

MULTI UNIT ABUTMENTS RECOMMENDED IN PROSTHETIC AND SURGICAL IMPLANTOLOGY TREATMENT (CASE REPORT)

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Abstract

Possibility for choosing multi-unit abutments in oral implantology create prosthetic flexibility on implant supported restorations. Multi-unit abutments offer a level of predictable esthetics, with consistent fit and function, that has greatly improved the effectiveness of implant supported constructions. The aim of this study is to show proven and documented clinical efficacy of multi-unit abutments, cost-effective solutions and portfolio of prosthetic restorations as one of the most comprehensive available. A case of a 45-year old patient with partial edentulous maxilla and previously prosthodontic treatment failure is presented. The clinical and paraclinical examination showed that the limited edentulous spaces were marginally acceptable for implant supported restorations. Combination of multi-unit abutments and definitive prosthetic construction were delivered six months after implant osseointegration.

Key words: abutments, dental implants, restorations, prosthodontic treatment, esthetic

Introduction

The multi-unit abutment is carefully designed to rehabilitate both edentulous and partially edentulous arches, particularly when using the clinically and scientifically proven all-on-4 treatment concept [1]. The original multi-unit abutment was developed in 2000 and was a first for the industry at the time. Since then it has been accepted as an industry standard and many have tried to copy its innovative design [2]. What set the multi-unit abutment apart from the rest are the design details, short cone for limited interocclusal space, wide shoulder for easy positioning of the prosthetic restoration.

For various soft tissue anatomies – both straight and angled 0°, 17°, 30° and 45° variants are available in several different collar heights (Figure 1). By tilting the posterior implants, anatomical structures such as mandibular nerve, foramen mentale and the maxillary sinus are avoided and the need for bone augmentation is reduced. Tilting the posterior implants also moves the implant abutment connection to the back of the mouth. Cantilevers are therefore reduced, improving support for the prosthesis. Shorter, longer and wider versions have been added to an expanded range designed to further help clinicians utilize a graftless approach and achieve cortical or bicortical anchorage where bone quality and quantity are limited [3], thus allowing more patients to benefit from the proven advantages of the multi-unit abutments treatment concept. In order to achieve better parallelity and height between the abutments sometimes additional caps and screws are needed. The angled multi-unit abutments allow for the tilting of the two posterior implants, meaning longer implants can be positioned in the anterior bone, rather than in the posterior where the bone is often resorbed [4,5]. This increases bone-to-implant contact and reduces the need for vertical bone augmentation. Anchoring the implants in better quality anterior bone also reduces cantilevers, improving support for the prostheses [6,7].



Figure 1. Variants of several different multi-unit abutment angulations

Furthermore, tilting the implants helps avoid critical nerve structures and the maxillary sinus. All this makes it a less invasive, lower risk, and more cost-efficient procedure for the patient, while increasing efficiency for the clinician. Dental implants offer primary stability at a level that allows for the restoration to be placed immediately, the Ti-implant surface and patented grooves then help maintain this stability during osseointegration. In combination with multi-unit abutments and the all-on-4 treatment concept, this allows edentulous patients to leave the dental surgery with a full set of teeth and renewed self-confidence.

The advantages of using multi-unit abutments is having a much easier and more predictable seating of the final restoration [8,9], creating reduced stress translated into the restorative system due to the passive nature of the seating process of multi-unit abutments. Clinicians can determine the angulation correction needed in the patient's mouth rather than on a model in the dental technician lab [10], they are able to evaluate the vertical clearance that they have available. This allows us them to evaluate the prosthetic options early in the process [11]. The lab technician can predictably place multi-unit analogs in the model, which will simplify dental technician procedures and facilitate more predictable results.

Case Presentation

A 45-year-old man presented to the prosthodontist's office with a complaint of sharp pain associated with a loose 4-year-old maxillary fixed bridge. The fixed bridge was supported only by one natural tooth (premolar), with 2 bilateral cantilevers which means absolute contraindication for this kind of prosthetic work (Figure 2). The patient noted that the bridge had been causing discomfort for quite some time and also had been evaluated by a periodontist and two endodontists that maxillary second premolar had chronic periodontal disease (Figure 2).

