DITRON DENTAL
USA

Full-Arch Implant Supported Rehabilitation with Screw-Retained Hybrid Prothesis and Implant Bar Overdenture

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INTRODUCTION

A major loss of alveolar bone and gingival soft tissue due to periodontal disease or prolonged use of unfitting prostheses presents a challenge to dental clinicians worldwide.[1] Bone and sinus augmentation are often required to replace loosening natural teeth with fixed prostheses supported by dental implants. These days, patients are interested in fixed restorations, due to the "old" and "outdated" image of removable prosthodontics. Therefore, a screw-retained overdenture attached to a custom- made, computer-manufactured titanium bar has become an available option. In this case, the denture remains fixed in the patient's mouth – it is, however, removable when needed, during recalls and maintenance appointments. Moreover, in cases of single-implant failure, it is possible to remove or replace the failing implant while keeping the existing denture intact, by milling a newly customized bar. CAD/CAM technology has broadened the scope and application of those treatment options, allowing for prosthodontically-driven implant placement and ideal substructure design for optimal esthetics and biomechanics.[2] As the computer aided design systems, surgical guides and imaging techniques optimizing implant placement evolve, implant placement becomes more and more restoratively oriented, providing rehabilitation not only of the dentition, but of the facial esthetics as a whole.[3] However, in cases of severe bone loss, the possibility to plan the implants "top-down", in a prosthetically-favourable position, disappears. We then must place the implants where the alveolar bone allows it, and use multiunit abutments to compensate the angulation of the implants and achieve an appropriate prosthetic position. The following case reports present two cases in which severe bone loss required the use of a complex hybrid assembly, using multi-unit abutments in several angles and a milled titanium bar retaining a screw- retained *(Case 1)* and a removable *(Case 2)* full-arch prosthesis.

CASE I

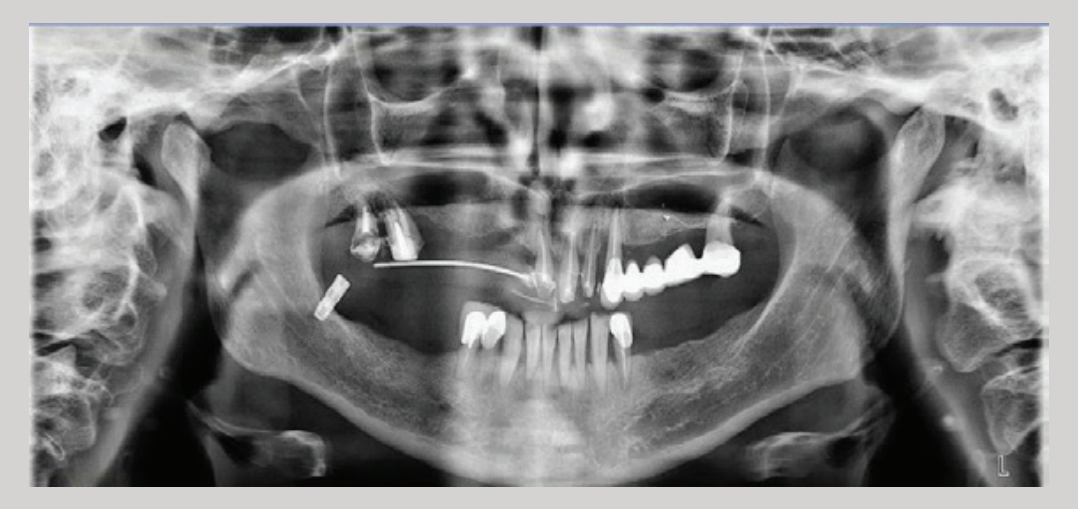

Figure 1

Figure 1:
A 50-year old, heavy smoking female with a long history of failed implants, arrived at the clinic. She presented with an old and failing temporary bridge with metal reinforcement on the maxilla *(1.7-1.6-X-X- X-X-1.1-2.1-2.2)*, and partial edentulism on the mandible, with only the anterior teeth present and a failing implant in position #4.8. Financial considerations allowed only for a maxillary restoration at this point.

