

Immediate restoration in the edentulous mandible

According to the Maló procedure using the CAMLOG Guide System and Vario SR abutments

Author_Dr Ferenc Steidl & Sebastian Schuldes, Germany

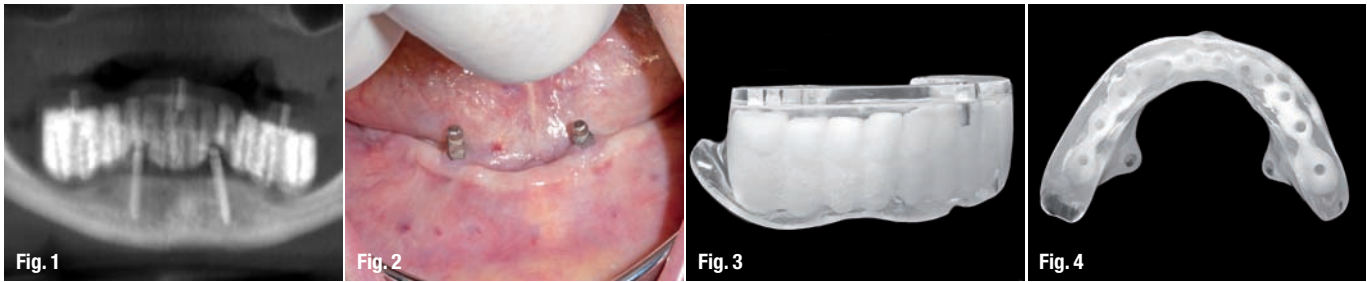


Fig. 1 _Initial radiograph.
Fig. 2 _Initial clinical situation.
Fig. 3 _Scanning template made from plastic containing barium sulphate.
Fig. 4 _Holes drilled through the radiopaque teeth according to the prosthetic tooth axis.
Figs. 5a & b _Diagnostics and implant planning (a) in accordance with anatomical and prosthetic requirements (b).

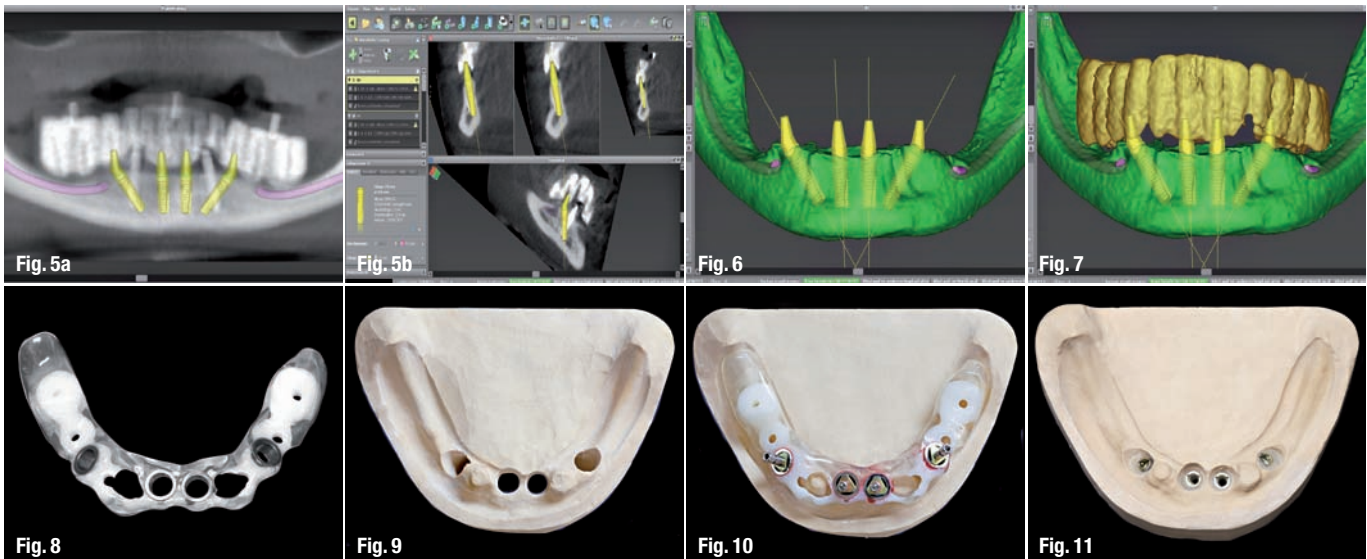
The Vario SR prosthetic components for fixation of implant-supported occlusally screw-retained restorations were used in this case to treat neuropathic pressure-induced facial pain. The 66-year-old patient came to our practice for the first time in May 2010 complaining of persistent pain in the right mandible. The pain intensified when the complete mandibular denture was inserted. However, pronounced pain continued even after several days of not wearing the prosthesis. The intensity of the pain varied between 6 and 10 on the visual analogue scale.

