

Fully Digital Bimaxillary Full-Arch Restoration: A Screw-retained Protocol Using V-Type and D-Type Multi-Unit Abutments

This clinical case presented by **Dr. Uğur Toprak** demonstrates a digital workflow featuring the XGATE Dental implant system. The process and results are described, as well as the design features of the V-Type (ultra-low profile) and D-Type (standard screw-retained) multi-unit abutments. This clinical case was executed entirely using a digital workflow. Treatment was initiated and completed under the guidance of intraoral digital scanning, 2D panoramic radiography, and 3D CBCT (cone beam computed tomography).

Briefly about the doctor:



Dr. Uğur Toprak

Graduated from the Ege University Faculty of Dentistry in 2020.

Specialisation: **Odontoiatria protesica**

Work experience: **6 years**

Place of work: **Şanlıurfa (Turkey)**

The doctor on his work: "Since completing my studies, thanks to my interest in dental implantology, I have been constantly improving my skills in this field and actively performing implant treatment. I have been practicing dentistry for six years, specializing primarily in full-arch restorations. For about six years, I have been managing my own clinic in Şanlıurfa, Turkey while also collaborating with the "White Dental" laboratory."

Why is this case interesting to fellow dentists?

1. Immediate implant placement is still considered a complex procedure, especially if complications such as inflammation are present. In this case, immediate implant placement was performed immediately after tooth extraction, following thorough curettage (debridement) of the periapical lesions. The implants integrated perfectly, and the gingival contour was well-formed.
2. A progressive prosthodontic approach using provisional PMMA restorations. This is a well-known technique, but many doctors still prefer a two-stage protocol. Immediate implantation solves two problems:
 - The patient gets a new smile and immediately uses the prosthesis during the healing phase.
 - The dentist obtains data on occlusion parameters (occlusal vertical dimension) first using images and digital impressions of the remaining teeth. The provisional prosthesis then serves as a template for creating the final definitive prosthesis.

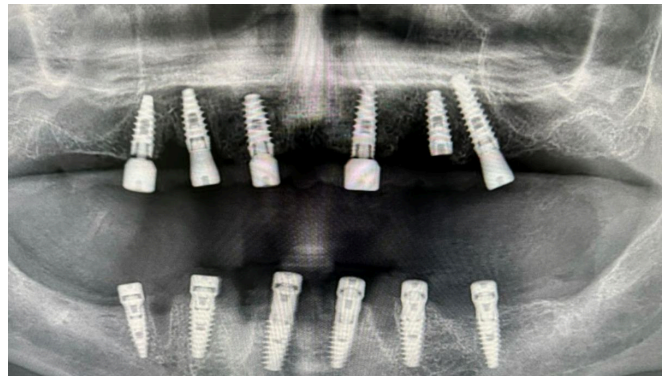


- It was established that the patient had no systemic diseases; therefore, there were no contraindications for implant treatment.
- The patient had a long history of smoking, which he quit 10 years ago.
- The initial examination revealed a severe impairment of masticatory function and poor oral hygiene leading to compromised aesthetics, as well as extensive dental caries due to smoking and poor hygiene.
- Due to long-term smoking and poor oral hygiene, there were no restorable teeth left in either jaw suitable for treatment.

Patient summary

The patient, a 64-year-old man, came to the clinic with complaints of tooth mobility and partial edentulism.

- Long-term smoking and poor hygiene also caused significant resorption of the alveolar ridge bone in both the upper and lower jaws, which negatively impacted the conditions for implant placement.
- Another negative factor for implantation was the pneumatization of the maxillary sinuses in the posterior regions, which further complicated the placement of implants, since performing a sinus lift in such conditions is extremely problematic.



In the upper jaw, due to sinus pneumatization, the most posterior implants on both the right and left sides were placed at an angle of approximately 30 degrees, with the implant apices oriented mesially to avoid penetration into the sinus cavity. This angulation was intended to both prevent implant penetration into the maxillary sinus and utilize the clinical advantages provided by the angled D-Type multi-unit abutments. Since adequate insertion torque could not be achieved for the implant at site 24, it was decided not to place a healing cap on it.