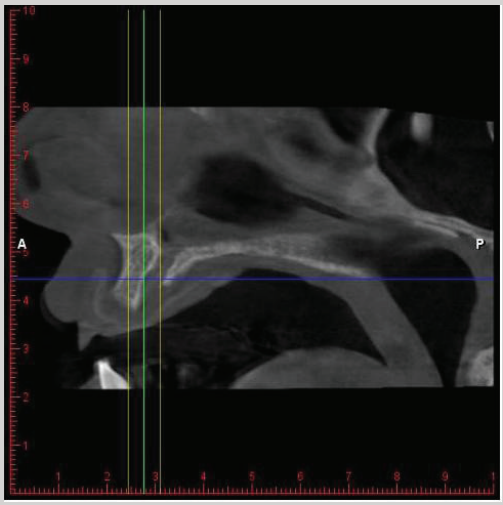

Figure 2a(1)

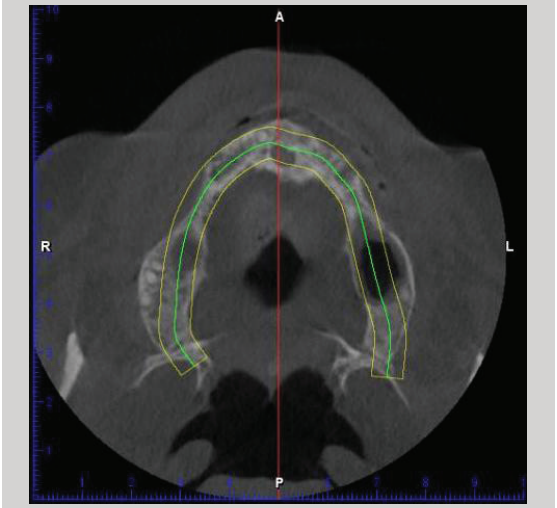

Figure 2a(2)

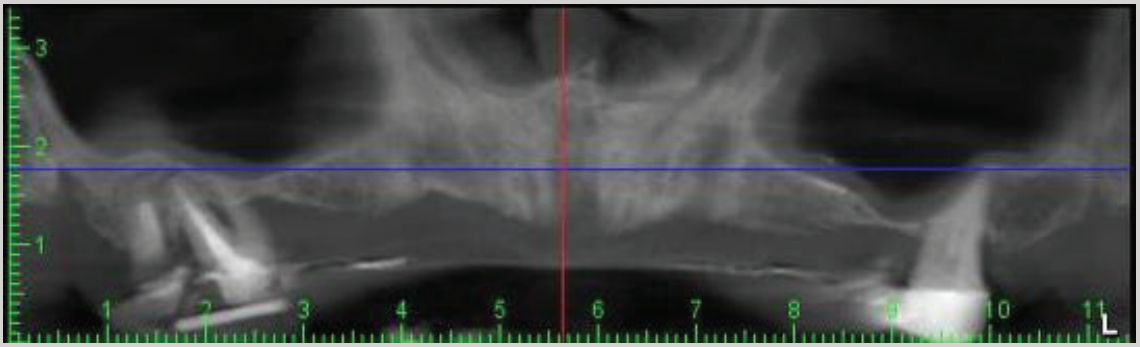

Figure 2a(3)

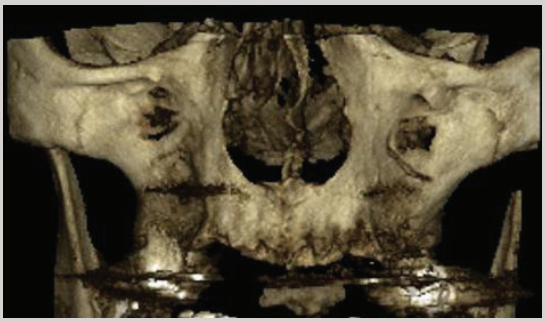

Figure 2a(4)

Figure 2a:
A CT Scan shows severe loss of alveolar bone height. Teeth 1.6, 1.7 and 27 were left as a support for the temporary removable denture with the intention to extract them at the end of the treatment.

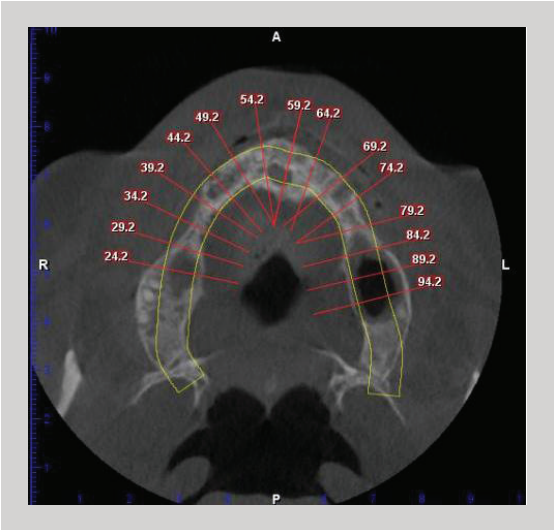

Figure 2b(1)