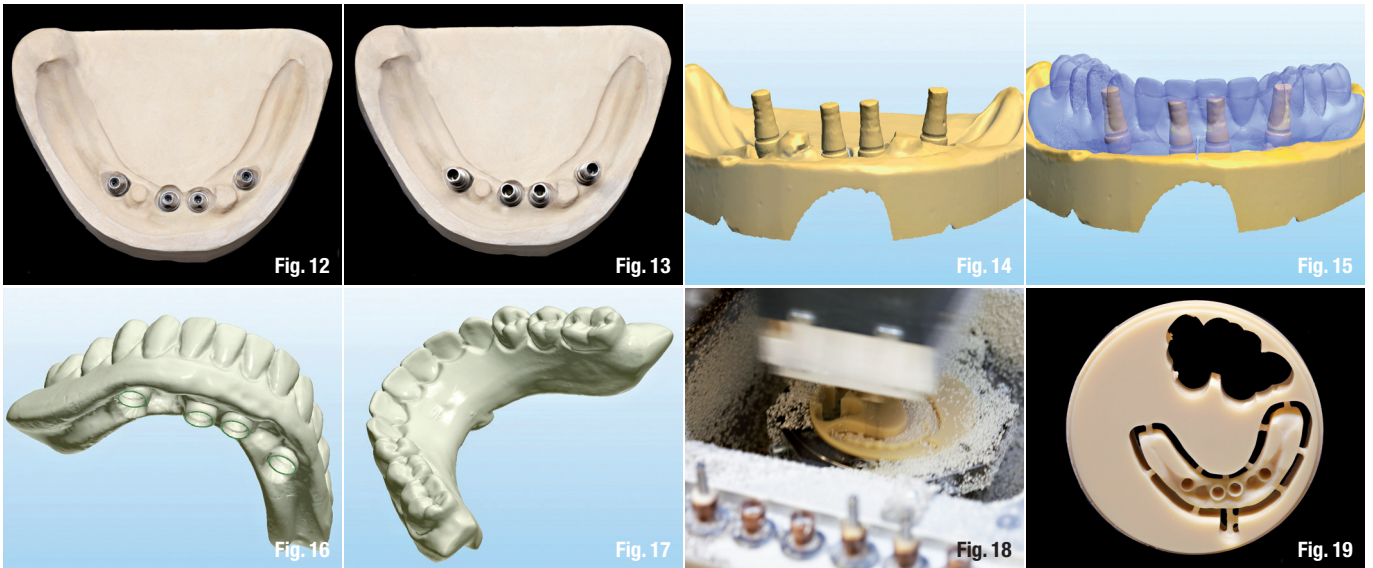
The following diagnosis was made:

- _severe mandibular atrophy;
- _crestal position of the bilateral mental foramina;
- _chronic neuralgiform facial pain in regions 43 to 45—the trigger point indicated the mental foramen region.

_Treatment planning

The patient had been treated with two one-piece diameter-reduced implants in regions 31





and 43, as well as a complete mandibular denture anchored by ball abutments (Figs. 1 & 2).

After extensive counselling and discussion, we opted for a temporary fixed mandibular restoration on four implants with simultaneous explanation of the existing implants.

