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New approaches to treatment of post-traumatic orbital defects and deformities using CAD/CAM technology

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Aim: To evaluate the efficacy of computer simulation and CAD/CAM surgical guides in treatment of patients with post-traumatic orbital defects and deformities.

Materials & Methods: 15 patients with post-traumatic defects and deformities of the orbit were recruited for the study. Bone reconstructions included individualized implant placement (5 patients), bone grafting procedures (3 patients), guided osteotomies and osteosynthesis (7 patients). In all patients computed tomography and 3-D scanning of the skin surface were performed. The obtained data was used for computer modeling and creation of surgical guides for guided osteotomies, bone grafting procedures, plates and implant placement. The anatomic results of the reconstructive surgery were estimated by postoperative CT and compared with the virtual planning of the operation.

Results: The use of computer modeling and CAD/CAM technology increased the precision of the orbital bone reconstruction, reduce the degree of invasiveness and the time required to perform the surgical manipulations. At the same time, comparison of simulation results with clinical outcome indicated the presence of linear and angular deviations in osteotomies, positioning of plates and implants. The degree of these deviations varied significantly, depending on clinical situation, quality of the CT data, algorithms used for computer modeling and template design.

Conclusions: The use of CAD/CAM technology significantly improves the efficiency of planning and carrying out the reconstructive operations. Higher precision of guided surgery requires the high quality of the CT and 3D scans, the use of special techniques in the templates manufacturing, effective interaction between surgeon and biomedical engineer.

Biography

Oxana Petrenko her completed his PhD from National Medical University and Postdoctoral studies from Donetsk National Medical University. She is the Head of Plastic and Reconstructive Surgery of Eye, Orbit and Adnexa course in P.L. Shupik National Medical Academy of Postgraduate Education. She has published more than 150 papers in reputed journals and has been serving as an Editorial Board Member of *Archives of Ophthalmology of Ukraine Journal*.

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