Mandibular reconstruction with a microvascular fibula transplant and a Medartis patient-specific implant.

The Surgeon

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Dr. Peters is an OMFS surgeon in the Department of OMFS of the University Hospital Aachen. Microvascular reconstruction is performed commonly in this department. Since 2008 virtual surgery planning has been used for bony free flaps in this department resulting in a wide knowledge of in house planning.

Introduction

A continuity resection of the mandible is often necessary after treatment of an oral squamous cell carcinoma. The reconstruction of the mandible with a microvascular fibula transplant is the most common treatment for dental rehabilitation in maxillofacial surgery.

The Case

Patient Profile

The 62 year old female patient presented in our department and complained about a mouth mucosal abnormality. Since 5 weeks a swelling of the anterior floor of the mouth has grown and the front teeth of the mandible loosened.
A biopsy of the abnormality revealed an oral squamous cell carcinoma.
As a consequence of that the tumor was resected with the anterior mandible and a neck dissection level I-III on both sides were performed. The soft tissue defect was reconstructed with a microvascular radial forearm flap. The bony defect was bridged with a Medartis MODUS reconstruction plate.
After one year without recurrence, the patient had the wish of dental rehabilitation.

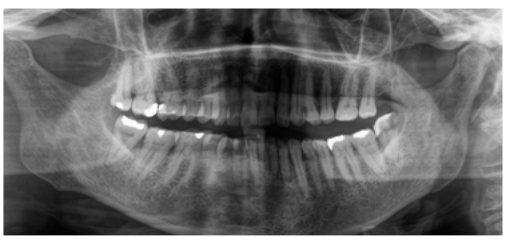

Figure 1

Figure 2

Clinical Findings / Preoperative Analysis

At this time the soft tissue in the mouth and from extraoral was closed. There was no indication for a recurrence of the squamous cell carcinoma or lymph node metastasis. The anterior mandible was resected. Only the teeth 38, 37 and 47 were left. A CT angiography of the lower legs showed a three vessel situation in each of them.

Surgical Treatment

The transplantation of the left fibula was performed in a two team approach. The first team prepared the mandible through an extraoral approach. The MODUS reconstruction plate was removed. The individually 3D-printed cutting guides for the mandible were mounted to the lower jaw and fixated with MODUS 2.0 screws. Then the supernatant was cut on each side of the mandible. Cervical an arterial branch from the A. carotis externa and the V. jugularis interna were dissected for anastomosis with the A. and V. fibularis.

The second team harvested the left fibula. The lower leg was incised from lateral and the fibula got dissected. The individually 3D-printed cutting guide for the fibula was mounted from lateral with MODUS 2.0 screws. The fibula was cut according to the cutting guide.

Figure 3

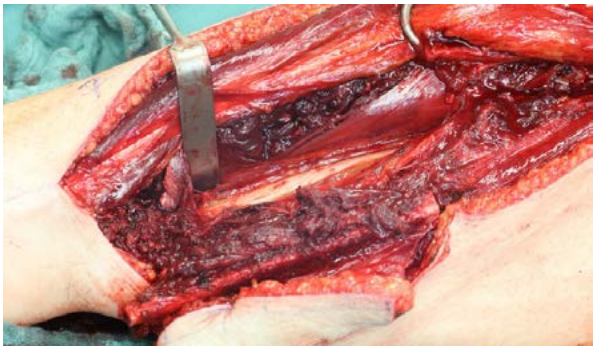

Figure 4

Figure 5

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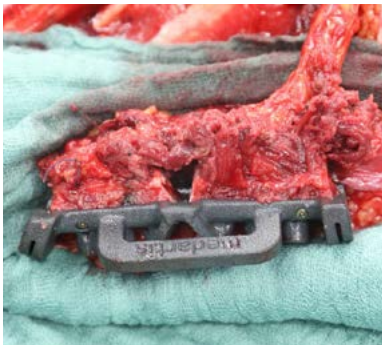

Figure 9

Intraoperative Findings

Using the individually 3D-printed anatomical models the fibula segments were aligned and fixed to the individually milled Medartis plate.

