



## Case Report

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# A New Wedge-Shape Dental Implants for Narrow Bone Ridge: REX Piezoimplant, a Case Report With 12 Months of Follow-Up

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**To Cite This Article:** Lucia Memè, Stefano Mummolo, Enrico M. Strappa, Fabrizio Bambini, Gianni Gallusi. A New Wedge-Shape Dental Implants for Narrow Bone Ridge: REX Piezoimplant, a Case Report With 12 Months of Follow-Up. *Am J Biomed Sci & Res.* 2022 - 16(3). *AJBSR.MS.ID.002224*. DOI: [10.34297/AJBSR.2022.16.002224](https://doi.org/10.34297/AJBSR.2022.16.002224)

**Received:** 📅 May 19, 2022; **Published:** 📅 May 30, 2022

## Abstract

**Objective:** The purpose of this study was to report the surgical protocol used in implant prosthetic rehabilitation with REX PiezoImplant type TL1.8 (Rex TL, Rex Implants, Columbus, OH, USA).

**Methods:** A 54-year-old patient was enrolled in the study. Clinical and radiographic examination (CBCT) showed severe bone atrophy of the maxilla. The preparation of the implant sites was performed with piezoelectric instruments and a specific sequence of inserts (SLC, W1, W2, W3, and W4). The implants were inserted with the REX IPD magnetic hammer achieving a slight bone expansion.

**Results:** The patient was strictly monitored monthly for up to 12 months. The final prosthesis was delivered 5 months after surgery. CBCT performed at the end of the study demonstrated good osseointegration of the implants and the absence of peri-implant bone resorption.

**Conclusions:** The use of REX PiezoImplants can be considered a valid minimally invasive surgery technique in atrophic bone crests, which do not allow the insertion of traditional implants without bone regeneration procedures.

**Keywords:** Wedge Implant; Narrow Ridge; Piezosurgery; Minimally Invasive Surgery; Atrophic Bone Crest

## Materials and Methods

A 54-year-old female patient was enrolled in this study. She did not suffer from systemic disease and did not smoke. The systemic exclusion criteria were: (i) existence of metabolic bone disease, (ii) history of malignancy, (iii) history of radiotherapy or chemotherapy

for malignancy in the past 5 years, (iv) history of autoimmune disease, and long-term steroidal or antibiotic therapy. The patient desired to replace her upper removable total prosthesis with a fixed prosthesis on dental implants.



The patient was provided oral and written information regarding the surgery and the study, and written informed consent was obtained. The clinical examination showed an atrophic

maxillary alveolar ridge, as expected since the patient extracted teeth and wore a total removable prosthesis for a long period of time (Figure 1).



**Figure 1:** Clinical situation at the baseline, before surgery.

Before the surgery, she was subjected to oral hygiene in order to lower the bacterial charge and favor the bone healing. Moreover, before starting the surgical phase, she was subjected to a Cone Beam Computer Tomography (CBCT), made by KAVO-ICAT 3D EXAM (KaVo, Biberach, Germany), to evaluate the bone width of the interested site. Images were acquired by means of Kavo software

and processed by a computer, using a cutting thickness of the images of 0.8 mm. Acquisition was performed using a FOV of 23x17 mm, in order to avoid stitching [1]. During the radiographical evaluation, the patient worn her removable prosthesis in which some metallic spheres with the function of landmarks have been blocked with wax (Figure 2).