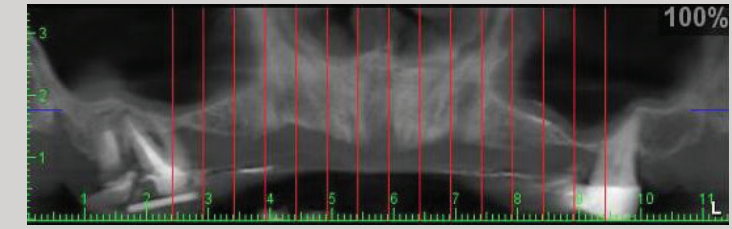

Figure 2b(2)

Figure 2b(3)

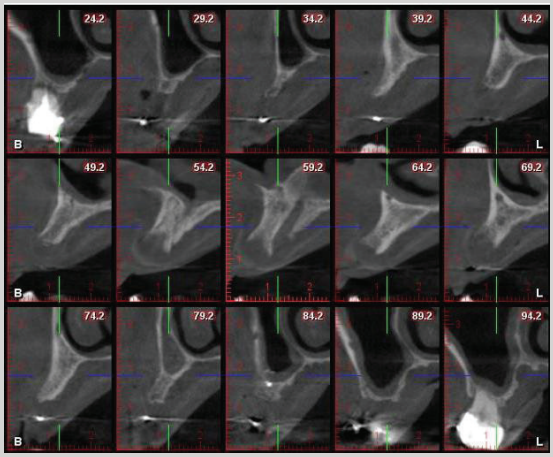

Figure 2b(4)

Figure 2b - continued:
Note the angulation of the remaining alveolar ridge. Since a screw-retained hybrid prosthesis was planned, angled multiunit abutments were used in the restorative stage to improve implants restorative position when needed.

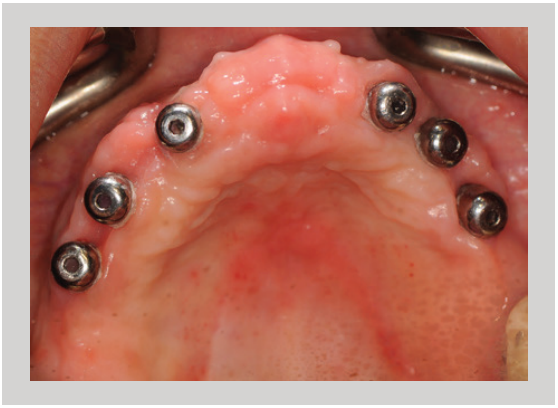

Figure 3a

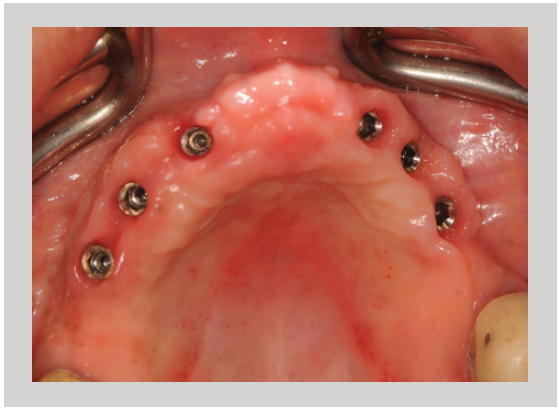

Figure 3b

Figure 3a,b:
Six Ditron MPI *(3.5mm platform)* implants were placed, combined with a closed bilateral sinus augmentation and horizontal ridge augmentation, using DBM graft *(OsteoDemin, Impladent Ltd., USA)* And a synthetic HA *(Osteogel. Impladent Ltd., USA)*.

Sinus augmentations were performed using Osteogen only.

Figure 4a

Figure 4b

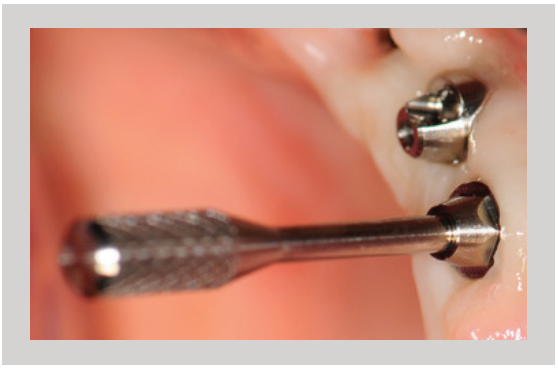

Figure 4c

Figure 4a,b,c:
Straight, 17 and 30-degree angulated multiunit abutments were used to improve the position of the restorative assembly.