Benefits of the selected restoration concept:

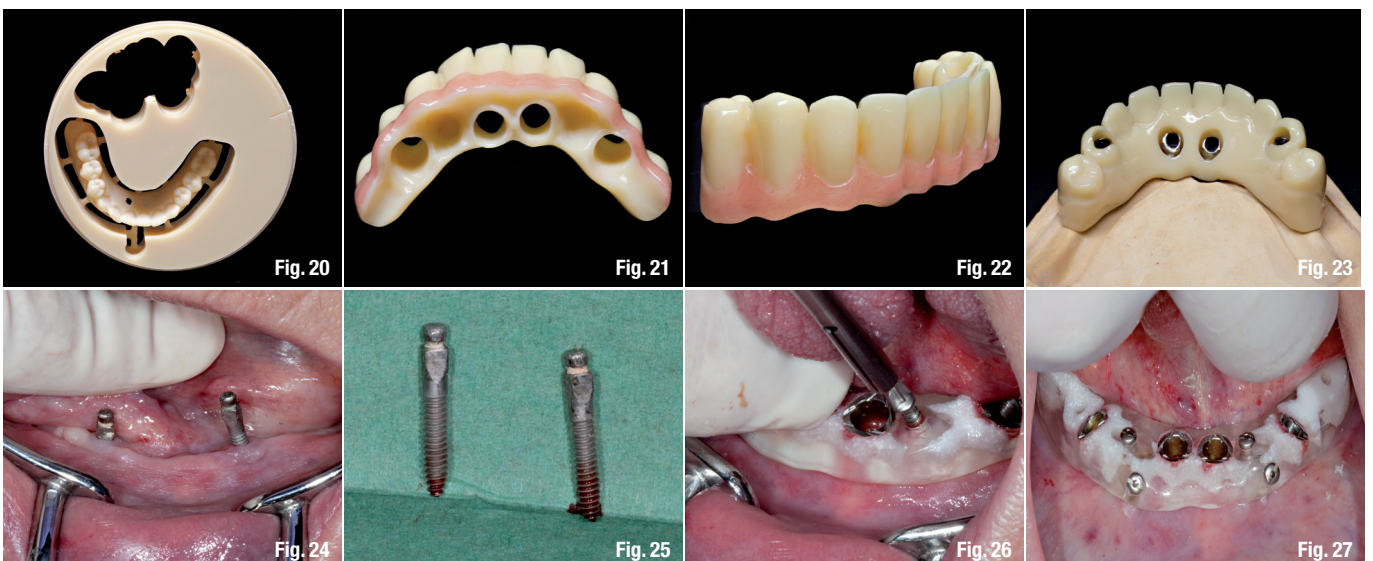
- explanation, implantation and immediate restoration in one sitting;
- a high level of safety owing to 3-D implant planning;
- durable temporary restoration with CAD/CAM high-performance plastic;
- precision template-guided implantation with the CAMLOG Guide System;
- high patient satisfaction with fixed screw-retained immediate restoration.

Pre-implantation planning

Because the existing denture satisfied the basic aesthetic and functional requirements, the given situation was reproduced in plastic containing barium sulphate according to backward planning. The desired prosthetic was fabricated from clear plastic with a titanium reference pin for the scanning template (Fig. 3). In order to make the prosthetic tooth axis visible in the CBCT scan, holes were drilled through the radiopaque teeth in the axis (Fig. 4).

The DICOM data was then read into the coDiagnostiX implant planning system (Straumann). Computer-supported analysis offers the possibility of accurate diagnosis and planning the implants in agreement with anatomical and prosthetic requirements (Figs. 5a & b). Positioning of the terminal implants at an exact 30-degree angle is a crucial requirement for the success of this treatment (Figs. 6 & 7).

- Fig. 6** Positioning of the terminal implants at an exact 30-degree angle.
- Fig. 7** View with the superimposed radiopaque components.
- Fig. 8** The scanning template was converted into a drilling template.
- Fig. 9** Preparation of the cast for model implantation.
- Fig. 10** The insertion posts in the required cam alignment with the screw-retained laboratory analogues.
- Fig. 11** Laboratory analogues placed into the cast.
- Fig. 12** The cast with screw-retained straight Vario SR abutments.
- Fig. 13** The Vario SR abutments with the Vario SR titanium caps.
- Fig. 14** Digitised cast situation.



