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Aesthetic and functional Rehabilitation of the face using dental and facial implants

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Introduction

A 12-year old female orphan from Romania was transferred into our hospital. The lower jaw showed an enormous tumor in the symphysis mandibulae; diagnosed as an intraosseous venous malformation of the mandible[I] [1]. After resection of the tumor the defect was primarily reconstructed using a microvascularized fibula-graft[II, V] [4, 6]. For total makeover of the mouth a computerized tomography was used for positioning the implants. The prosthesis was designed by using a Procera®-Implant Bridge. Because of vertical and horizontal loss of the anterior arch, a customized chin implant was prefabricated to improve the esthetical facial symmetry[VIII, XI]. Using dental and facial implants together in one operation is an option for full-face makeover. It reduces operating time and cost, avoids a second bone grafting procedure, improves the esthetic outcome and thus is beneficial for the patient and the dentist.

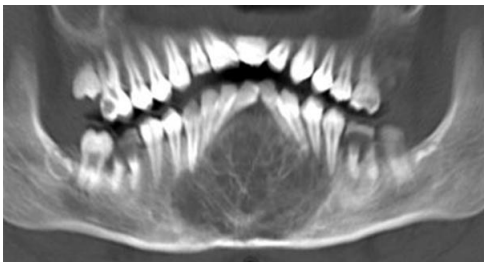

Fig. 1: The orthopantomography of the lower jaw demonstrates the size of the tumour (50x60 mm) in the center of the mandible. Caries on 16, 26, 36 and 46.

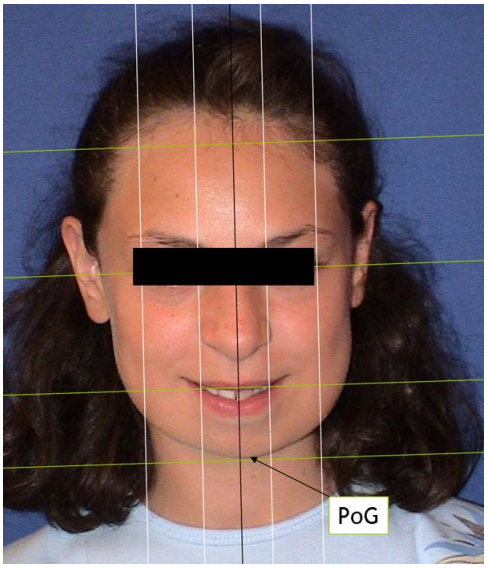

Fig. 2: Extraoral view one year after tumor resection and primarily reconstruction with a microvascular osseomyocutanoeus fibula graft. The heigh of the lower face is reduced. The chin (PoG) deviated to the left.

Fig. 3: Intraoral view one year after tumor resection. The skingraft is performing the mouthfloor.

Objectives

Clinical situation before implantation: The extraoral view after tumor resection showed a shortened and asymmetrical lower face [2]. The point of the chin (PoG) was deviated to the left. The mandibular angles were widened and clumsy. The maxilla was collapsed in transversal direction. Profile analysis showed an posteriorily inclined lower face and a labial deformation of the upper incisors. The radiographic evaluation indicated a vertical deficit of approximately 40 mm between the incisors and a sagittal deficit of approx. 20 mm.