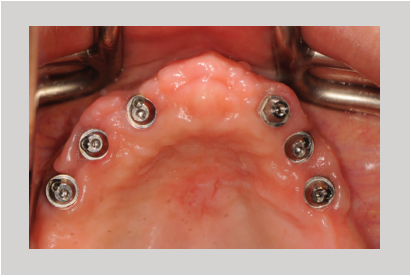

Figure 5a

Figure 5b

Figure 5c

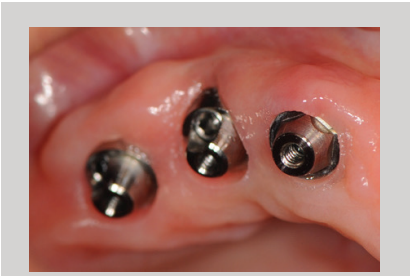

Figure 5d

Figure 5e

Figure 5 a,b,c,d,e:
Note the exposed buccal part of the angulated multiunit at position 2.5 – usually, such an exposure may cause an aesthetic concern. However, in this case, the low lip line of the patient rendered this tissue deficit unnoticeable. The patient accepted this aesthetic disadvantage.

Figure 6a

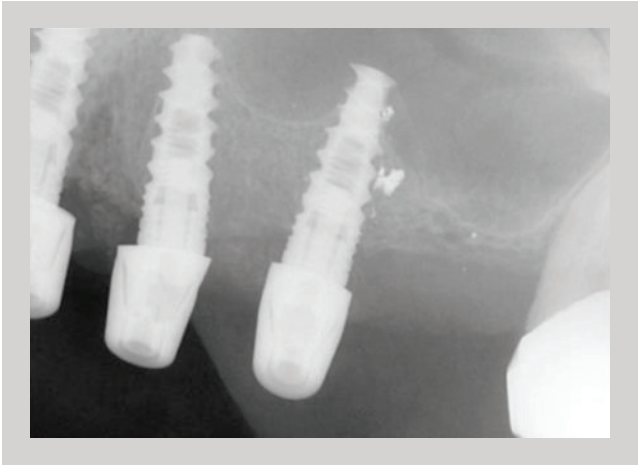

Figure 6b

Figure 6 a,b:
X-ray following placement of the multiunit abutments.

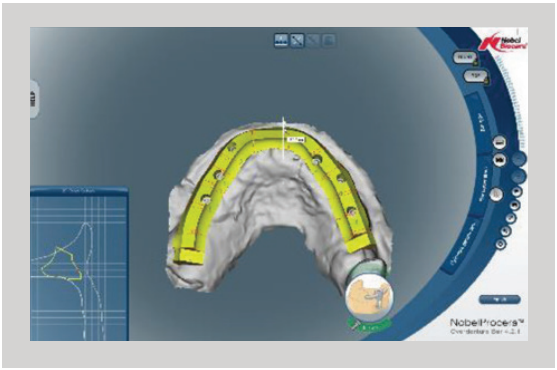

Figure 7a

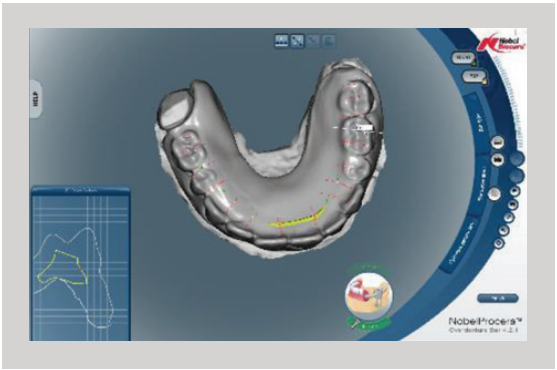

Figure 7b

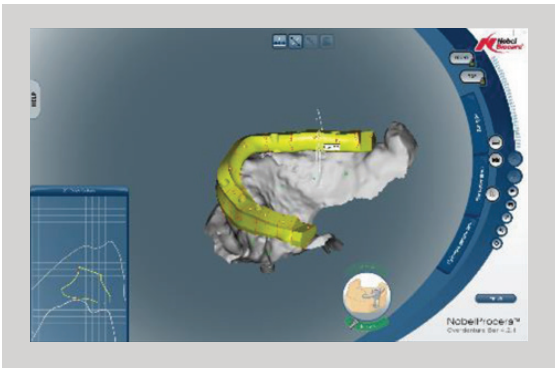

Figure 7c

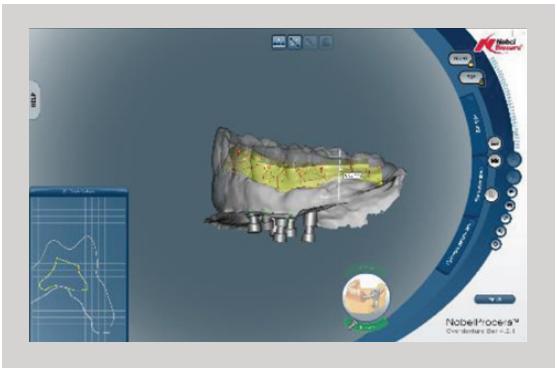

Figure 7d

Figure 7 a,b,c,d:
A final impression was taken, and the stone model, together with a clinically approved diagnostic wax-up were sent to NobelProcera CAD/CAM Services Center.