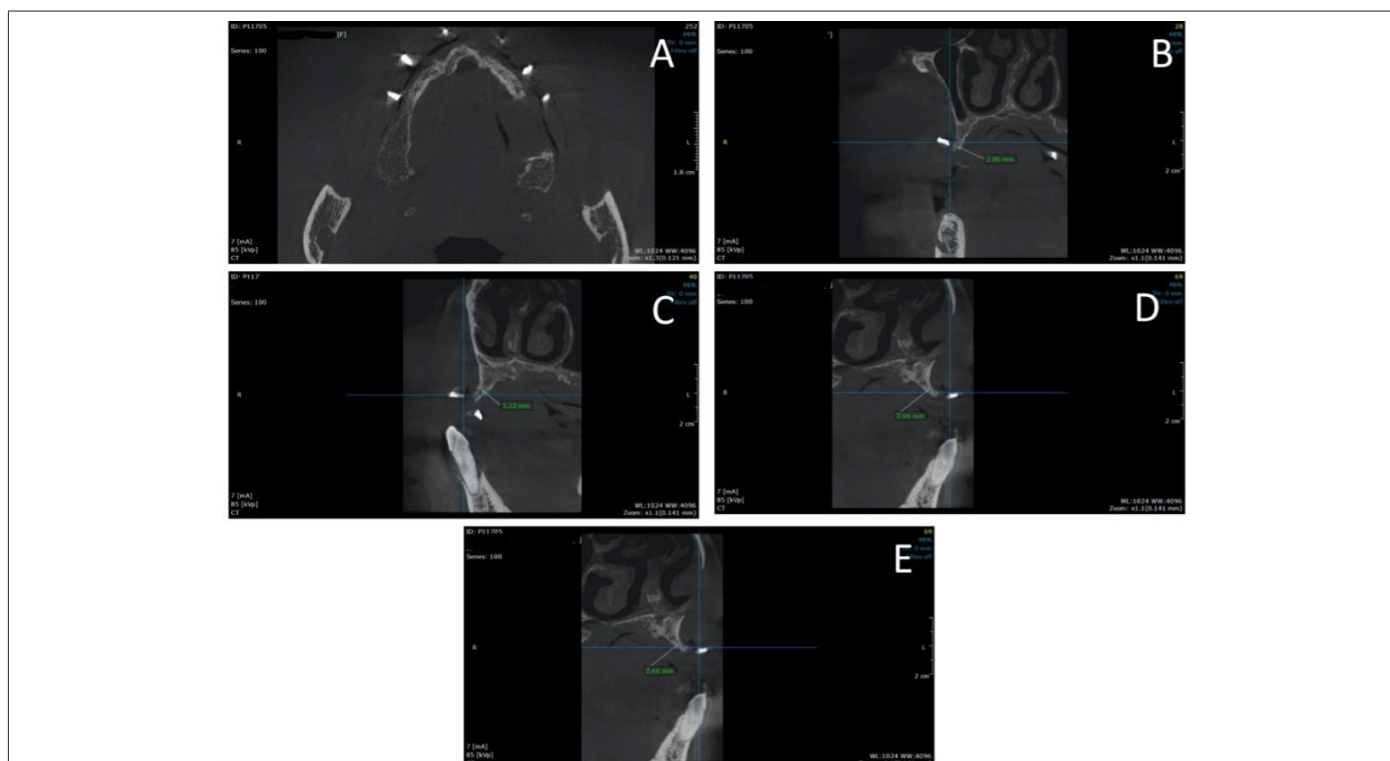
**Figure 2:** CBCT was carried out before the surgery, at the baseline of the study. The metallic spheres inserted into the removal prosthesis were visible and used as landmarks for the implant insertion.

The CBCT analysis confirmed the clinical evaluation, highlighting a maxillary bone resorption and a horizontal bone width inconsistent with the insertion of traditional implants, without bone regeneration procedures. The width of the bone ridge was determined by measuring in perpendicular direction the distance between the buccal and lingual walls.

Using the metallic spheres as landmarks, 4 points were

evaluated in the CBCT scans (Figure 3A):

- Point 1, with a horizontal width of 2.86 mm (Figure 3B);
- Point 2, with a horizontal width of 3.22 mm (Figure 3C);
- Point 3, with a horizontal width of 2.66 mm (Figure 3D);
- Point 4, with a horizontal width of 3.29 mm (Figure 3E).



**Figure 3:** CBCT evaluation before the surgery highlighting 4 point were implants will be inserted. (A) Metallic spheres were inserted into the removable prosthesis as landmarks. (B) Point 1 revealed a horizontal width of 2.86 mm; (C) Point 2 and Pont 3 (D) displayed a horizontal width of 3.22 mm and 2.66 mm, respectively; (E) Point 4 showed a horizontal width of 3.29 mm.

Based on these horizontal measurements, it was decided to treat the patient with a minimally invasive implant rehabilitation, using four REX PiezoImplant TL1.8 type (Rex TL, Rex Implants, Columbus, OH, USA). One hour before surgery, patient received 2 gr of amoxicillin, and then, just before surgery, 0.2% chlorhexidine mouthwash was performed for 2 minutes. Moreover, 1 g of amoxicillin twice a day for 5 days was prescribed. The patient was subjected to local anaesthesia with Articaine, 40 mg/ml 1:100.000, administered by infiltration in the areas adjacent to the surgery.