Material and Methods

Dental and facial deficits were analyzed and associated with criteria for a well-proportioned look within the preoperative situation. The best position and length of the dental implants was planned and evaluated using a 3D CT Scan. The anterior-posterior angulation of the implants was optimized regarding both functional and esthetic standards. The custom chin implant was produced by by PorexSurgical, Inc. [Atlanta, USA] using the same 3D CT Scan[VII-IX]. The operation was anticipated with a stereolithographic model [5] and a non-sterile template made from the same material. Single-step Surgery An extraoral submental approach was used to remove the titanium osteosynthesis plates fixed in the first operation[II-VI]. The periostum was elevated from the reconstructed fibula graft. The implants were inserted by a guidance template. Eight implants were used in total[VI] (NB Replace Select Straight Groovy, Narrow Plan. Length 11.5-15 mm), [6]. After thinning out the oral skinflap [3] from 20 to 4 mm and conditioning the vestibular soft-tissue, the impression was taken with copings. The casting was then transferred in plaster. The implant bridge was waxed up and scanned with a Procera®-Scanner. The data was sent to Sweden for moulding the titanium implant bridge [7]. To avoid maxillary collapse, an orthodontic apparatus was fixed to the upper molars and activated with a Memory® screw [9c]. In the meantime, the customized chin implant was adapted to the anterior part of the fibula and fixed with resorbable screws[VIII]. For a better extraoral esthetic result, the submental scar was removed and a medial rotationflap performed. The soft tissue was sutured intracutaneously.

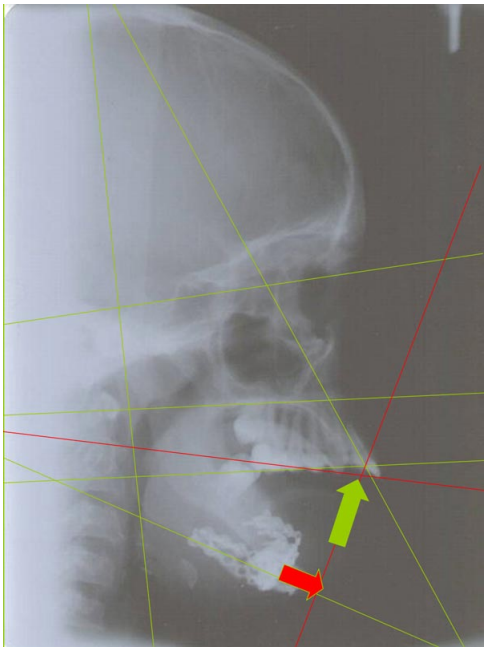

Fig. 4: Lateral x-ray. The lines showes the vertical and horizontal loss of the mandible. The arrows are indicating the ideal position for implantation.

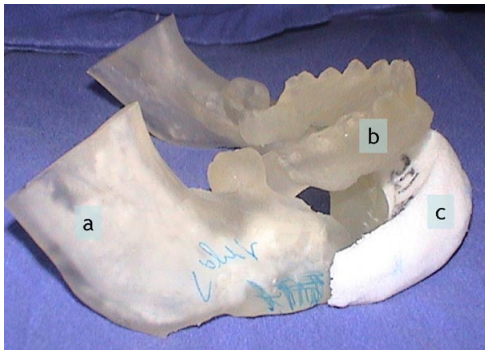

Fig. 5: Stereolithographic-template [a] for operation-planning. The prosthesis [b] shows ideal positioning of the planned implant-bridge. The white chin [c] indicates ideal size and form of the chin for best esthetical outcome.

Fig. 6: Extraoral approach and insertion of 8 implants (NB Replace Select Straight Groovy NP 11,5-15 mm).

Fig. 7: Frontal view of the titanium implant-bridge made by Procera®-technic.

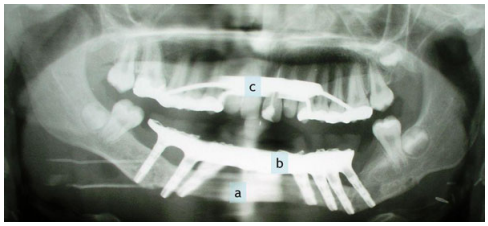

Fig. 8: Okklusal view of the final Procera®-Implant-bridge.

Fig. 9: Postoperational orthopantomography after tumor resection in the mandible. Reconstructed mandible with fibula graft (a), 8 implants and fixed Procera®-implant-bridge (b). In the upper jaw: Extension of the maxilla with Memory® -screws (c).

