Three-Dimensional Craniofacial Bone Reconstruction With SmartBone on Demand

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Abstract: This is a report of a 34-year-old male lacking of bone development in the frontal and orbital part of the skull due to a surgical removal of a right orbital-front osteoma at the age of five. The integrity of the craniofacial district was important for the young patient also for social acceptance and self-esteem. Based on computed tomography patient images, a skull model was reconstructed, both digitally and on 3D real model, to best design the needed bone graft. Defect wide extension and surface curvature called for the use of the puzzle technique, where the whole graft is composed by several elements, mechanically slotting into each other. The realization was made possible thanks to the use of a composite xenohybrid bone substitute specifically developed for reconstructive surgery (SmartBone®, by Industrie Biomediche Insubri SA). SmartBone® technology allowed the realization of custom-made grafts which perfectly joined each other and fitted the bone defect thanks to mechanical strength, also at low thicknesses and wide extensions. The postoperative course was uneventful and computed tomography scans showed new bone formation and complete calvaria continuity already ten months after surgery, with no signs of inflammation over the entire follow up. This case study represents a proof of concept that SmartBone® On Demand ™ custom-made bone grafts, together with puzzle technique, are effective, easy to handle and provide final excellent functional and aesthetic results.

Key Words: Bone substitute, osteoma, reconstructive surgery, xenograft

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