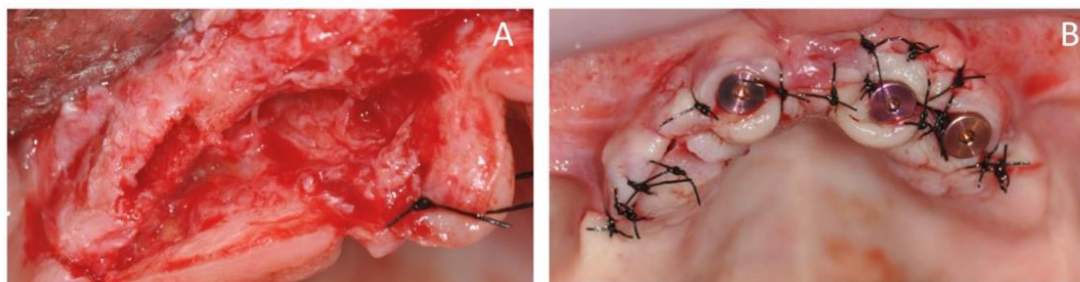
Subsequently, a crestal incision was made from zone 2.6 to zone 2.1 and from zone 1.1 to zone 1.6. Full-thickness flaps were reflected in the vestibular and palatal sides to maximize visualization of the underlying alveolar ridge defect and to allow a good implant positioning. Four REX PiezoImplants, with a length of

9 mm and a maximum thickness of 1.8 mm, were inserted following the surgical protocol suggested to the manufacturer. Each step of preparation of implant site was performed with the piezoelectric device Piezosurgery® (Mectron S.p.A).

At first, the bone crest was made uniform through the use of the SLC insert. For each implant, initially, the pilot osteotomy was performed, with the special insert W1, performing a first perforation in the desired implant position (sites 1.3, 1.5 2.3 and 2.5), reaching a depth of 9 mm. Subsequently, the correct insertion axis, position, angulation and distance between the 4 pilot osteotomies were verified by means of the alignment pins. Then, using W1 insert, two secondary osteotomies, used as landmarks, were created for each implant: the first was made 1 mm mesial and the second 1 mm distal each initial pilot osteotomy, reaching a depth of 5mm.

Through the micro-saw burr W2 the main osteotomy was connected to the secondary osteotomies, reaching a depth of 9 mm. The walls of the osteotomy were finished using the W3 micro-file insert. By inserting the appropriate FitGauge the size and alignment of the performed osteotomies were again checked. Finally, through the micro-file insert W4, the osteotomies were widened in a mesio-distal direction, to a depth not greater than 3 mm for the type of implant selected (REX TL 1.8) (Figure 4A).

After the preparation of the implant sites, implants were inserted using the REX IPD magnetic hammer (Implant Placement Device, Mectron S.p.A) (Figure 4B). Since the patient presented a type 3 bone quality according to Misch et al. [2], the four implants were inserted with 6/8 percussions, each with an increasing power from 1 to 4 (IPD value scale), thus also obtaining a slight bone expansion.



**Figure 4:** (A) Maxillary bone crest after the implant sites preparation with the follower burrs: W1, W2, W3 and W4. (B) Implants were inserted, and single sutures were used to close the flaps. Finally, the cover screws were located.

