Skull reconstruction

Skull reconstruction can be challenging due to the complex 3-dimensional shape of some structures, such as the orbital walls, and for cases involving a large cranial vault. In such situations, computer-assisted design and modeling of prostheses is especially helpful to achieve an adequate reconstruction. Simultaneous tumor resection and skull defect reconstruction are also challenging because the preoperative imaging does not display the anticipated defect. Currently, sophisticated methods based on physical prototypes and templates are required to enable simultaneous resection and reconstruction techniques.

Using OsiriX software, virtual bone resection was performed using preoperative images by carefully delimiting the tumor on each slice. The modified images were integrated to predict the defect and also served as a basis for prosthesis construction. At the time of surgery, the images were projected onto the patient's skull using a surgical navigation system to delimit the area of the craniectomy.

The virtual planning method was simple and accurate and provided a precise preoperative definition of important structures that needed to be spared, such as the frontal sinus. Using this method, simultaneous tumor resection and prosthetic skull reconstruction was successfully achieved for a patient with a wide skull tumor.

Simultaneous skull tumor resection and prosthetic reconstruction are possible when a virtual preoperative tumor resection is performed, and a corresponding customized prosthesis subsequently is manufactured and used [1].

1)
Bruneau M, Kamouni R, Schoovaerts F, Pouleau HB, De Witte O. Simultaneous Image-Guided Skull Bone Tumor Resection and Reconstruction With a Preconstructed Prosthesis Based on an OsiriX Virtual Resection. Neurosurgery. 2015 Aug 18. [Epub ahead of print] PubMed PMID: 26287551.

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