Treatment plan and surgical stages

Following CBCT scanning and intraoral scanning, the following treatment plan was developed:

1. Step-by-step extraction of all remaining teeth, thorough curettage of the periapical lesions, and preparation of the alveolar ridges for implant placement.
2. Due to the pneumatization of the sinuses in the upper jaw, implant placement was planned in the posterior regions without perforating the sinus floor.
3. In the lower jaw, implant placement was planned taking into account the topography of the inferior alveolar nerve. Tooth extraction and implant placement were performed in several stages. The bite was recorded using the remaining teeth to ensure anatomically correct prostheses were fabricated. Otherwise, there was a risk of placing abnormal stress on the temporomandibular joints (TMJ).

Immediately after tooth extraction, periapical lesions were curetted. After cleaning, the implants were placed subcrestally at a depth of approximately 2–3 mm. This placement allows for the formation of a thick and robust soft tissue seal without the risk of exposing the titanium components of the implants and abutments. A total of 12 implants manufactured by XGATE Dental were placed: 6 in the upper jaw and 6 in the lower jaw.



D-Type 30°
2 mm



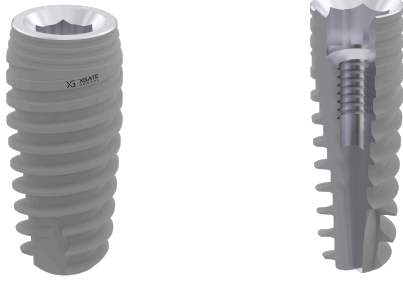
D-Type 30°
3 mm

Since sufficient torque was achieved for almost all other implants, there were no contraindications for the placement of healing abutments, with the exception of the implant at site 24.

This distribution provided the conditions for the fabrication of natural-looking definitive teeth and made it possible to achieve a balanced distribution of the occlusal load while preserving important anatomical structures.

In this case, XGATE Dental implants were used exclusively. The implants were placed at the following sites:

- Upper jaw: 12, 14, 16, 22, 24, 26
- Lower jaw: 41, 44, 46, 32, 34, 36



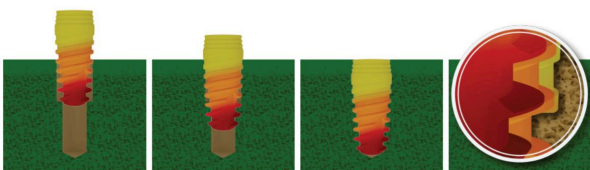
Distribution of implants in the upper jaw:

- 12 – 4.2 × 10 mm
- 14 – 4.2 × 10 mm
- 16 – 4.2 × 10 mm
- 22 – 3.75 × 11.5 mm
- 24 – 4.2 × 10 mm
- 26 – 4.2 × 13 mm

Distribution of implants in the lower jaw:

- 41 – 3.75 × 11.5 mm
- 44 – 4.2 × 11.5 mm
- 46 – 4.2 × 11.5 mm
- 32 – 3.75 × 10 mm
- 34 – 4.2 × 11.5 mm
- 36 – 4.2 × 11.5 mm

It is worth briefly mentioning the design features of XGATE implants and why they are ideal for such cases.



XGATE Dental cone-like implant compresses the bone in a gradual fashion, while the special drilling blades at the bottom enable smooth and minimal osteotomy incisions. These features allow achieving high primary stability in difficult situations when there is a soft bone or an existing socket from previous extractions. XGATE Dental implants allow for immediate implant placement and enable functionality soon after the procedure.

Placing implants into the sockets of extracted teeth is an excellent opportunity to achieve anatomically correct load distribution and excellent aesthetics after the completion of the prosthodontic phase.

Postoperative protocol

For prophylactic purposes and to control edema, the patient was prescribed antibiotics. A liquid and soft diet was recommended for 15 days following surgery. After healing, three weeks later, provisional PMMA prostheses were delivered.

Here are photos of the healed gingiva and the seated multi-unit abutments on both jaws. Please note that these photos were taken during the preparation stage for the definitive prosthesis.



