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# Application of ultrashort implants while treating severe bone atrophy of the posterior maxilla

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**Abstract:**
This case report demonstrates a solution to a long-term problem caused by missing teeth in the distal maxilla and complicated by severe bone atrophy. If a tooth is missing over a prolonged period, bone remodeling and volume loss commonly require bone grafting. Innovative treatment techniques are applicable to the issues occurring in clinical cases of that kind.

Keywords. Ultrashort implants, implantation, bone atrophy, minimally invasive treatment.

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**Introduction.** Tooth loss associated with its decay and periodontal diseases is still one of major dentistry challenges [1,2]. Implantation is an appropriate treatment modality for partial edentulism. Leading study findings reveal this health issue in 70% of the population. Moreover, the incidence of this nosological entity does not tend to drastically decline. Statistics show that implantation is commonly used to repair dentition defects [3,4]. Some patients seek dental care to restore mastication via implantation long after their teeth are removed. Therefore, often do dentists face such difficulties while planning the surgery as lacking vertical bone volume, narrowing interdental space, and maxillary sinus pneumatization. These conditions get progressively worse in the patients who used to wear removable dentures. Placement of ultrashort implants prevents them from any time-consuming and costly invasive surgery, e.g. open sinus lift. This case report aims to introduce 4-mm state-of-the-art ultrashort implants while treating severe vertical bone atrophy of the posterior maxilla.

**Case report**. Patient T. aged 52 underwent a comprehensive examination in the Clinic of Innovative Dentistry in August 2022. She had secondary partial edentulism of the maxilla. The dentition defect was arising on the site of tooth 26 (the FDI World Dental Federation notation). This patient was subject to a standard clinical examination. Emphasis was placed on the data of cone beam computed tomography (CBCT) and panoramic scans, diagnostic casts, and a dental photography protocol.

The diagnostic cast and the dental photography protocol were scrutinized to detect the interdental space on the site of missing tooth 26 for further prosthetic rehabilitation planning (Fig. 1).

Patient T. was offered preliminary orthodontic treatment aimed at restoring the interdental space but she refused to comply with it. The CBCT scan revealed severe bone atrophy on the site of tooth 26. Vertical and horizontal bone volume amounted to 4 mm and 6.5 mm, respectively, on the planned implant placement site (Fig. 2).

The chosen treatment plan envisaged the insertion of an ultrashort implant called Straumann Tissue Level Standard Plus Regular Neck. Its distinctive features are a smooth neck and SLActive surface. In contrast to other implant systems, this one is made of Roxolid metal alloy, which is composed of 15% zirconium and 85% titanium. It is much stronger than the implants made of Grade 5 titanium alloy [5,6]. Furthermore, SLActive surface is of superior osseointegration compared to other implant surfaces, which is an essential factor while opting for an implant system and a range of implants for patients with severe vertical bone atrophy [7].

The CBCT scan made it possible to identify the future implant site and to mark it with a hole using Lindemann Drill. Afterwards, it was gradually replaced by drills of larger diameter up to the required value as per the surgical protocol for Straumann Tissue

