential damage of the abutment screws after removal of the prosthesis. Because of the mechanical forces that are applied to the screw (preload with resulting clamping force), the mechanical properties of the abutment screws are irreversibly modified.

When an abutment screw is tightened (i.e, 30 N/cm with a torque wrench), a force is generated between the abutment and implant. The abutment and implant are held together by a “clamping force”, which results from the applied rotational torque force called “preload”. The abutment screw when torqued will become an “elongated spring”, which results in tension on the screw threads. There is a resultant elastic recovery of the thread, which creates a force (clamping force) that results in friction between the abutment and implant. After the initial torque, approximately 2 – 10% of the initial preload is lost, which is a phenomenon termed “embedment relaxation” or “settling effect”. [2] This loss of preload is counteracted by re-torquing the screws to the initial torque 5-10 minutes after the first torque.

Therefore, the entire torquing process will result in changes to the abutment screw physical properties.

Various clinical studies have evaluated the ramifications of the removal and re-insertion of abutment screws. Rangert et al., concluded that removal and tightening of abutment screws led to altered interface stability, mainly from alteration of the mechanical and physical properties. This may result in screw loosening or screw fracture. [3] Butkevica et al. reported that repeated tightening and loosening of abutment screws will result in torque-level changes. Their studies concluded that ideally the number of tightening/loosening cycles should be limited. [4] Arshad et al. evaluated the effect of repeated

screw joint closing and opening cycles and cyclic loading on abutment screw removal torque and screw thread morphology using scanning electron microscopy (SEM). All groups in the study exhibited reduced removal torque values in comparison to insertion torque values in each cycle. [5]

In summary, re-insertion of the prosthesis with the same screws will increase the potential for screw loosening and fracture. Therefore, ideally screws should be replaced after each re-insertion, however this is costly and in most cases impractical. Unfortunately, it is impossible to generalize for all clinical situations and various types of screws, as manufacturers screws differ in initial torque, screw material, screw geometry, number and pitch of screw threads and application of a second torque. (Figure 2)

Figure 2: Abutment screw deformation (green arrow) from repeated removal / insertions in comparison to a new screw.



So, what are the advantages and disadvantages of removing the prosthesis for maintenance appointments?

Advantages

- Access to the implant and abutments for hygiene
- Ease of cleaning and polishing the prosthesis
- Modification of the prosthesis if indicated

Disadvantages

- Time-consuming
- Abutment screw deformation
- Possible increased screw loosening/fracture
- Possible need to replace abutment screws
- Increased stress to the implant from removal/insertion of screws

What is the position of the American College of Prosthodontics (ACP) ?

In 2016, The American College of Prosthodontics' published a position paper stating that full-arch implant prostheses **should not** be removed at routine hygiene visits.[1] However, it is their position if the prosthesis does not allow for adequate cleaning or signs and symptoms are consistent with peri-implant disease, then the prosthesis should be removed.

Summary:

- 1.) There exists no clear scientific evidence on the professional technique and protocols to manage full-arch fixed implant prostheses.
- 2.) It is imperative the clinician and patient implement a long-term maintenance program that will access patient compliance and facilitate early detection of potential complications.
- 3.) The patient must understand they have a responsibility in maintaining ideal hygiene, however it is the clinicians responsibility to provide a prosthesis that is easily cleansable.

- 4.) Ideally, the full-arch implant prostheses should be designed to allow for access and proper cleansability (convex intaglio surface)
- 5.) The prosthesis removal, cleaning, and re-insertion is the easiest technique to remove debris from the prosthesis, however it may lead to complications.
- 6.) The main long-term disadvantage of continued prosthesis removal is the irreversible alteration of the abutment screws which may lead to screw loosening/fracture.

Conclusion:

In most clinical situations, the prosthesis should not be removed for routine maintenance. However, if any of the following are present, removal is recommended to properly clean and modify the prosthesis if necessary;

- There exists debris accumulation that cannot be removed via standard hygiene practices.
- The prosthesis design has inherent physical obstacles that prevent proper hygiene
- There is active peri-implant disease (peri-mucositis or peri-implantitis)



which cannot be remedied by conventional techniques

Generalized Guidelines If Prosthesis IS Removed

* If the prosthesis requires removal (as per criteria above), the implants and abutments should be cleaned via conventional hygiene methods. The prosthesis should be mechanically cleaned to remove biofilm and any debris build-up. The prosthesis may be placed in an ultrasonic bath cleaner (with tartar and stain remover) and then highly polished to obtain a surface which will minimize biofilm accumulation.