Please observe a diagnostic wax-up driven planning of the titanium frame.

Figure 8a

Figure 8b

Figure 8 a,b,:
A milled titanium bar (Nobel Procera, NJ, USA) was created in accordance with the CAD planning. The bar was scanned again, and a zirconia superstructure, including teeth, was milled.

Figure 9a

Figure 9b

Figure 9c

Figure 9 a,b,c:
Try-in with model teeth and wax on the titanium bar. The try-in was fitted on the model and in the patient's mouth, and later scanned to serve as a template for the final restoration.

Figure 10a

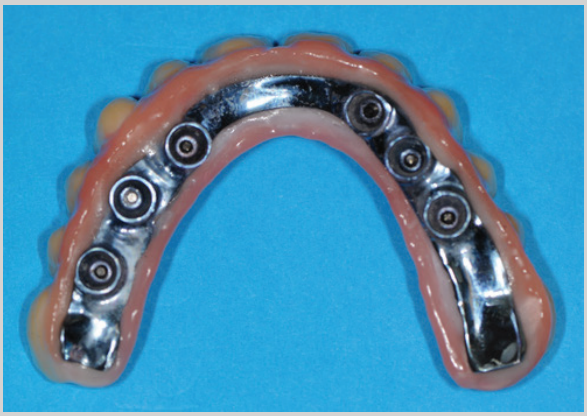

Figure 10b

Figure 10 a,b:
The final zirconia prosthesis was milled and cemented with composite to the titanium bar. Note the screw locations – the angled multiunit abutments allow alteration of the screw axes.

Figure 11a

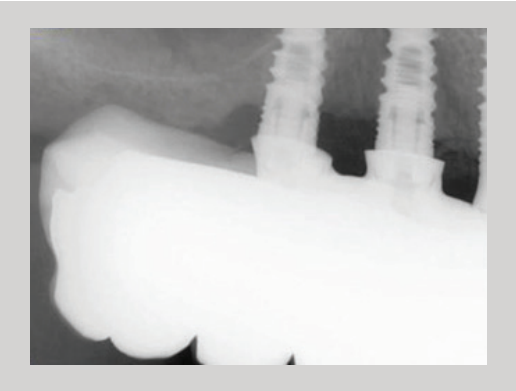

Figure 11b

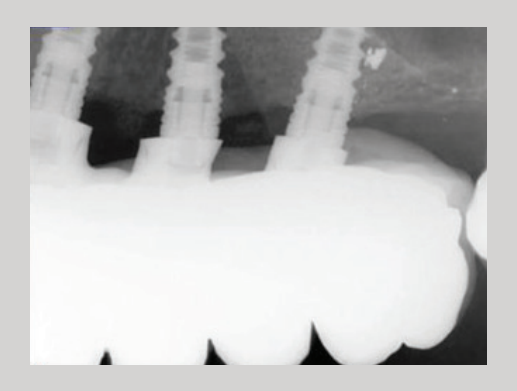

Figure 11c

Figure 11 a,b,c:
The screwed full-arch maxillary prosthesis post-placement. Note, that tooth 2.7 was eventually left in the mouth, as it was intact and didn't require extraction.

Figure 12a

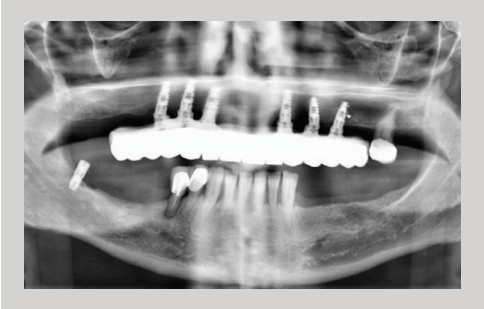

Figure 12b

Figure 12 a,b:
Follow-up after 12 months. Note the excellent stability of the final restoration.

CASE I Titanium Bar Supported Removable Denture

Figure 1a

Figure 1b

Figure 1 a,b:
A 70-year old female arrived at the clinic, complaining of an unstable maxillary complete removable denture. Initial diagnostic checkup revealed a significant alveolar bone loss.