*Fig. 1.* **Pre-treatment view.**

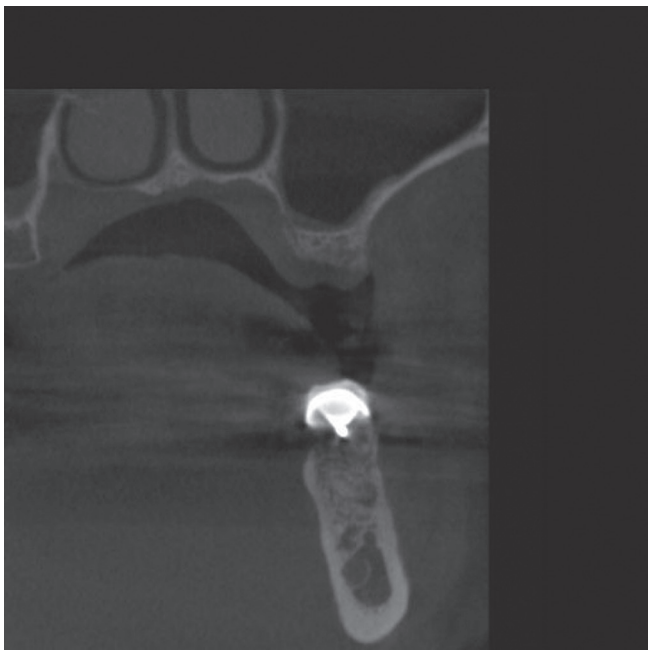

*Fig. 2.* **Pre-treatment CBCT scan.**

*Fig. 4.* **Implant view after unscrewing the healing abutment.**

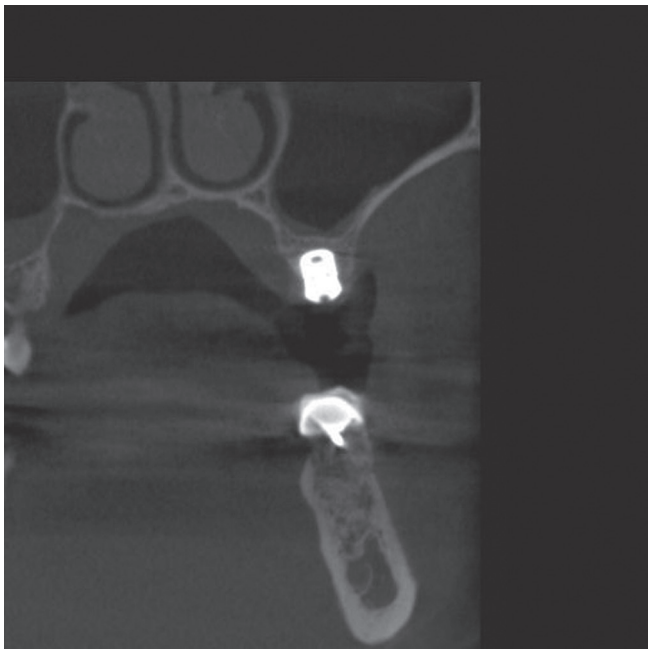

*Fig. 3.* **CBCT scan made 4 months after implant insertion.**

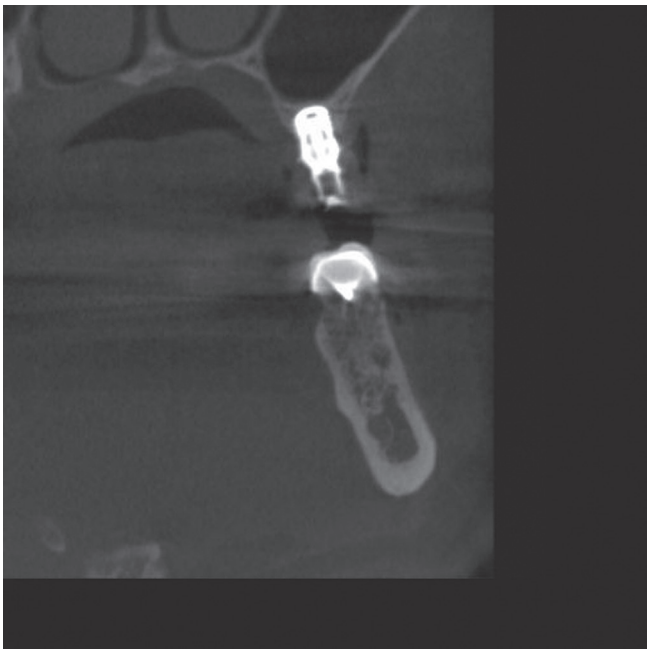

*Fig. 5.* **CBCT scan made 2 months after loading the implant with the temporary crown.**

Level Standard Plus Regular Neck implants. Physiological saline was profusely used for cooling the drill, which was rotating at a speed of 1200 rpm, while preparing the bone bed. The irrigation device was handpiece-mounted. The implant of the chosen diameter and length was inserted with a physiodispenser handpiece once the bone bed was formed. Primary implant stability was achieved. The torque value constituted 15 Ncm. It was decided to install a cover screw and to tightly suture the gingiva via interrupted stitches on the implant site. CBCT was repeatedly performed in four months to evaluate the bone volume on the implant placement site (Fig. 3).

