Surgical Approaches for Class III Skeletal Deformity

Before surgery, history taking and careful evaluation of the patient should be performed. Patient having frequent fractures may suggest osteogenesis imperfecta, as the disease may go unnoticed. For patients with class III malocclusion, maxillary, mandibular, or combined problems may exist. Facial asymmetry is important for detection and taken into treatment planning. Patient's concern should be carefully assessed. Types of osteotomy for class III skeletal deformity typically include LeFort I, bilateral sagittal split osteotomy, and genioplasty. In this center, most of orthognathic surgeries were two-jaw, as facial aesthetics are more addressed in addition to occlusal deformity. We prefer to use single (final) dental splint for two-jaw surgery. Using this method, evaluation of facial appearance is more convenient. The maxillomandibular complex is moved to the desired position, evaluated, and finally fixed. Technique of the mandibular ramus split and fixation will be presented. Anatomy of the pterygomaxillary junction was studied which provided useful surgical information, in order to achieve accurate split and less trauma to the surrounding neurovascular structures. 3D simulation provides useful information for transferring the plan to the operating theater. 3D printing of the dental occlusal splint, positioning guides or models can be performed to facilitate the surgery. The bony collision and facial asymmetry can be predicted or avoided. Ancillary procedures can be performed during orthognathic surgery for the class III deformity, which include contouring of the zygoma or mandible, reduction of the soft tissues, etc.

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Surgeon's Role in Computer Assistance and Surgical Simulation

Virtual surgery planning (VSP) has gained substantial popularity in recent years, and increased accuracy is only one of the features that lead to the rise of this technology. Based on the cone-beam computed tomography (CBCT), the surgeon is able to assess the osseous morphology and its relationship to the soft tissue and the position of the inferior alveolar nerve in the mandible in order to avoid nerve injury during the sagittal splitting procedure. Furthermore, the VSP process is carried out like an actual OGS, so that every surgical step can be evaluated before entering the operating room. Unusual bony deformities, such as weak bony unions in the Le Fort I segment of cleft patients can be previewed before resulting in surgical difficulty. The placement of the maxilla and the proximal and distal segments of the mandible can be precisely adjusted to provide the best possible aesthetic and functional result. Especially facial asymmetry patients demand 3D planning to address the correct positioning of the bony segments in all three dimensions; in these difficult cases good planning can alleviate surgical morbidity because the surgeon can rely on the result of the simulated surgery during the procedure.

When two-jaw OGS is carried out with a single occlusal splint, the surgeon has six degrees of free movement to position the maxillo-mandibular complex (MMC) in the position that yields the best aesthetic and functional result for the patient and thus providing an enormous surgical flexibility. However, this range of freedom also comes with a long learning curve, because the positioning of the MMC can be hard for the beginner and even the experienced. VSP can shorten the learning process, because the planning procedure already simulates the actual surgery and its result by providing the measurements of maxillary impaction, yaw rotation and mandibular ramus configuration. The whole process of MMC positioning can be rehearsed in a calm enviornment without the stress in the operating room and thus free the surgeon of doubt in his result when intraoperative judgement is impaired by swelling, muscle relaxation and supine positioning. Intraoperative navigation and individually 3D-printed positioning guides support the surgeon in achieving the desired result by further reducing the human error. These techniques are now used for OGS by some international centers, and the dropping prices of planning programs and 3D printers will certainly contribute to the spreading of these tools.

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