The first endodontist did not feel that endodontic therapy was required, while the second endodontist agreed to provide treatment. Conventional root canal therapy was completed on the second premolar in the upper right quadrant so the pain and discomfort disappeared.

The patient was informed of the prognosis of the second premolar tooth, he didn't agree for sinus lift and augmentation procedure, because of the anatomical constrictions and the interest in keeping treatment cost-effective, a plan for a fixed prosthesis supported by two implants was proposed. The CBCT scan was then further utilized to plan the placement of the implants.

The treatment plan called for, angulated placement of one implant on the distal wall of the sinus, with the one remaining implant placed axially in the first premolar space. By utilizing the CBCT scan, the implant dimensions and positions were verified, then provisional denture was fabricated. At the next appointment, the patient's existing fixed bridge was removed, and two dental implants were immediately

placed. One 3.6 mm x 13 mm implant was placed in the area of teeth 14; one 3.6 mm x 11 mm implant was placed in the areas of teeth 17. The posterior implant was angulated distally following the protocol, engaging the distal wall of the sinuses and providing a wider anterior-posterior spread. The anterior implant was placed to engage the cortical bone at the inferior border of the maxilla. The planned position and angulation of the implants were achieved, utilizing the remaining premolar as a reference guide (Figure 3).

Once the implants were placed, six months later one straight regular abutment was placed on the anterior implant, and a 30-degree multi-unit abutment with a 3 mm collar was placed on the posterior implant (Figure 4). With the provisional prosthesis in place, healing occurred for six months, after which time final impressions were taken for the fabrication of the definitive porcelain fused to metal (PFM) prosthesis (Figure 5). Resonance frequency analysis readings demonstrated positive bone remodeling and healing.

The final restoration was delivered with minimal adjustments. The new prosthesis met the esthetic needs of the patient, functioned well, and eliminated the pain and discomfort the patient was experiencing prior to implant therapy.

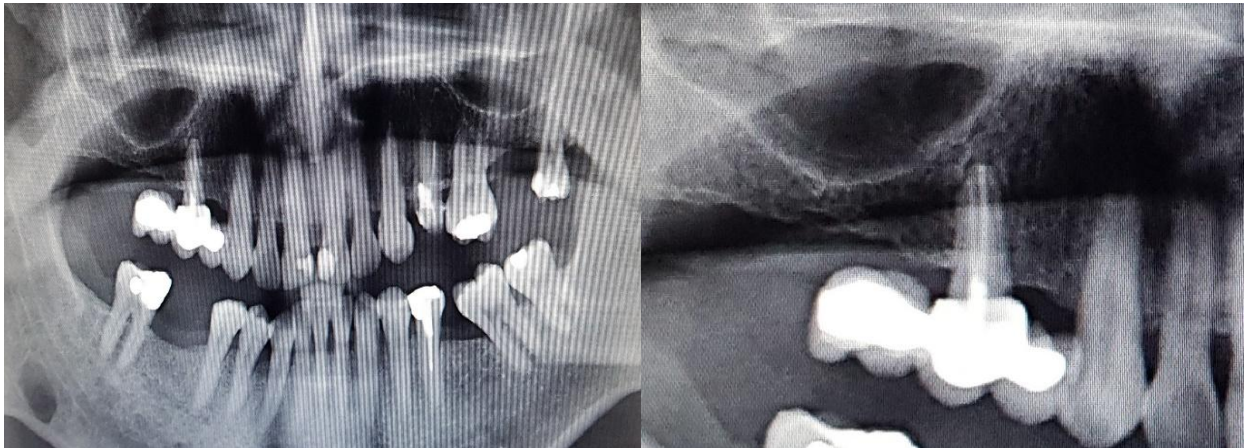


Figure 2. Preoperative panoramic radiograph. The patient suffered from pain associated with a 4-year-old maxillary fixed bridge, maxillary second premolar with chronic periodontal disease.