Results

Clinical situation after dental and facial implantation: Due to CT analysis, computer-based planning and the use of templates, the dental implants were inserted safely and simply[IV-VI]. The accuracy of the Procera® Implant Bridge based on 8 implants was very high. The functional oral reconstruction, mastication and esthetic restoration (lipbumping) was mainly acceptable. Even so the precise screw fixation of the prefabricated alloplastic chin implant was very uncomplicated[IX]. Thus the oral and facial result was highly appreciated by the patient.

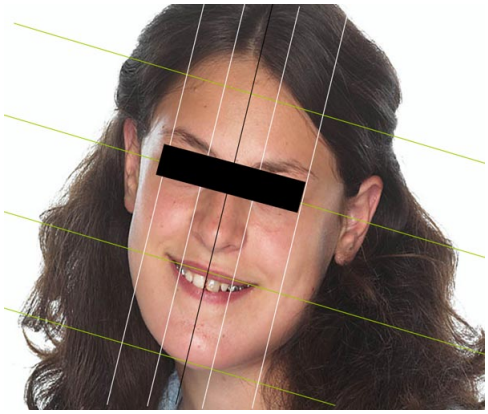

Fig. 10: Intraoral view after conditioning the skingraft, implantation and implementation of the Procera®-implant-bridge.

Fig. 11: Extraoral view after dental-implantion and oral rehabilitation with an implant-bridge. Mandibulary reconstruction and harmonisation of the lower-face using a customized chin.

Conclusions

Particularly patients with tumors or defects of the jaw are presenting large facial deformities in the sagittal, horizontal and vertical dimension. In these cases, modern dental implants are promoting oral rehabilitation to be functional - even in reconstructed jaws (bone-grafts) or high-risk regions. Once more new prosthetic solutions like Procera®techniques are able to convert awful prerequisites into beautiful teeth. For more than 20 years, facial implants have been used in plastic surgery for graftless defect-reconstruction and augmentation. Especially in the field of facial renewals, off-the-shelf or customized replacements can be used easily to improve the esthetic look. While many patients often desire facial- and not only dental-solutions, every dentist should be aware of the opportunities state-of-the-art treatments offer for appropriately selected patients. The surgeon's goal should be to achieve, to realize and to obtain beautiful teeth and beautiful faces now! - and for everyone.