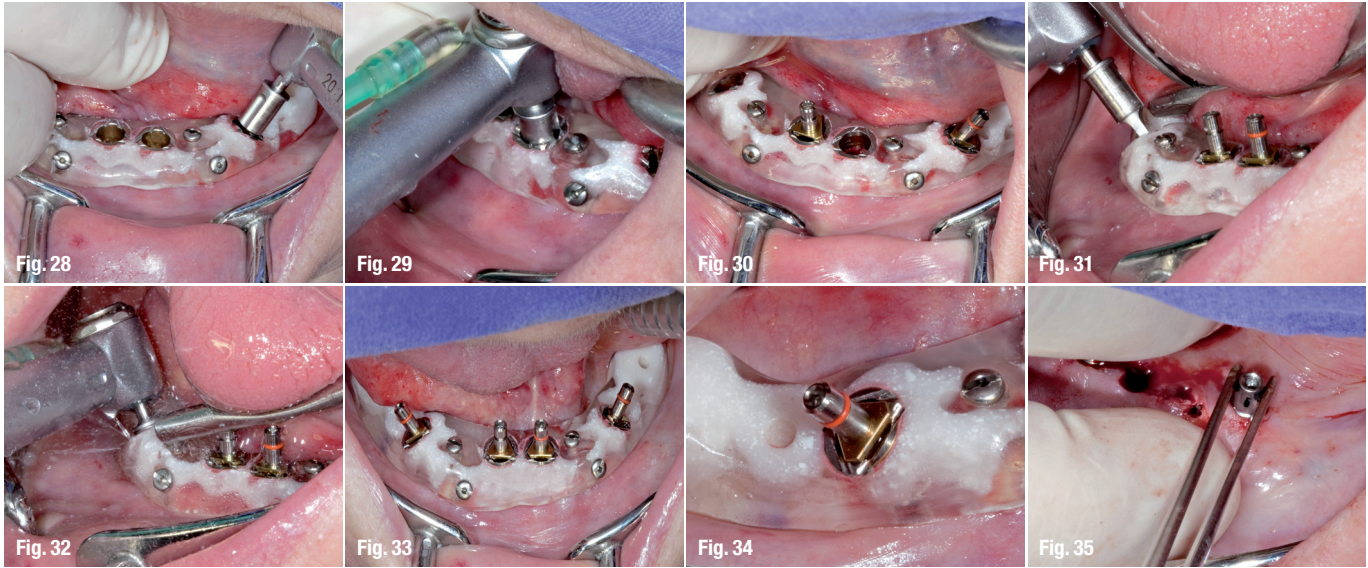


Fig. 15 _Desired prosthetic situation superimposed over the cast situation.

Fig. 16 _The CAD restoration was created with DentalDesigner.

Fig. 17 _The second molars were omitted.

Figs. 18 & 19 _CAM of the restoration (Fig. 18) using a tooth-coloured PMMA blank (Fig. 19).

Fig. 20 _Detailed preparation of the occlusal surfaces.

Figs. 21 & 22 _Aesthetic customisation using gingiva-coloured plastic, basal (Fig. 21) and labial (Fig. 22).

Fig. 23 _Adequately sized bonding gap for intra-oral bonding.

Fig. 24 _Explantation of the one-piece diameter-reduced implants.

Fig. 25 _The explants.