Later on, a healing abutment was fitted to the implant on the site of tooth 26 followed by temporary crown placement (Fig. 4).

An authentic temporary Straumann synOcta abutment was applied for prosthetic replacement. This step was needed for creating a perfect emergence profile and assessing the occlusion with respect to opposing teeth.

Two months into implant-supported placement of the temporary crown, a CBCT scan revealed stable bone volume on the implant site (Fig. 5).

Based on the examination and CBCT results, it was decided to manufacture a permanent crown supported by an ultrashort implant from Prettau® Zirconia zirconium dioxide. An authentic permanent abutment called Straumann Variobase RN was installed. Its height was 6 mm. Its diameter was 5.5 mm. The contact point was adjusted on the metal ceramic crown of tooth 25 before the permanent crown was made for replacing tooth 26 (Fig. 6, 7)

**Discussion.** This case report has a high level of originality since no other studies concerning application of 4-mm ultrashort implants have been published so far. This treatment plan was selected because patient T. had previously suffered from hypersensitivity to an anesthetic

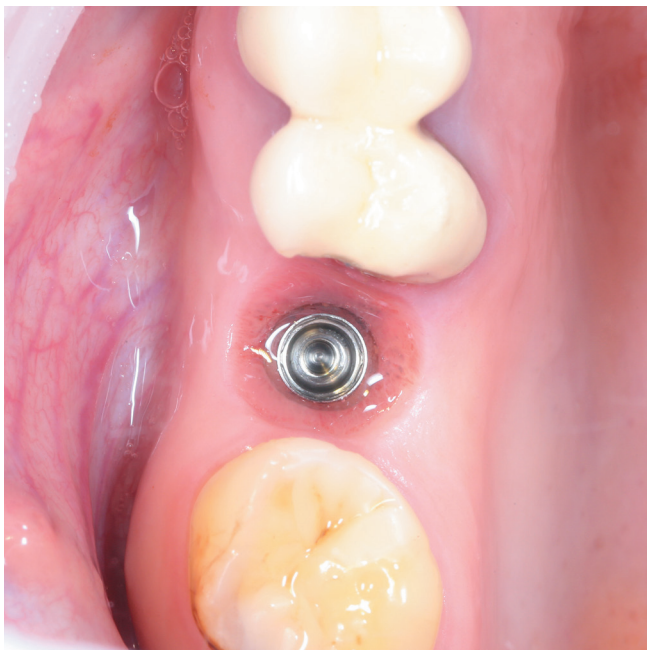

*Fig. 6.* **Emergence profile established with the use of the temporary crown.**

*Fig. 7.* **Permanent crown supported by an ultrashort implant.**

component called norepinephrine. Consequently, bone augmentation could only have been performed as part of open sinus lift if the patient had taken a preoperative sedative drug. She refused to adhere to this treatment plan.

**Conclusion.** Application of ultrashort implants is an alternative to bone augmentation and grafting with long-term postoperative recovery. This technique may significantly reduce the invasive nature of dental care provided to patients with severe vertical bone atrophy of the maxilla. Nevertheless, further studies with longer follow-up periods are needed to confirm these findings.

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## AUTHORS' CONTRIBUTION:

*Leonid A. Stolov* – has made a substantial contribution to the concept or design of the article; drafted the article.
*Zurab S. Khabadze* – revised the article critically for important intellectual content; approved the version to be published.
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