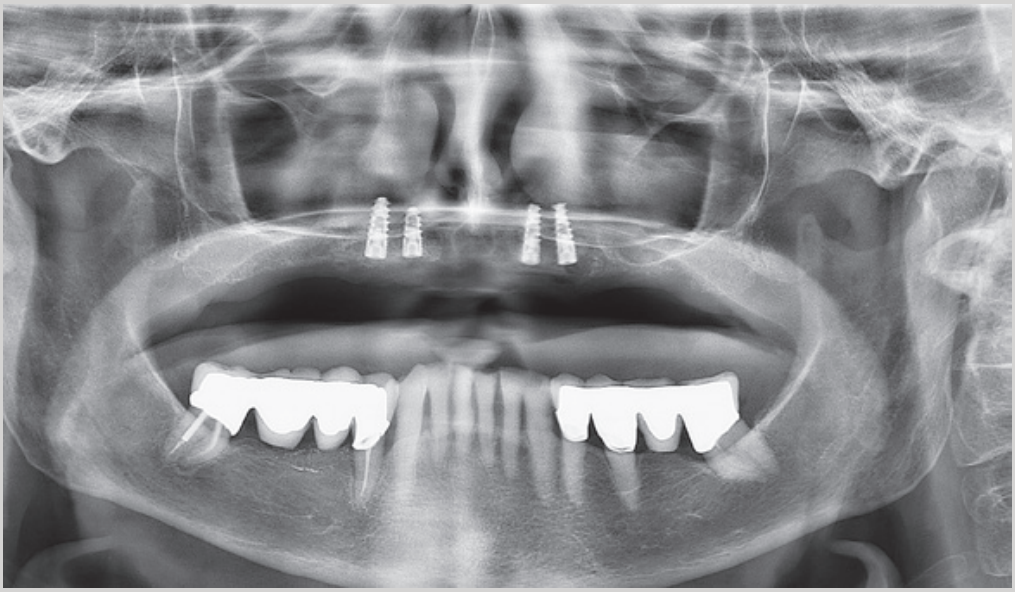

Figure 2

Figure 2:
Four Ditron MPI dental implants *(3.5mm platform)* were installed, along with Bilateral closed sinus and nasal floor lifting, and horizontal alveolar ridge augmentation, using DBM graft *(OsteoDemin, Impladent Ltd., USA)* and a synthetic HA *(Osteogen, Impladent Ltd.,USA)*.

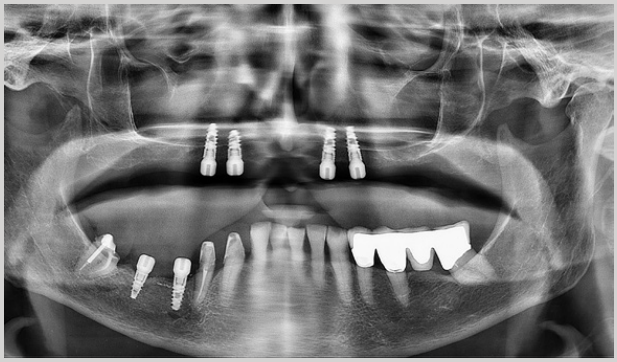

Figure 3a

Figure 3b

Figure 3 a,b:
Implants were uncovered 6 months later. In the mandible – two Ditron MPI implants were placed in #45, #46.

Figure 4

Figure 4:
Four straight multiunit abutment were installed 1 month after implants uncovering, and screwed in with a torque of 30 Ncm. There was no need in fixing the angulation of the alveolar ridge in this case, as the treatment plan here included a bar, upon which a complete removable denture will be placed.

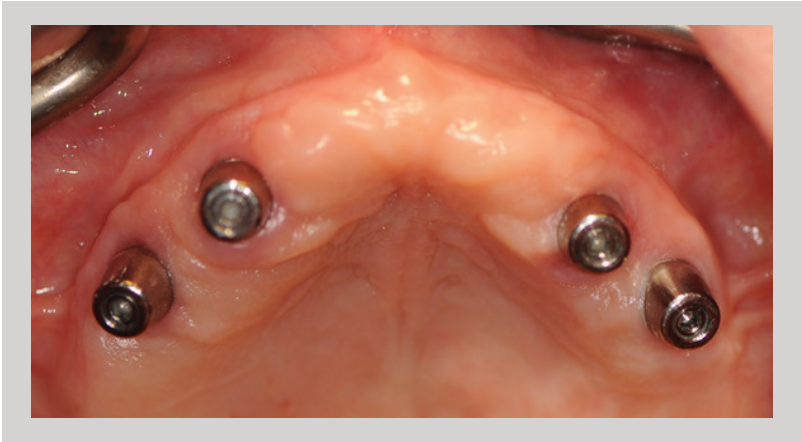

Figure 5a

Figure 5b

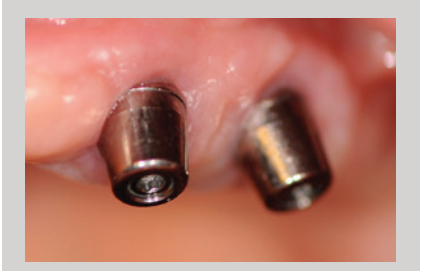

Figure 5c

Figure 5 a,b,c:
The conical healing caps connected to multiunit abutments allow an improved path of insertion of the temporary removable denture, after soft reline.

