LEADING REGENERATION

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Major Bone Augmentation

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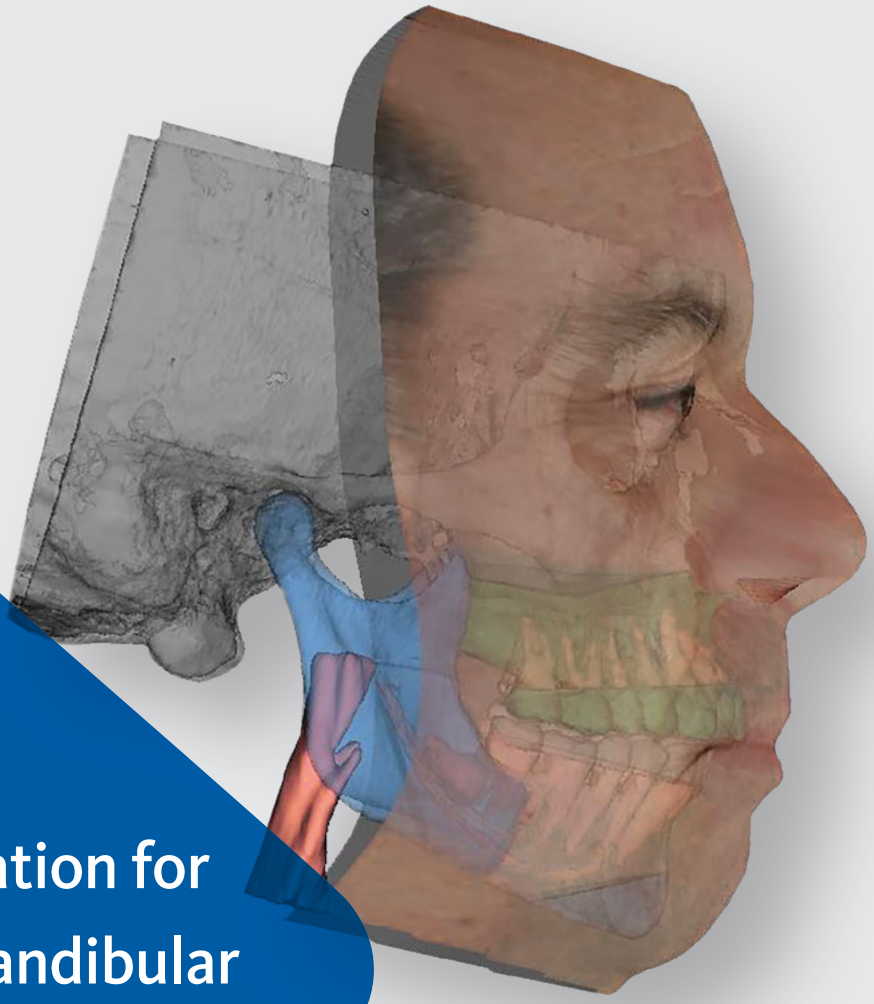

Dr. Aarnoud Hoekema

Bone augmentation for large maxillomandibular advancements in orthognathic surgery

The Situation

A 57 year-old male patient was referred to my clinic for treatment of a severe Obstructive Sleep Apnea (OSA, apnea-hypopnea index 66). Prior treatment with Continuous Positive Airway Pressure Therapy was unsuccessful because of non-acceptance. Treatment was indicated because of the severity of the patient's apnea and debilitating symptoms of daytime sleepiness. Patient opted for a definite and surgical treatment of his OSA. Therefore Maxillomandibular Advancement (MMA) surgery was performed with large advancement of the maxillomandibular complex.

Preoperative Baseline

The patient was characterized by a dentally compensated bimaxillary retrusive skeletal class-2. Orthodontic preparation enlarging the dental overjet was preferential but declined by the patient.

The Patient Profile

Maxillary advancement (mm at A-point)	**7 mm**
Mandibular advancement (mm at B-point)	**13 mm**
ASA classification	**ASA II**
Patient's age	**57 years**
Movement of the occlusal plain	**Counter-clockwise rotation 4 degrees**

"Large MMA in orthognathic surgery requires grafting of osteotomy bony defects. The use of autologous bone and Geistlich Bio-Oss® Collagen is a predictable and safe as well as minimally invasive procedure to achieve this goal."

Dr. Aarnoud Hoekema

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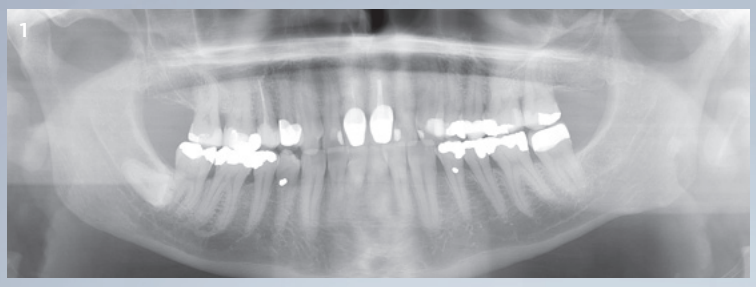