* There exist no accepted guidelines on the replacement of abutment screws after removal. Many variables exist such as screw diameter, material number of threads, number of implants which need to be considered when replacing screws. Therefore, the clinician should evaluate the need to replace screws on a case-by-case basis depending on the above-mentioned factors.

* Care should be exercised in immersing the prosthesis in disinfected proprietary solutions as they may have an adverse effect on the surface properties of the prosthesis. Therefore, only use solutions that are approved via the manufacturer's specific materials instructions.

Generalized Guidelines If Prosthesis IS NOT Removed

The regular hygiene practices on a prosthesis should include titanium scalers, ultrasonics, or rubber cup with a fine-grit polishing paste. Studies have shown that glycine powder air polishing is the most effective alternative to manual and mechanical instrumentation. [6]

[1.] Piermatti, J., P. Barndt, and G. Thalji. "Maintenance of Full-Arch Implant Restorations." Barndt P, editor (2016).

[2.] Shingley JE, Mischke CR, Standard handbook of machine design, 1st ed. New York : McGraw Hill 1986; 23-6.

[3.] Rangert, B. O., et al. "Bending overload and implant fracture: a retrospective clinical analysis." International Journal of Oral and Maxillofacial Implants 10.3 (1995).

[4.] Butkevica, A., Nathanson, D., Pober, R., and Starting, H. (2018). Measurements of repeated tightening and loosening torque of seven different implant/abutment connection designs and their modifications: an in vitro study. The Journal of Prosthodontics 27 (2): 153–161.

[5.] Arshad, M., Mahgoli, H., and Pavaminia, L. (2018). Effect of repeated screw joint closing and opening cycles and cyclic loading on abutment screw removal torque and screw thread morphology: scanning electron microscopy evaluation. The International Journal of Oral and Maxillofacial Implants 33 (1): 31–40.

[6.] Menini, Maria, et al. "Efficacy of air-polishing devices without removal of implant-supported full-arch prostheses." International Journal of Oral Implantology 14.4 (2021).

QUESTION OF THE MONTH

Magnetic resonance imaging (MRI) is a widely accepted radiographic modality used as a diagnostic tool which is considered to be safer than radiographic techniques as it does not expose the body to radiation. However, MRI's are strong magnets, which in the presence of a metal object (dental implant) could be dangerous because of the excessive magnetic field interactions. There are metals such as steel, iron, nickel, and chrome cobalt (ferromagnetic metals) which maybe highly susceptible to the MRI magnets.

Titanium implants are paramagnetic metal, which exhibit a weak attraction to a magnetic field of a MRI. The risk of implant-based complications is very low, and MRI can be safely used in patients with implants. [1] [2]

[1]. Rupp R, Ebraheim NA, Savolaine ER, et al. Magnetic resonance imaging evaluation of the spine with metal implants: general safety and superior imaging with titanium. Spine (Phila Pa 1976) 1993;18:379-85

[2.] Sullivan PK, Smith JF, Rozzelle AA. Cranio-orbital reconstruction: safety and image quality of metallic implants on CT and MRI scanning. Plast Reconstr Surg. 1994;94:589-96.

CASE REPORT

It appears from the pre-operative radiographs, less than 5 mm of host bone was present for the placement of the implant. In addition, the bone quality appeared to be very poor. The implant was placed with a mallet, therefore without sufficient bone quantity and quality, the implant lacked stability which resulted in the implant being displaced into the maxillary sinus. From the maxillary sinus, the implant migrated to the infraorbital region, requiring endoscopic surgical removal. To prevent displaced implants in this region, a **minimum of 5 mm of host bone** is required when placing the implant and bone graft in the posterior maxilla.

RESEARCH STUDY QUESTION OF THE MONTH

Yes: The failure rate is **more than double** than of non-SSRI users

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by Mark Romano
CEO of NOW MEDIA

AI to Help With Your Dental Marketing?

We are now all familiar with the concept of Artificial Intelligence. It is now easier than ever before for us to take advantage of AI as a way to enhance our marketing efforts.

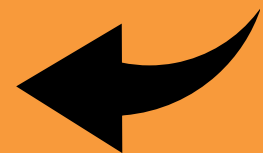
How Does AI Help With Dental Marketing?