The individual plate makes the fixation of fibula segments fast and easy. After assembling of the fibula transplant the vascular pedicle got cut and moved to the mandible. The plate was fixed to the remaining jaw and vascular anastomosis was performed.

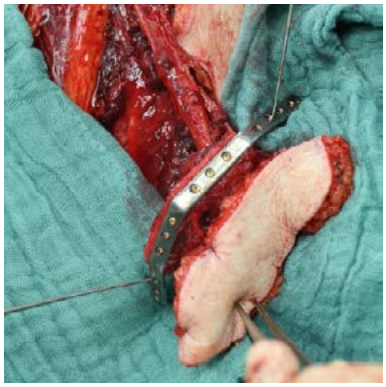

Figure 10

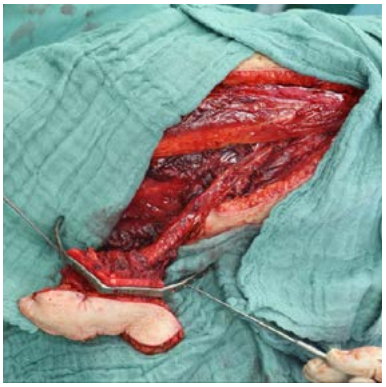

Figure 11

Figure 12

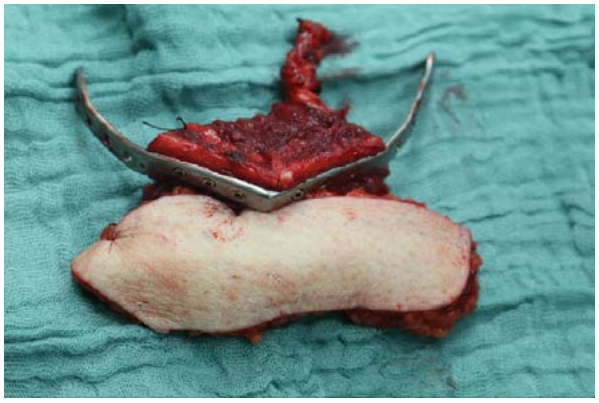

Figure 13

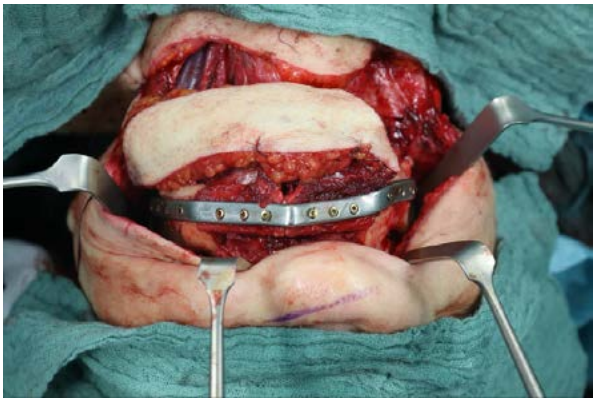

Figure 14

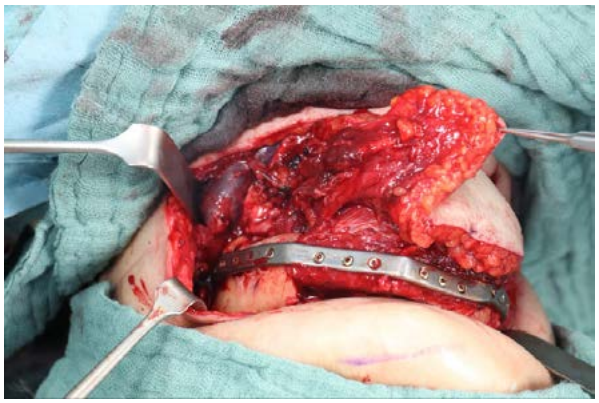

Figure 15

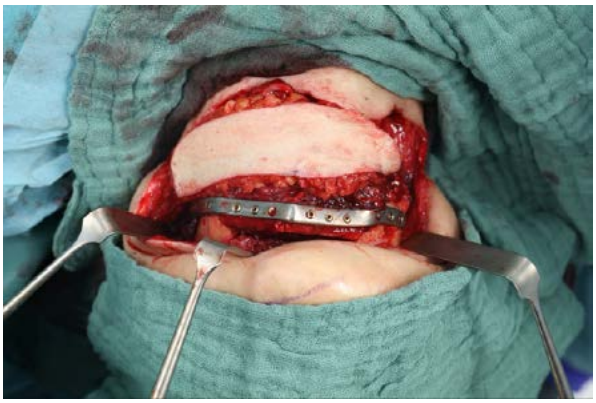

Figure 16

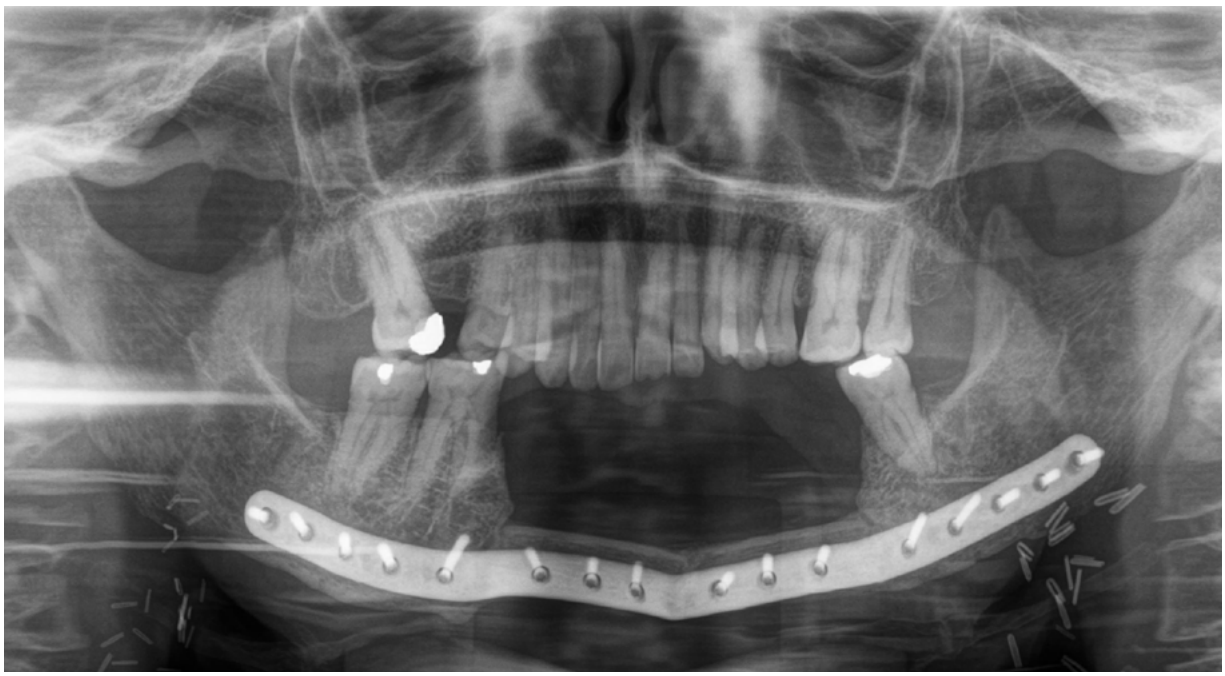

Figure 17

Postoperative Treatment

Postoperatively the patient was fed through a gastric tube for 7 days. Afterwards for 14 days only liquid alimentation was possible followed by 14 days of smooth food and 2 months of soft food. During follow up there was no wound dehiscence intraoral or extraoral and the wound on the lower leg is closed. The patient is now scheduled for insertion of enosseus dental implants.

Conclusion

After continuity resection of the mandible a microvascular fibular transplant is a well established solution for the reconstruction of bony defects. After healing dental rehabilitation using enosseous dental implants is possible. The using of individually milled reconstruction plates and cutting guides makes the reconstruction more accurate and the assembly of the segments of the fibula transplants easier.