BONE FLAP RECONSTRUCTION OF MANDIBULAR DEFECTS AFTER ONCOLOGIC RESECTION IN THE INSTITUTE OF CANCER OF LAS AMERICAS CLINIC

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Mandible reconstruction remains one of the challenges faced by head and neck and reconstructive surgeons for cancer. Loss of mandibular continuity after tumor resection compromises oral function and esthetic appearance impairing quality of life. Microvascular grafts have become the gold standard of treatment for management of mandibular defects post resection. We present a descriptive study to show the experience at Instituto de Cancerología Clínica (IDC) Las Américas, Medellin, Colombia, and the outcome in 59 cases requiring mandibular reconstruction with free fibula flap after large surgical excision for tumors.

Materials and methods

We reviewed the medical records of our Head and Neck Department between November 2011 and July 2016, and gathered data from 59 patients who required reconstruction with microvascular free fibula flap. 12 (20%) patients had preoperative radiation, 22 (37%) history of tobacco use, 19 (32%) hypertension and 7 (11%) diabetes.

Table 1. Etiology of the osseus defect

Diagnosis	Number of patients	% Patients
Squamous cell carcinoma	27	45%
Ameloblastoma	9	16%
Osteoradionecrosis	4	7%
Osteosarcoma	3	5%
Ossiffying Fibroma	3	5%
Myxoma	2	3%
Other	11	19%
Total	59	100%

Surgical planning protocol included a CT scan of the patient's face in full occlusion. MIMICS® is used to generate a 3D reconstruction of the bone structure, while the mandible is segmented from the rest of the cranium and a Fused Deposition Modelling (FDM) machine creates ABS (Acrylonitrile butadiene styrene) prototypes in order to obtain a plastic model of the patient's defect. These models are used to conduct a personalized surgical plan.

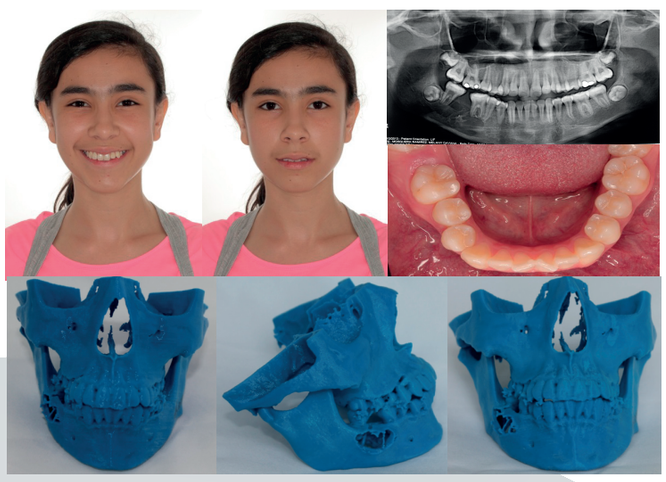
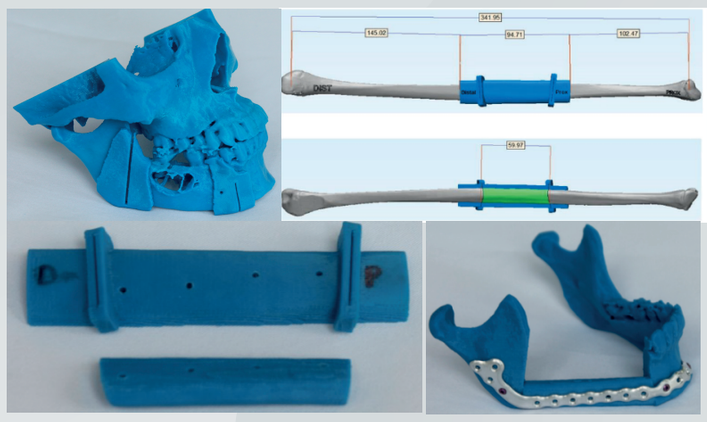


Figure 1. 3D full occlusion CT reconstruction anatomical models for surgical planning



The next step is to design the prosthesis and osteotomy guides.
The plate is manufactured with commercially pure grade 4 Titanium for better osseointegration.

Figure 2. Mandibular reconstruction plate and ostetomy custom cutting guides.

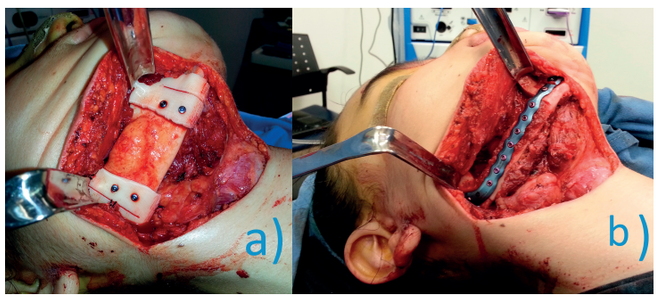
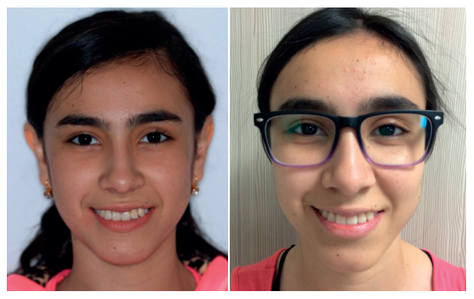


Figure 3. a) Tumor resection with custom cutting guides, **b)** Reconstruction with bone flap and titanium plate.

Surgical simulation of all the components of the plate and resection guides is performed on the 3D printed models to complete intervention planning

Results

The study group included 59 patients, 28 (47%) men and 31 (53%) women. The average age at the time of the operation was 51 years (11- 92). 39 (66%) had vascularized osteocutaneous fibula free flap reconstruction and 20 (34%) an osseous vascularized fibula flap only



The average operation time was 420 minutes. 51 (86.4%) flaps were successful and the postoperative courses were uneventful. Complications occurred in 22 patients (37%). Free flap failure occurred in 8 (13%) of the 59 patients, 7 (88%) of them were heavy smokers and 5 (63%) had prior radiation therapy.

Discussion

The head and neck surgery team at the IDC Las Américas have used this technique since 2011. All materials are made in Colombia. The reconstruction of mandibular defects following surgical resection for benign and malignant oral cavity tumors and others with fibula free flaps has shown to be a reliable technique with good short and long-term prognosis.
The current 3D virtual technology and personalized prototypes have allowed for successful reconstructions. Risk factors for failure were tobacco use and prior radiation therapy.

Conclusions

Current mandibular reconstruction strategies that combine interdisciplinary surgical planning and 3D technology improve functional and cosmetic results. Quality of life without risking oncologic outcomes can be achieved.

References

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