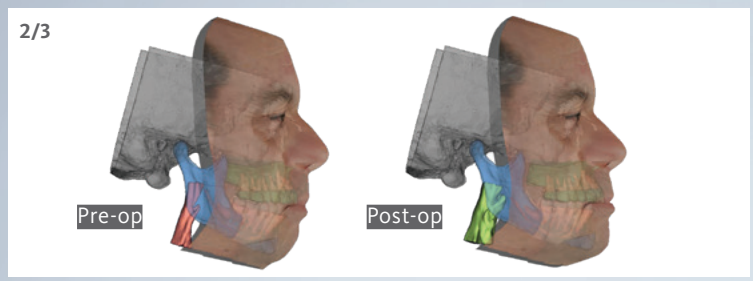

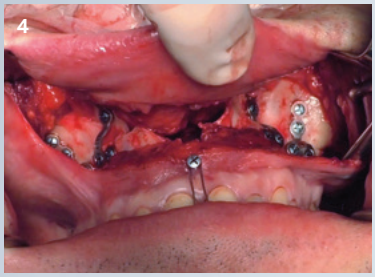

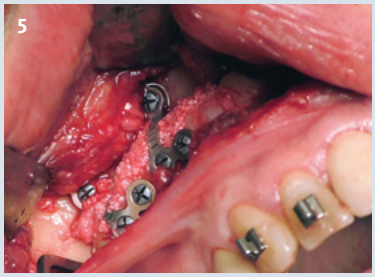

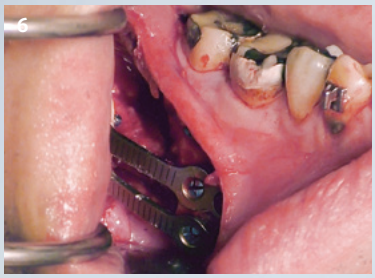

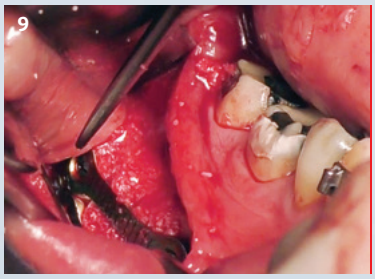

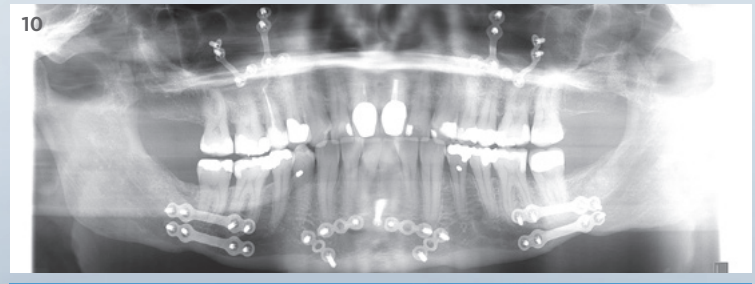

The Approach

The main goal of MMA surgery for OSA is to create a profound enlargement of the upper airway. A Le Fort I osteotomy is combined with a Bilateral Sagittal Split Osteotomy (BSSO). Because of the large advancement of the maxillo-mandibular complex, grafting of the osteotomy sites is recommended. Thus minimizing the risk of postoperative complications (e.g. non-union). Grafting of the osteotomy sites was accomplished by means of autologous bone chips harvested during the osteotomy and deproteinized bovine bone mineral mixed with 10 % collagen (Geistlich Bio-Oss® Collagen).

The Outcome

Postoperative recovery of the patient was without complications (e.g. wound dehiscence, osteosynthesis failure or infection). Follow-up and a postoperative sleep study showed a resolution of symptoms and nocturnal airway obstructions. In addition, the maxillary and mandibular osteotomy sites showed signs of complete bony ingrowth. Grafting large bony defects during MMA surgery with a combination of autologous bone and Geistlich Bio-Oss® Collagen appears to be a predictable means of reconstruction.

| **1** Panoramic radiograph of the preoperative situation. | **2/3** Three-dimensional planning of MMA surgery. A preoperative (2) and postoperative (3) morph illustrating the anticipated skeletal, airway and facial aesthetic changes following MMA surgery with a genioplasty. | **4** Intraoperative view before grafting of the anterior maxillary wall following fixation of the Le Fort 1 osteotomy. | **5** Intraoperative view of anterior maxillary wall following grafting. For this purpose Geistlich Bio-Oss® Collagen 500 mg blocks were trimmed and interpositioned at the osteotomy site. | **6** Intraoperative view of the large bony defect between the proximal and distal mandibular fragment of the right BSSO. | **7** To graft the bony defect of the mandible, first Geistlich Bio-Oss® Collagen 500 mg blocks are interpositioned at the inferior and lateral border of the osteotomy site. | **8** Subsequently the lateral border of the osteotomy in the mandible is grafted with autologous bone chips harvested during the osteotomy. | **9** View of the right BSSO site following grafting and before double-layer closure of the wound. | **10** Panoramic radiograph of the postoperative situation at one-year follow-up. | **11/12** Effects of MMA surgery on facial aesthetics. Preoperative (11) and postoperative (12) photograph showing the large advancement in the lower third of the face following MMA surgery.

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Keys to Success

Aim at the maximum possible maxillomandibular advancement while respecting the patients profile and the surgical limitations in such large advancements.

Graft the osteotomy sites in case of large advancements of the mandible or maxilla with autologous bone and Geistlich Bio-Oss® Collagen blocks.

Use additional means of osteosynthesis for stabilizing the mandible (e.g. double plating) in case of large mandibular advancements (i.e. ≥ 10 mm).

Use double layer closure (i.e. both the muscular and mucosal layer) in order to shield maxillary and mandibular grafting sites from the oral environment.

My Biomaterials

In addition to autologous bone chips, Geistlich Bio-Oss® Collagen 500 mg blocks were used as bone substitute.