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NEW DEVELOPMENTS IN SURGICAL CORRECTION OF HEMIFACIAL MICROSOMIA

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Abstract

Hemifacial microsomia is characterised by unilateral skeletal and soft tissue deficit in the temporal fossa, which when involving the mandible may cause severe facial asymmetry, and typical deformities of the middle ear and the auricle.

Correction possibilities of these characteristic features during childhood and adolescence have improved over the last years. Since 1987, several innovations have been introduced in the Zurich protocol modified by Sailer for correcting the typical deformities of hemifacial microsomia. The most important innovations are:

- Correction of the position of the external ear during childhood, sometimes in combination with growth centre transplantation to the mandible.
- Callus distraction of the unilaterally hypoplastic mandible.
- The use of stereolithography allowing for precise diagnostic and planning of skeletal corrections and implant placement.
- The application of the 3D Orthognathic Surgery Simulator (Krenkel) in severe asymmetries allowing for more precision in planning and performance of the bimaxillary facial rotation.
- Total ear reconstruction by means of a Z-plasty, shifting the auricular rudiment cranially and dorsally, costal cartilage grafting in combination with tissue expansion and filling of the temporal fossa with lyocartilage.
- Implant supported epitheses.

These techniques are discussed and illustrated.

Introduction

Dysostosis otomandibularis or hemifacial microsomia is characterised by skeletal and soft tissue deficit in the temporal fossa and severe facial asymmetry. Damage of the differentiating tissues of the first and second branchial arches is thought to be responsible for the typical hemifacial hypoplasia with underdevelopment of the different structures involved, including ear anomalies.[1] The centre of hypoplasia is the ear-temporo-mandibular joint region.[2] Surgical concepts such as growth centre transplantation during childhood, reconstruction of the temporomandibular joint, bimaxillary facial rotation originally described by Obwegeser at the end of adolescence and correction of skeletal and soft tissue deficits are established methods.[2-7] This descriptive paper emphasizes on the illustration of new developments which were introduced over the last few years.

Methods

Several innovations have been introduced in the Zurich protocol for correcting the typical deformities of hemifacial microsomia.

- Severe ectopic situation of the external ear can be corrected during childhood by means of Z-plasty and ear tugs are excised. However, the lobular-like structure should be preserved in case of later ear reconstruction. This can be done simultaneously with the growth centre transplantation.
- If a hypoplastic ascending ramus and mandible are present, callus distraction is applied for elongation of the bony as well as the soft tissue structures.
- Precise planning and transfer of the planned surgical movements during the bimaxillary facial rotation procedure is of utmost importance for obtaining skeletal symmetry and reducing the need

as well as the extent of secondary skeletal contouring procedures.[8] The 3D Orthognathic Surgery Simulator®, developed by Krenkel and Lixl is a reliable tool to achieve this goal.[9] Apart from the usual face-bow registration of the maxilla, the position of the mandibular angles and inferior mandibular border are registered as well. This tool permits the performance of mock-surgery while measuring the exact amount of linear movements and rotations in the 3 dimensions. The sagittal split procedure is simulated as well as condylar displacements if they are imposed by the planned mandibular movements. These can be corrected by posterior horizontal rotation of the maxilla, thus correcting parallellism at the sagittal split. Morphological changes of the gonial angles are visualised. The changed chin position as a consequence of the facial rotation can be measured so that the remaining chin correction f.i. a propeller-genioplasty, can be planned in advance.[10] The preoperatively planned surgical movements are transferred during surgery by means of the Face-O-Meter and an intermediate splint, which allow for a three-dimensional control of the surgical displacements, without extending the operation time.

- One of the main surgical challenges is the reconstruction of the ear. Two main options are presented to the surgeon. Reconstruction of the external ear by means of chondral graft was, in our experience, facilitated by previous tissue expansion.[11,12] Nevertheless, more surgical sessions are required to obtain an aesthetically satisfying result in comparison with the alternative technique by means of epitheses supported by bone-anchored implants.
- Stereolithographies allow for precise diagnostic and planning of skeletal procedures, the remaining soft tissue deficit to be corrected and the optimal placement of craniofacial implants.

Discussion

These new developments in the Zurich protocol modified by Sailer for correcting hemifacial microsomia deformities are characterised by interceptive procedures during childhood and more predictable results for the definitive corrections in adolescence. Whereas the interceptive childhood procedures have an uncertain outcome due to unpredictable growth patterns, their major advantage is to improve skeletal and soft tissue symmetry at a young age, thus facilitating later corrections and at the same time reducing the facial stigma which might interfere with socialisation. As for the definitive corrections, their predictability is such that both patients and parents can be assured that the functional and aesthetic aspects of the deformity can be corrected without leaving behind disturbing remnants of its initial expression.

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