During the provisional PMMA prosthesis stage, the implant at site 24 was not loaded. This was because sufficient torque could not be achieved, and the provisional maxillary prosthesis rested on five implants to eliminate any occlusal load on this particular implant. All implants were utilized for the definitive zirconia prosthesis.

Let's briefly review the types of multi-unit abutments used and why they were chosen. The photo shows angled **D-Type** multi-units abutments installed in the area of sites 26 and 16 to compensate for the implants' deviation from the prosthetic axis. These abutments are available in three modifications: **17°, 30°, and 45°**, and can accommodate significant divergences **up to 130°**.

Low-profile V-Type MUAs were placed at the remaining sites, detailed as follows:

Maxilla

- Sites 12 and 22: subgingival height of 1 mm
- Sites 14 and 24: subgingival height of 4 mm

Mandible

- Sites 32 and 36: subgingival height of 3 mm
- Sites 44 and 34: subgingival height of 1 mm
- Sites 41 and 46: subgingival height of 4 mm



V-Type
1 mm



V-Type
2 mm

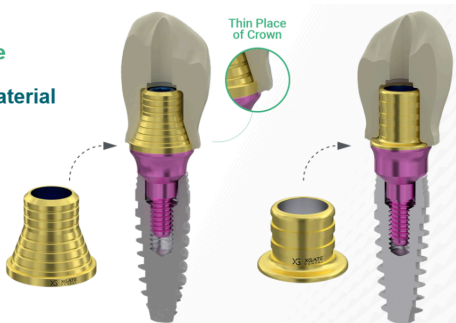


V-Type
3 mm

The V-Type multi-unit abutments deserve special attention; their low profile and wider contact area between the abutment and the sleeve ensure:

- Better aesthetics since the prosthetic margin is thicker, which means it is stronger and closer to the implant platform than other MUA types.

Small cone provides more space for the restoration material



- Improved mechanical properties due to a contact area of 10 mm² versus 6 mm² for the D-Type MUA.



- In some cases, angled abutments can be avoided because the V-Type MUA can compensate for inter-implant divergence of up to 40°.



The following images show the definitive prostheses, which utilize a titanium framework and zirconia crowns. The prostheses were manufactured using high-precision digital technology, ensuring an excellent passive fit and minimizing the number of try-ins and adjustments.



Now, let's review the outcome. The following image demonstrates the screw-retained maxillary prosthesis, which achieved a perfectly passive fit.



In the following pictures, the screw access holes are already sealed, and the treatment is fully completed.

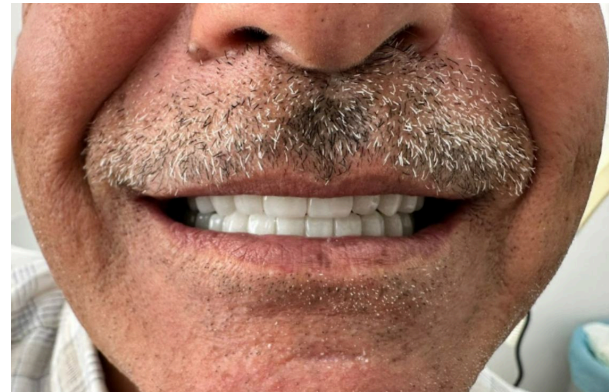


The mandibular prosthesis was also seated without complications.



The patient is completely satisfied with the result; he was provided with instructions on oral hygiene and the maintenance of implant-supported restorations.

Here is a general view of the full-arch restoration.



Key technical aspects

The use of low-profile multi-unit abutments and a monolithic zirconia prosthesis on a titanium framework is crucial for achieving superior aesthetics and uniform load distribution. Titanium has greater elasticity than zirconia, which is important for prostheses with cantilevers in the posterior regions. Zirconia has excellent wear resistance; these prostheses do not absorb food stains or wear down, and are highly likely to last the patient's lifetime. The combined use of V-Type and D-Type multi-unit abutments ensures ideal load distribution and compensates for the angulation of the posterior implants. A digital protocol has simplified and accelerated virtually all processes, from implant placement to the fabrication of provisional and definitive restorations.

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