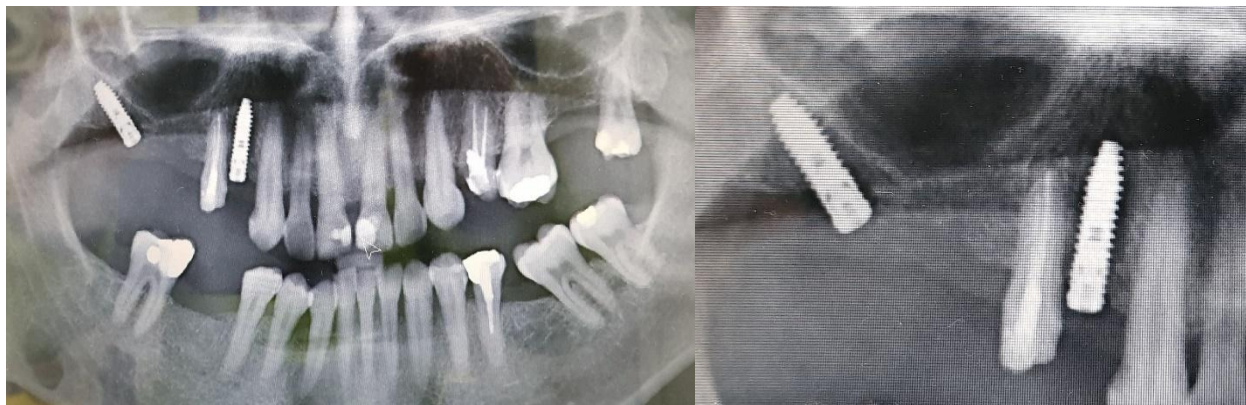


Figure 3. Postoperative panoramic radiograph evaluation, six months after dental implants osseointegration.



Figure 4. One straight 1 mm multi-unit abutment placed on the anterior implant 14, and a 30-degree multi-unit abutment with a 3 mm collar on the posterior implant 17.



Figure 5. Clinical view of the final restoration, fabricated of the definitive porcelain fused to metal (PFM)

Discussion

The advantages of using multi-unit abutments far outweighs any of the concerns mentioned regarding the clinicians and dental technicians. Having a much easier and more predictable seating of the final restoration and creating reduced stress translated into the restorative system due to the passive nature of the seating process of multi-unit abutments, which correspond with our study. Additionally, each time the patient has a recall appointment, it will be much easier to remove and replace the prosthesis due to screw- retaining option [11]. *Advantages* to beginning your restorative process with the foundation of multi-unit abutments in the mouth:

1. Clinicians can determine the angulation correction needed in the patient's mouth rather than on a model in the dental technician lab, as it was described in our case.
2. Clinicians are able to evaluate the vertical clearance that they have available. This allows them to evaluate the prosthetic options early in the process.
3. Dental technician can predictably place multi-unit analogs in the model, which will simplify lab procedures and facilitate more predictable results.

Many clinicians place multi-unit abutments at the surgery appointment and convert a denture into an implant-retained prosthetic. This is always best done by placing appropriate multi-unit abutments and adapting the denture to the multi-unit abutments. However, if we choose not to immediate-load the implants, it is always best to seat the multi-unit abutments before the initial impression as we begin the restorative process, as it was done in our case report. If we begin the impression process with multi-units placed and take our impressions at the multi-level rather than implant level, it saves us steps later and enhances the accuracy of the final prosthetic's fit [12,13].

When correcting for implant angulation is required-multi-unit abutments are intended to be connectors between the dental implants and multiple implant screw-retained restorations. There are usually 3-4 angle correction options to choose from, ranging from straight - 0° to 45°. Clinicians can make selection at conversion appointment or at the initial prosthetic impression appointment [14]. Whenever we can be aware that as the restorative process unfolds, clinicians may have to consider changing one or more of the angulations in order to best support the final prosthetic.