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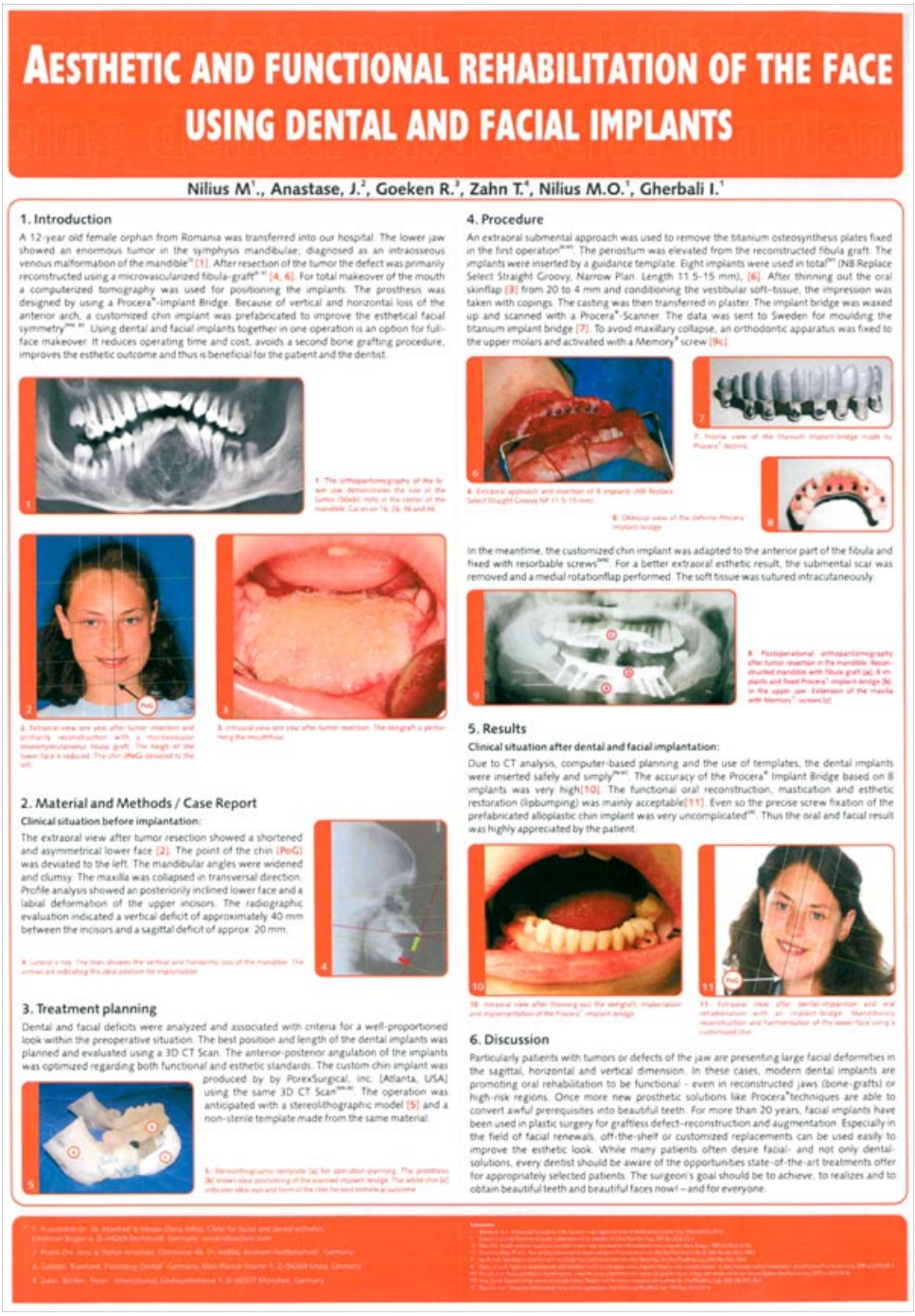

AESTHETIC AND FUNCTIONAL REHABILITATION OF THE FACE USING DENTAL AND FACIAL IMPLANTS

Nilius M.[1], Anastase, J.[2], Goeken R.[3], Zahn T.[4], Nilius M.O.[1], Gherbali I.[1]

1. Introduction

A 12-year old female orphan from Romania was transferred into our hospital. The lower jaw showed an enormous tumor in the symphysis mandibulae; diagnosed as an intraosseous venous malformation of the mandible[1] [1]. After resection of the tumor the defect was primarily reconstructed using a microvascularized fibula-graft[2, 4] [4, 6]. For total makeover of the mouth a computerized tomography was used for positioning the implants. The prosthesis was designed by using a Procera®-implant Bridge. Because of vertical and horizontal loss of the anterior arch, a customized chin implant was prefabricated to improve the esthetical facial symmetry[3, 4]. Using dental and facial implants together in one operation is an option for full-face makeover. It reduces operating time and cost, avoids a second bone grafting procedure, improves the esthetic outcome and thus is beneficial for the patient and the dentist.

1. The orthopantomography of the lower jaw demonstrates the size of the tumor (50x60 mm) in the center of the mandible. Caren on 16, 26, 36 and 46.

2. Extraoral view one year after tumor resection and primarily reconstruction with a microvascular osteomyocutaneous fibula graft. The height of the lower face is reduced. The chin (PoG) deviated to the left.

3. Intraoral view one year after tumor resection. The autograft is performing the mouthfloor.

2. Material and Methods / Case Report

Clinical situation before implantation:

The extraoral view after tumor resection showed a shortened and asymmetrical lower face [2]. The point of the chin (PoG) was deviated to the left. The mandibular angles were widened and clumsy. The maxilla was collapsed in transversal direction. Profile analysis showed an posteriorly inclined lower face and a labial deformation of the upper incisors. The radiographic evaluation indicated a vertical deficit of approximately 40 mm between the incisors and a sagittal deficit of approx. 20 mm.