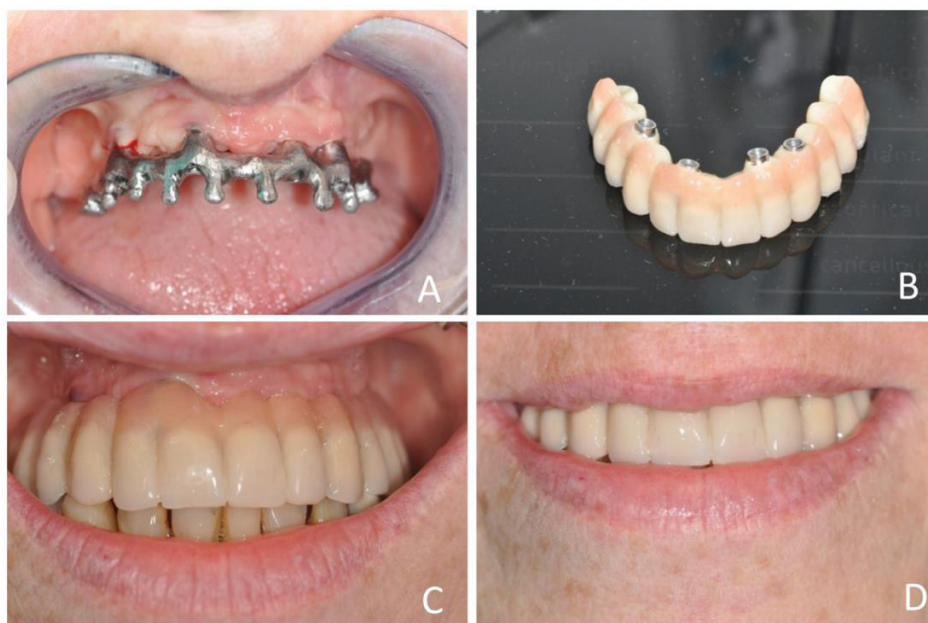
Once the implants were inserted, a single suture, using 4.0 Supramid (B.Braun, Milano S.p.A), were performed.

Sutures were removed after 10 days. During the healing period, the patient underwent regular monthly checks and the upper mobile prosthesis was relined with a soft acrylic resin in order to avoid soft tissue compression.

At the end of the 4 months required for the correct implant

healing and osseointegration, a polyether impression was taken, and, through the use of pre-screwed transfers, the correct position of the implants was reported in the impression.

The metal connection structure was screwed to the implants by means of titanium cylinders inserted into the structure itself (Figure 5A-5D). Finally, the final prosthesis was made on the metal structure and was screwed to the implants, without soft tissue compression (Figure 5C).



**Figure 5:** Rehabilitation phase. (A) Before the realization of the prosthesis, the metal connection structure on the inserted implants was evaluated. Then the definitive prosthesis was realized (B) and screwed to the implants (C). (D) The final results displayed a natural smile.