_Fabrication of the drilling template and immediate restoration

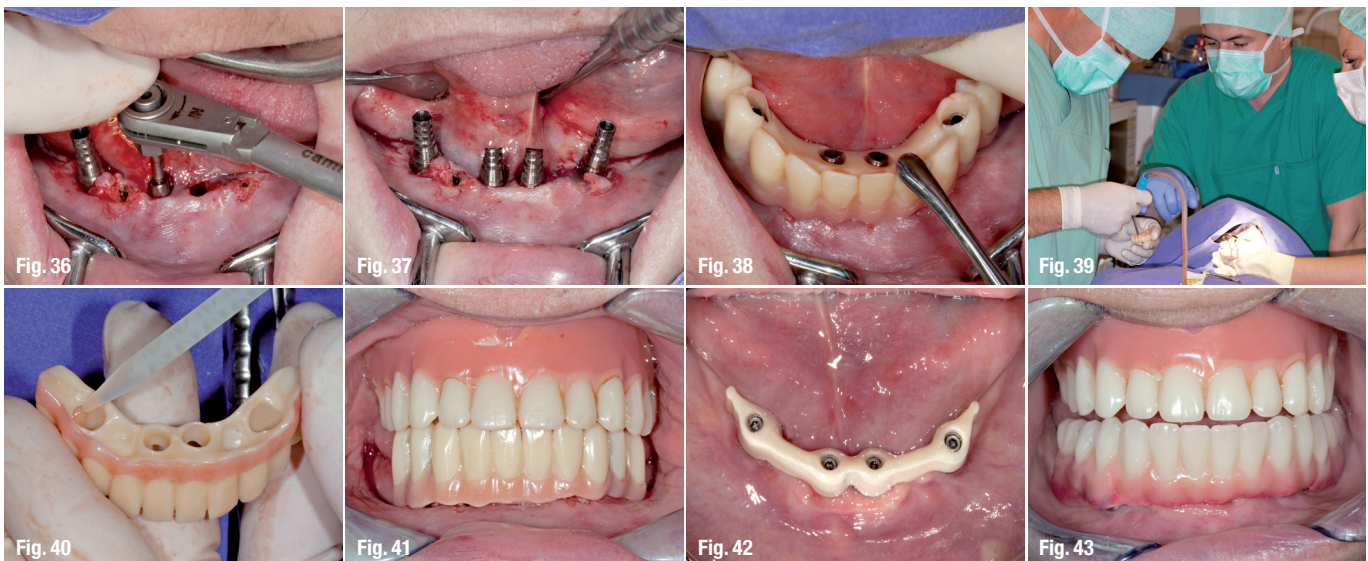
The position of the implant determined during 3-D implant planning was transferred to the drilling template in the dental laboratory using the gonyX coordinate table. The guiding sleeves with depth stops from the CAMLOG Guide System were precisely bonded on to the scanning template, thereby converting the scanning template into a drilling template (Fig. 8).

In order to fabricate the immediate restoration, a model was required. Corresponding cavities were incorporated into the cast (Fig. 9). The CAMLOG Guide insertion posts were then used to insert the laboratory analogues into the cast (Fig. 10). It was important here to position the insertion posts with the screw-retained laboratory analogues according to the required cam alignment Fig. 11). Figures 12

and 13 show the Vario SR abutments and Vario SR titanium caps on the cast.

A laser scanner was then used to digitise the cast (Fig. 14). In order to simplify the CAD of the immediate restoration, it made sense to superimpose the desired prosthetic situation defined by backward planning over the existing situation (Fig. 15). The design was created with DentalDesigner (3Shape; Figs. 16 & 17). After a suitable milling strategy had been determined, the data was transferred to a five-axis milling machine. A tooth-coloured PMMA blank was used as the material of choice (Figs. 18–20).

In contrast to traditionally fabricated temporary solutions, CAM-fabricated immediate restorations distinguish themselves by their high resistance to fracture. This property is an important technical requirement for complication-free function of the restoration. In order to achieve pleasing aesthetics, gingiva-coloured



plastic was used (Figs. 21 & 22). Careful polishing is required to keep plaque deposits as low as possible. The bonding gap around Vario SR titanium caps should be sized for tension-free intra-oral bonding (Fig. 23).

Surgical procedure

The one-piece diameter-reduced implants were explanted (Figs. 24 & 25). The drilling template was secured using four osteosynthesis screws (Fig. 26). These provided adequate stability and safety for guided implantation. In order to correctly align the insertion posts, corresponding markings were milled into the CAMLOG Guide guiding sleeves in the laboratory (Fig. 27).

Implantation was flapless using the CAMLOG Guide System gingival punch (Fig. 28). The implant bed was prepared accurately with the CAMLOG Guide System and depth referenced with drills of ascending lengths in an intermittent drilling technique (Fig. 29). After a central implant had been inserted, a terminal implant was inserted (Fig. 30). The second centrally positioned implant was then placed and the second terminal implant thereafter (Figs. 31–34).