4. Lateral x-ray. The lines showes the vertical and horizontal loss of the mandible. The arrows are indicating the ideal position for implantation.

3. Treatment planning

Dental and facial deficits were analyzed and associated with criteria for a well-proportioned look within the preoperative situation. The best position and length of the dental implants was planned and evaluated using a 3D CT Scan. The anterior-posterior angulation of the implants was optimized regarding both functional and esthetic standards. The custom chin implant was produced by by PorexSurgical, Inc. [Atlanta, USA] using the same 3D CT Scan[5,6]. The operation was anticipated with a stereolithographic model [5] and a non-sterile template made from the same material.

5. Stereolithographic template (a) for operation planning. The prosthesis (b) shows ideal positioning of the planned implant bridge. The white chin (a) indicates ideal size and form of the chin for best esthetical outcome.

4. Procedure

An extraoral submental approach was used to remove the titanium osteosynthesis plates fixed in the first operation[2,4,6]. The periostum was elevated from the reconstructed fibula graft. The implants were inserted by a guidance template. Eight implants were used in total[4,6] (NB Replace Select Straight Groovy, Narrow Plan. Length 11.5-15 mm), [6]. After thinning out the oral skinflap [3] from 20 to 4 mm and conditioning the vestibular soft-tissue, the impression was taken with copings. The casting was then transferred in plaster. The implant bridge was waxed up and scanned with a Procera®-Scanner. The data was sent to Sweden for moulding the titanium implant bridge [7]. To avoid maxillary collapse, an orthodontic apparatus was fixed to the upper molars and activated with a Memory® screw [9c].

6. Extraoral approach and insertion of 8 implants (NB Replace Select Straight Groovy NP 11.5-15 mm).

7. Frontal view of the titanium implant bridge made by Procera® technic.

8. Oblicual view of the definite Procera® implant bridge.

In the meantime, the customized chin implant was adapted to the anterior part of the fibula and fixed with resorbable screws[3,4,6]. For a better extraoral esthetic result, the submental scar was removed and a medial rotationflap performed. The soft tissue was sutured intracutaneously.

9. Postoperational orthopantomography after tumor resection in the mandible. Reconstructed mandible with fibula graft (a), 8 implants and fixed Procera® implant-bridge (b), in the upper jaw. Extension of the maxilla with Memory® screws (c).

5. Results

Clinical situation after dental and facial implantation:

Due to CT analysis, computer-based planning and the use of templates, the dental implants were inserted safely and simply[3,4,6]. The accuracy of the Procera® Implant Bridge based on 8 implants was very high[10]. The functional oral reconstruction, mastication and esthetic restoration (lipbumping) was mainly acceptable[11]. Even so the precise screw fixation of the prefabricated alloplastic chin implant was very uncomplicated[3,6]. Thus the oral and facial result was highly appreciated by the patient.

10. Intraoral view after thinning out the skingraft, implantation and implementation of the Procera® implant bridge.

11. Extraoral view after dental-implantion and oral rehabilitation with an implant-bridge. Mandibulary reconstruction and harmonisation of the lower face using a customized chin.

6. Discussion

Particularly patients with tumors or defects of the jaw are presenting large facial deformities in the sagittal, horizontal and vertical dimension. In these cases, modern dental implants are promoting oral rehabilitation to be functional - even in reconstructed jaws (bone-grafts) or high-risk regions. Once more new prosthetic solutions like Procera®techniques are able to convert awful prerequisites into beautiful teeth. For more than 20 years, facial implants have been used in plastic surgery for graftless defect-reconstruction and augmentation. Especially in the field of facial renewals, off-the-shelf or customized replacements can be used easily to improve the esthetic look. While many patients often desire facial- and not only dental-solutions, every dentist should be aware of the opportunities state-of-the-art treatments offer for appropriately selected patients. The surgeon's goal should be to achieve, to realizes and to obtain beautiful teeth and beautiful faces now! – and for everyone.