Google Analytics is already using AI. The analytics program takes data from all over the internet and uses it to not only analyze past and current trends, but also predict what will happen — it's called predictive analytics. This is useful in planning future marketing goals. This data is used to help your dental practice more precisely target its marketing to attract the ideal potential patient. With the help of AI, marketing can be a precision tool, increasing accuracy and speed of results, because a computer learns and reacts much faster than any human could ever do. Your dental practice can properly take advantage of AI and precisely focus its marketing efforts to ensure increasingly beneficial results.

Recently released, Google Analytics 4 - is the next generation of analytics which collects event-based data from both websites and apps. If you need any help get started with Google Analytics 4, we would love to help. Please email mark@nowmediagroup.tv or call/text 858-352-8474. Thank You!



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ITXPROS – TIP of the Month

CBCT Motion Artifacts: Major Source of Image Inaccuracies

During the acquisition of CBCT Scans, image artifacts caused by patient movement is a major problem which leads to distortion of the 3-dimensional reconstruction. Studies have shown motion artifacts to occur up to 83% of scans and movement greater than 0.5 mm has significant effects on the image quality. [i][ii] Motion artifacts are depicted on images as white or black lines, double contours, or inability to identify vital structures. The resultant image distortions will lead to inaccuracies in surgical guide fabrication. Therefore, because accuracy is vitally critical in implant dentistry, it is imperative that clinicians restrict patient movement as much as possible during a scan.

The following are possible solutions to reduce motion artifacts:

1. Sitting Position CBCT units result in less motion than stand-up or supine
2. Verify patients head position is securely immobilized and stabilized
3. Provide detailed instructions to the patient prior to the scan.
4. Complete a dry run or a practice scan for the patient
5. Especially in elderly or medically compromised patients, reduce the exposure time. There is a direct correlation between scanning time and motion artifacts. (Average scan time is approximately 20 sec., with a range of 5 – 40 sec.)
6. Have patient close eyes for the entire the scan duration
7. Have patient breath normally as holding their breath will usually result in movement



[i] Spin-Neto R, Costa C, Salgado DM, Zambrana NR, Gotfredsen E, Wenzel A. Patient movement characteristics and the impact on CBCT image quality and interpretability. *Dentomaxillofac Radiol.* 2018;47:20170216.

[ii] Abdelkarim, A., et al. "Effect of movement on high-resolution cone-beam computed tomography images." *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology* 2.103 (2007): e48.

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Lab Technician to The Stars!!



10 Second Technique to Change An O-Ring

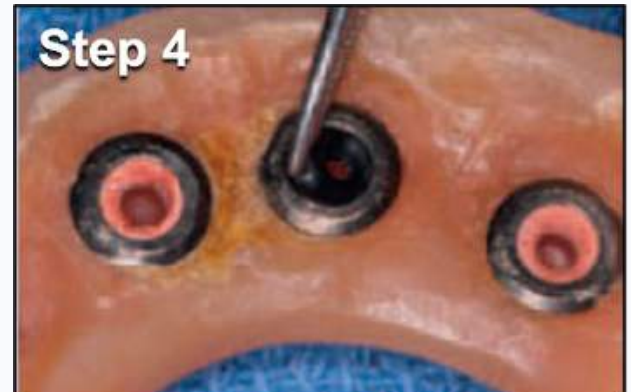
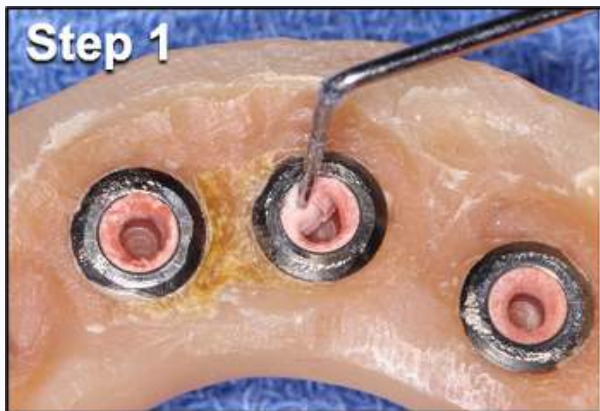
Changing O-Ring attachments can be frustrating, especially if they are not completely seated within the metal housing. However, the following is a simple and easy technique to change an O-ring fast and accurately.