Seating the immediate restoration

After removing the CAMLOG Guide insertion posts, the Vario SR abutments were inserted at 20 N cm (Figs. 35 & 36). The Vario SR titanium caps were shortened to the required length, placed on the Vario SR abutments and mounted with the Vario SR prosthetic screw (Fig. 37). The immediate restoration fabricated pre-implantation could then be bonded in the mouth tension-free (Figs. 38–41).

Discussion

The procedure demonstrated here, which follows the All-on-4 technique taught by Paulo Maló from Lisbon, led to the complete disappearance of the severe facial pain about two months post-operatively. The immediate prosthetic restoration was highlighted in particular in the patient's evaluation. This resulted in an immediate improvement in mastication, speech function, food intake and quality of life. Remission of neuralgiform symptoms protracted over two months after seating of the fixed prosthesis and corresponding load relief of the mental foramen.

This case illustrates the failure of a number-reduced implant treatment concept in the advanced atrophied mandible and the potential of purely implant-supported prostheses to avoid pressure-induced neuropathies. The mandibular restoration was converted into a removable bar-retained superstructure (Figs. 42 & 43).

about the authors

cosmetic
dentistry



Dr Ferenc Steidl obtained his degree in dentistry in 1996 from Friedrich Schiller University in Jena in Germany. He subsequently undertook specialist training in oral surgery in Bietigheim-Bissingen and at Diakonie Hospital

in Schwäbisch Hall in Germany. He has been practising implant dentistry since 1997. In 2001, he qualified as a specialist in oral surgery through the Baden-Württemberg Federal Chamber of Dentists (LZK) in Germany. He is a member of the German Society of Dental, Oral and Craniomandibular Sciences (DGZMK), German Federation of Oral Surgeons (BDO), German Association of Oral Implantology (DGI), Academy of Oral and Maxillofacial Surgery (AGKi), German Society of Periodontology (DGP), and Central German Association for Dental Implantology (MVZI). In 2008, he became a fellow of the European Board of Oral Surgery (European certification). Dr Steidl works at a group practice for maxillofacial surgery in Sömmerda and Bad Frankenhausen in Germany.

Praxis Dr Ferenc Steidl

DRK Mannische Krankenhaus
An der Wipper 2
06567 Bad Frankenhausen
Germany

Tel.: +49 3634 317387
info@praxis-steidl.de
www.dr-steidl.de



Sebastian Schuldes, MDT, undertook dental technician training from 1991 to 1995, and qualified as a master dental technician in 1999. In 1999 and 2000, he pursued continuing education for business administration in trade. In 2004,

he helped establish the Cercon technology centre. He obtained a Master of Science degree in 2008.

Dental-Labor Schuldes

Johann-Sebastian-Bach-Str. 2
99817 Eisenach
Germany

Tel.: +49 3691 203950
info@zahn-neu.de
www.zahn-neu.de

- Fig. 26** Fixation of the drilling template using four osteosynthesis screws.
Fig. 27 The fixed drilling template.
Fig. 28 Gingiva punching.
Fig. 29 Implant bed preparation with the CAMLOG Guide form drill.
Fig. 30 Positioning of one central and one terminal implant.
Figs. 31 & 32 Implant bed preparation and insertion of the final implant.
Fig. 33 All four SCREW-LINE implants CAMLOG Guide in the defined final positions.
Fig. 34 Detailed view of the precisely maintained cam alignment.
Figs. 35 & 36 The Vario SR abutments were inserted (Fig. 35) at 20 N cm (Fig. 36).
Fig. 37 The Vario SR titanium caps were shortened according to the prosthetic unit.
Fig. 38 Check of the tension-free seating of the immediate restoration on the Vario SR titanium caps.
Fig. 39 The surgical procedure was stress-free and controlled.
Fig. 40 A dual-hardening luting composite (combo.lign, bredent) was used for intra-oral bonding of the immediate restoration.
Fig. 41 A final photograph of the immediate restoration in the mandible.
Fig. 42 The final restoration was milled from a zirconium oxide bar.
Fig. 43 The final mandibular restoration.