Figure 6a

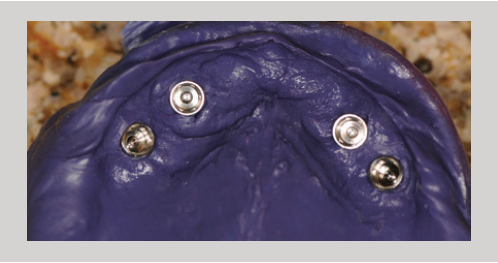

Figure 6b

Figure 6c

Figure 6 a,b,c:
Final impressions were taken using an open tray technique, and analogues were connected.

Figure 7a

Figure 7b

Figure 7 a,b:
A master model with a diagnostic tooth set up was sent to the lab, to create a milled titanium bar *(NobelProcera CAD/CAM Services)*.

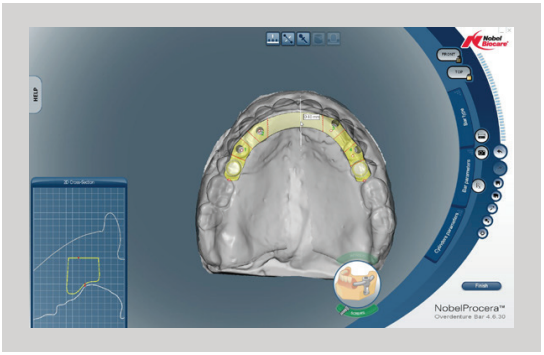

Figure 8a

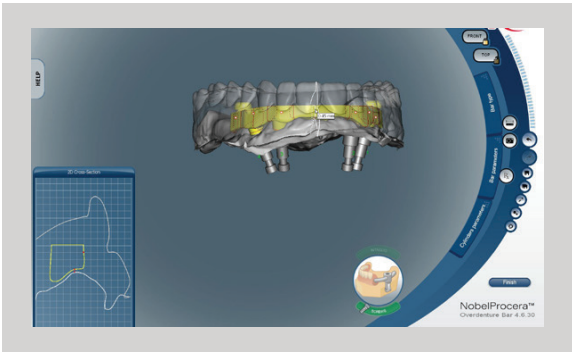

Figure 8b

Figure 8 a,b:
Titanium bar planning before milling.

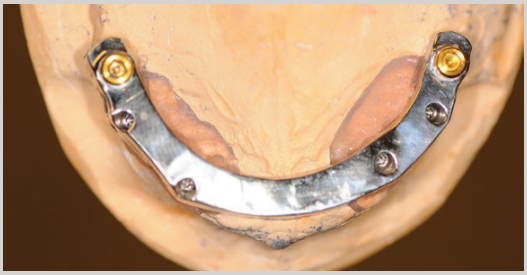

Figure 9a

Figure 9c

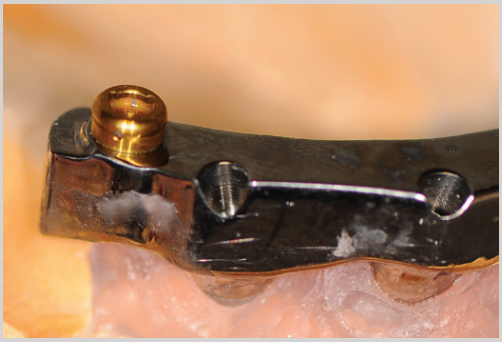

Figure 9d

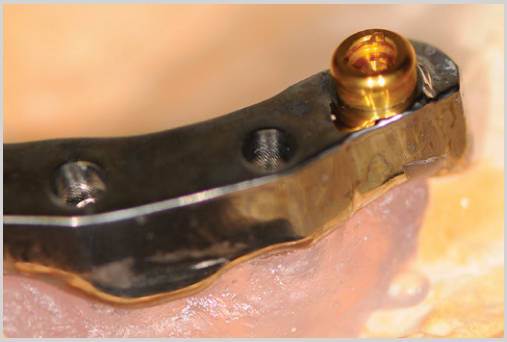

Figure 9d

Figure 9 a,b,c,d:
A titanium bar was milled *(NobelProcera CAD/CAM Services)*.

Figure 10a

Figure 10b

Figure 10 a,b:
Final try-in of the metal bar and the temporary prosthesis. Note the cast metal frame in the interface of the prosthesis with the bar.