Step 1: Remove old O-Ring by “puncturing” the ring with an explorer. Clean any debris out from inside the metal encapsulator

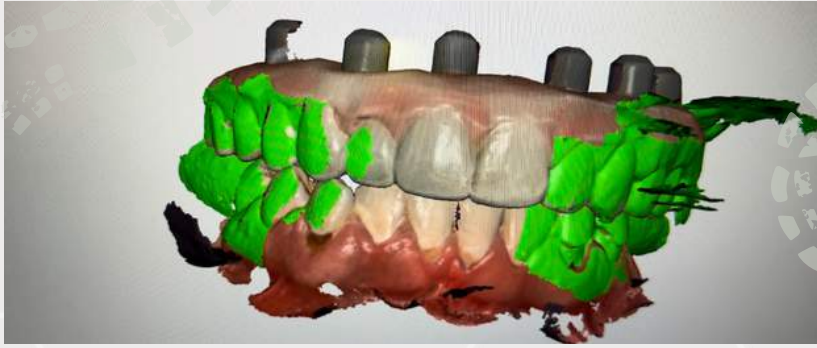
Step 2: Apply Water soluble petroleum jelly (K-Y) with brush to the inside of the encapsulator. Do not use Vaseline as it will break down the attachment.

Step 3: With cotton forceps, place the attachment vertically into the necapsulator

Step 4: Tuck and seat O-ring into one corner, then opposite corner until the entire ring is passively in the housing



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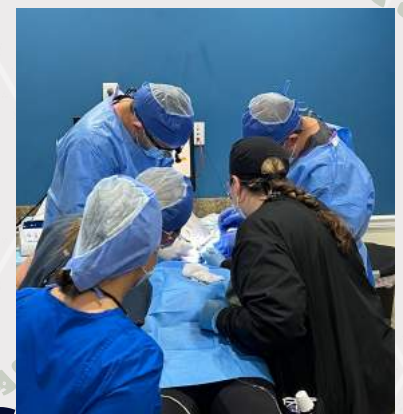
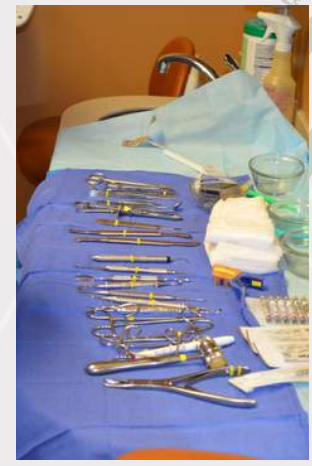


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The course gives you the confidence you need to place dental implants and allows you to meet like minded colleagues and instructors. \ Dr. Resnik is a great lecturer, keeps things interesting and presence scientific research to back up his claims. Most importantly the course will provide you with cook book instructions and protocols for everything you will encounter during your implant journey, from placement, to suture line opening to dealing with infections, consent form templates, medical clearance templates...etc. \. Strongly recommend! -- **Dr. J Chen**

This course gives you a comprehensive introduction to placing single, multi, and full arch implants mostly using guided techniques. This course is for anyone at any level. The audience is made up of beginners who have never placed an implant (like myself) to the well seasoned general dentists/ OMFS who has had years of experience placing implants. Best money I have spent to forward my career. -- **Dr. Natalie Sigwart**

I finished the 5-course curriculum just this past year. Dr. Resnik and the faculty are hands down the best in the business. The Resnik program gives you the education, tools, and the confidence to be proficient at implant dentistry. This curriculum gives you the knowledge and the skills to take your practice to the next level! -- **Dr Michael Buck**

Many thanks to Dr. Resnik and the Resnik Institute for their excellence and the quality of the surgical and prosthetic implant courses. I have gone through most of the courses a second time to my advantage, because they are always updated with new labs and lectures. THANK YOU! -- **Dr. Barb Leadbeater**

After 30 years of practicing dentistry, my only regret is that I did not get involved with implant dentistry earlier in my career, specifically with the Resnik Institute. I never realized how rewarding and exciting for both me and my practice this could be. Dr. Randy Resnik and his entire staff are a major factor in this testimony! -- **Dr. Douglas Adel**

Dr. Resnik has an amazing depth of scientific based knowledge concerning his subject. He builds a very large zone of safety. If one stays within this zone the success rate will be maximized and complications will be extremely rare. -- **Dr. Terry Rigdon**

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