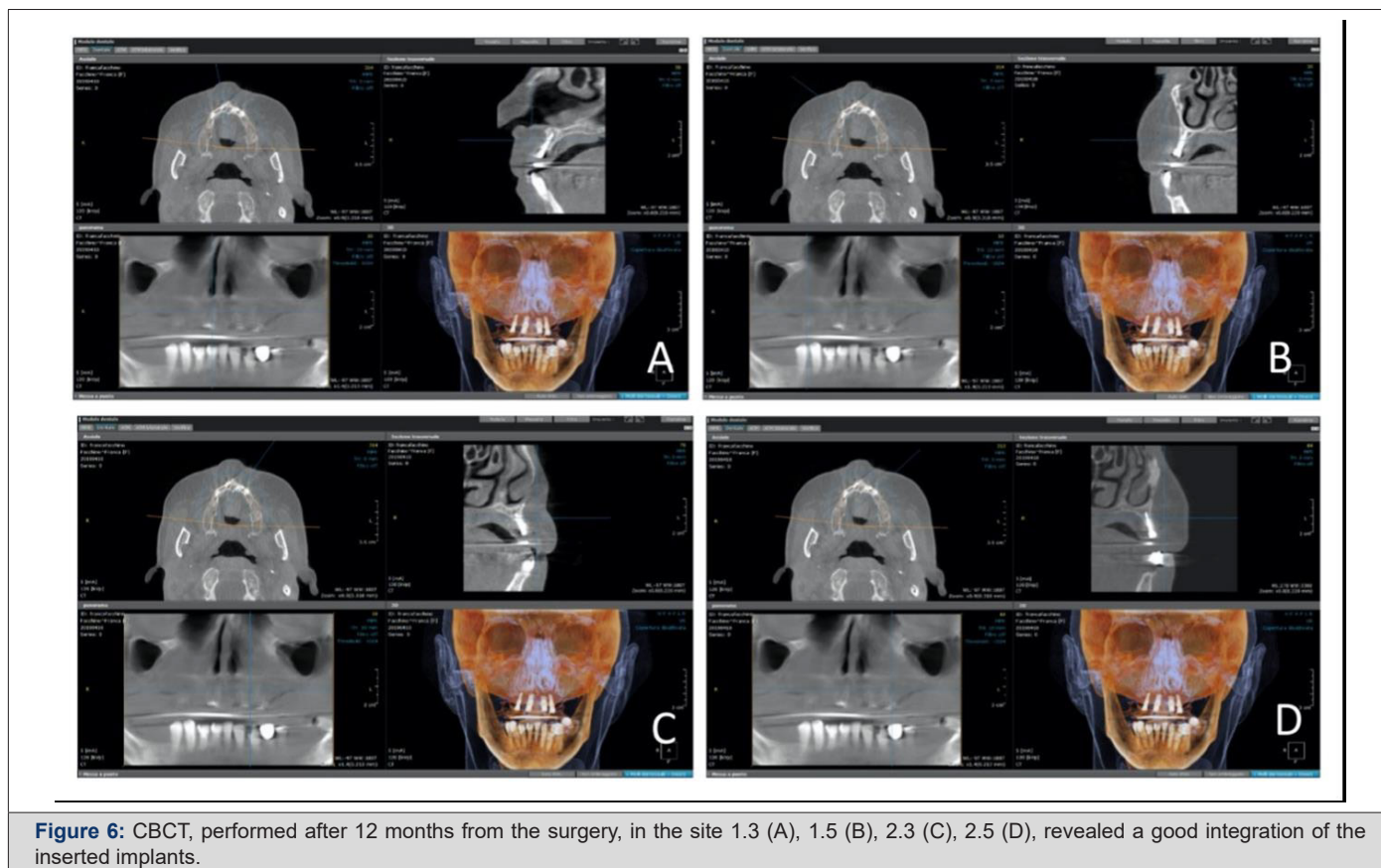


## Results and Discussion

### Result

In this case report a 54-year-old patient was enrolled. The surgical procedures were performed successfully as planned without complications. The follow-up evaluation performed at

the time of suture removal, on day 10, and after 1 month, showed uneventful healing, no signs of inflammation and soft tissue closure. The CBCT analysis, performed at 12 months of follow-up, revealed no residual radiolucency and a good osteointegration of the inserted implants (Figure 6).



**Figure 6:** CBCT, performed after 12 months from the surgery, in the site 1.3 (A), 1.5 (B), 2.3 (C), 2.5 (D), revealed a good integration of the inserted implants.

### Discussion

Nowadays, the use of these wedge implants can be considered as a valid minimally invasive surgery technique in atrophic bone crests, which do not allow the insertion of traditional implants without bone regeneration procedures. In particular, the REX PiezoImplant represents an interesting evolution of the Linkow blade [3]. Blade implants showed a high failure rate due to unpredictability in achieving primary stability, the type of loading protocol and postoperative complications [4]. Implant primary stability displays an important role in the osseointegration of dental implants. In the study of Vercellotti et al a good primary stability was obtained after the insertion of REX PiezoImplant in all cases and both mesio-distal and bucco-lingual ISQ values at 6-month follow-up resulted significantly higher than at 4-month follow-up [5].

Moreover, the possibility of preparing the implant site with cold-cut vibrating inserts rather than with high-speed drills, reduces

the heat avoiding the risk of creating bone necrosis and favoring a better osteointegration [6]. A recent meta-analysis showed that ultrasonic implant site preparation has a positive influence on early bone healing, resulting in faster development of secondary stability when compared to conventional drilling techniques [7]. In a recent study of Vercellotti et al. [8], these implants with a wedge-shape showed low morbidity and positive short-term clinical results in narrow ridges treatment [9-16]. Further researches are needed, but from the data obtained, these implants show an excellent prognosis, avoiding complications, facilitating the surgery and improving the patient's comfort [17-26].

### Conclusion

The progressive resorption of the alveolar ridge after tooth extraction may lead to maxillary or mandibular atrophy, resulting in reduced horizontal or vertical dimensions of the bone crest or in a combination of them. Insufficient bone volume could compromise

the implant insertion. This case report documents the insertion of a new wedge-shape dental implant, REX PiezoImplant (Rex TL, Rex Implants, Columbus, OH, USA) in a patient with a horizontal bone width between 2.66 mm and 3.29 mm. According to our results, REX PiezoImplants displayed a good osteointegration, also demonstrated by CBCT analysis after 12 months of follow-up.

## Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this study. Authors confirm that the submitted work, including images, is original and the journal policies have been reviewed. There are no conflicts of interest to disclose.

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