The critical point here is that when we place multi-unit impression coping, and screw on to the abutments before initial impression, the pins should all be close to parallel. They do not have to be precisely parallel but close by eye. That is the point and benefit of using multi-units, dentists are forgiving.

When correcting implant height disparities is needed-multi-unit abutments can also correct for implant height disparities. The prosthesis seats more solidly and predictably if we use multi-unit abutments to not only correct for angulation but also for height. Multi-unit abutments can accommodate for height differences because they come in a selection of height profiles. The idea is to use low profile multi-unit abutments in implants placed higher relative to the occlusal plane of the tissue, and use taller profile multi-unit abutments when the implants are placed deeper into the bone. Our goal is to have all of the multi-unit abutments seating at about tissue level, and relatively even with each other.

General for all screw- retained prosthesis

When restoring a full arch, screw-retained implant prosthetic case, even a minimal disparity in the draw of the implant interface access causes restorative challenges. The use of multi-unit abutments can overcome restorative challenges and is highly recommended (if not required) when creating a full arch screw-retained implant restoration. Multi-unit abutments (MUA), are designed with a range of angle correction and are available for virtually all implant platforms. Multi-unit abutments provide a passive draw and positive uniform seat for all abutment sites. The big advantages that they bring the edge of the

bridge close to the surface which makes it easy for the dentist to work. The big problem with these besides the small screws that may take up a lot of space in the bridge. There is less space from top to bottom which can make a Prettau zirconia dental implant bridge weaker. The screws may need to be checked on a routine basis so sometimes these bridges require removal, re-tightening and replacement of the screws. If even one screw gets loose and can break which is quite the pain to remove and can lead to a broken bridge altogether.

The other option is to make the bridge go directly to the top of the implant. This is not possible with all types of bridges and it is not possible with all types of implants [15]. This requires a very high level of skill and accuracy to make the bridge without the help of multi-unit abutments because the accuracy has to be dead on. Without the multi-unit abutments a much larger screw can be used which is not likely to break or loosen. Most dentists are not comfortable doing this but this is often my preferred technique for at least a decade. Sometimes it's better to mix and match multi-unit abutments along with making the bridge go directly to the implant level. Each case is very unique and specific and should be treated as such [16]. Sometimes the multi-unit abutments can get in the way of having proper convex surface on a full arch bridge making cleaning very difficult. So basically the multi-unit abutment is a angle changing abutment that acts as a spacer to go through the gums, as it was shown in our case. Sometimes they are chrome in color or they can be colored. Either way they are still manufactured in titanium and need to have a precision fit to the implant [17].

Multi-Unit Disadvantage

The biggest disadvantage of this particular abutment is that the screw that holds the bridge on is quite tiny. Tightening the screw down can be difficult very much because it is so small. It is like the size of the screws that may hold your eyeglass frames together. The multi-unit abutment is shaped like cone.

If one cone is in alignment with another cone a bridge can be made over it, this makes it so the bridge will not rock from side to side. We call this passive fitting of the prosthetic bridge. If there is no alignment between the multi-unit abutments, additional fabricated caps may be needed for achieving better parallelity.

The caps are connected with the multi-unit abutments with additional screw. These are all complementary financial concerns for dentist and patients.

Because of the multi-unit abutments size and shape, maneuvering can be very difficult for the clinicians in the mouth of the patients. To this purpose there is a need for a unique handle designed for placing the abutment on top of the implant, they provide easy and secure handling for simple insertion and optimal base placement into the implant (Figure 6). This unit can't be available in some implant systems, or may be a one more additional cost for the dentist and dental technicians.



Figure 6. Additional handle designed for precise placement multi-unit abutment into the implant.

Conclusion

Multi-unit abutments provide great benefits for reconstructions where the implant treatment protocol is called for.

They provide surgical flexibility by allowing the posterior implants to be tilted following the mesial or distal wall of the sinus, avoiding the sinus cavity and eliminating the need for grafting.

This saves considerable time and expenses for the patient, which was described in our case report. At the end we can recommend multi-unit abutments as a final - abutments for all indications and treatment options, complementary prosthetic connections in implant dentistry.

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