Figure 11a

Figure 11b

Figure 11c

Figure 11d

Figure 11 a,b,c,d:
The final prosthesis. Note, that upon the patient demand porcelain teeth were used in the prosthesis, despite their relative hardness and weight. Nevertheless, porcelain teeth also have an advantage, as they suffer minimal attrition and thus allow for a much better control of the occlusion in the long term. Note also the pronounced facial flange of the prosthesis *(see Fig. 13)*.

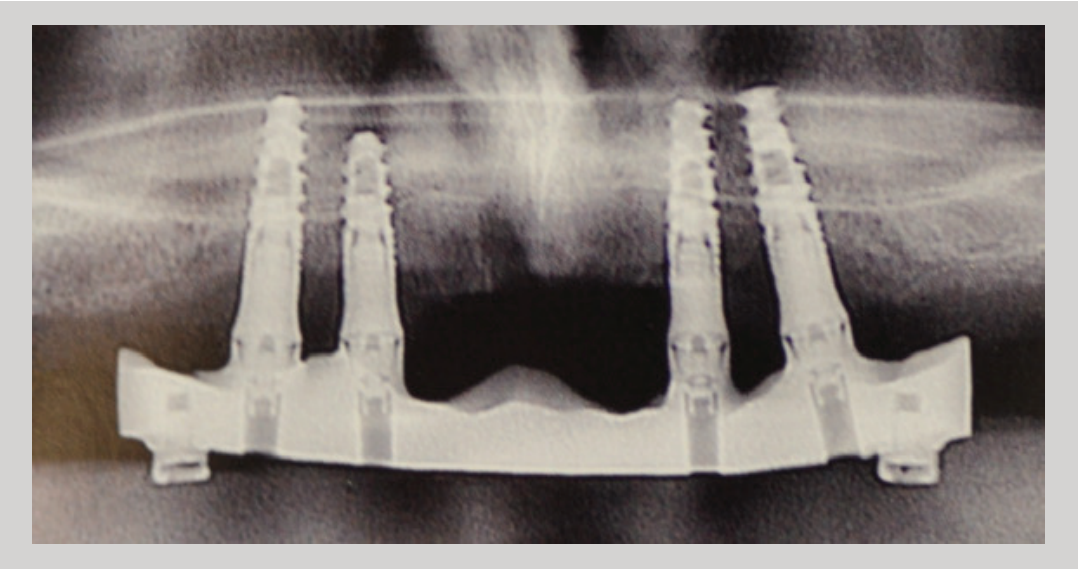

Figure 12a

Figure 12b

Figure 12 a,b:
A milled titanium bar was delivered, and connected to the multiunit abutments with a 20Ncm torque.

Observe the stable bone interface surrounding the implants.

Figure 13 - Before

Figure 13 - After

Figure 13:
With the assistance of the new denture, we have succeeded in recreating the vertical dimension of occlusion, while the pronounced facial flange of the denture *(Fig. 11)* allowed for proper lip support, to the utter satisfaction of the patient.

Figure 14a

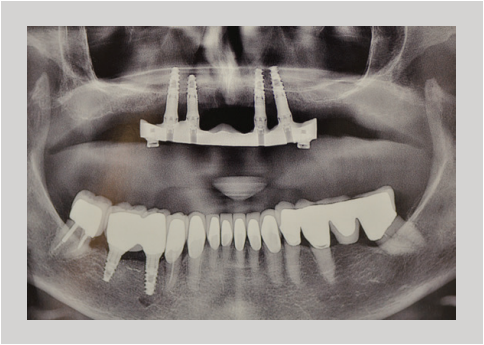

Figure 14b

Figure 14c

Figure 14 a,b,c:
The final restoration on the model, while the bar is connected to the implants. After delivery, the **patient is extremely happy.**

Figure 14a

Figure 14b

Figure 15 a,b:
a – Initial state
b – Following delivery of the new denture

CONCLUSION

This clinical report demonstrates the use of CAD/CAM manufactured bars and screw-retained dentures for full-mouth restorations, including rehabilitation of external facial esthetics. It is evident that the choice of a removable prosthesis allowed the placement of simpler, straight multi-unit abutments, while the screw-retained prosthesis required severe compensation of the initial implant angles. Both scenarios are, however, viable and executable given a proper treatment planning and matching expectations with the patient regarding the final result.

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2. Spyropolou PE et al, Maxillary implant-supported bar overdenture and mandibular implant-retained fixed denture using CAD/CAM technology and 3-D design software: A clinical report, J Prosthet Dent (2011), 105(6):356-362.

3. Davodi, A., Nishimura, R., & Beumer III, J. (1997). An implant-supported fixed-removable prosthesis with a milled tissue bar and hader clip retention as a restorative option for the edentulous maxilla. Journal of Prosthetic Dentistry, 78(2), 212-217.

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