OsiriX

OsiriX® software for advanced 3D planning.

It is a freeware software and user friendly. Additionally, it has the tools for the preoperative analysis of patients [1].

This 3-D VR representation can be examined in detail, shared and discussed with others, and related precisely to physical reality [2].

It is up to the user to choose the amount of structures to contour, and at the end of the process, each one is already aligned to the entire volume [3] [4] [5]. Then, each object can be visualized partially or completely transparent and oriented according to the viewer's choice.

The scene is created from a range of volume data sets, surface models derived from them, and transformations derived from 3-D registrations of both volumes and models [6] [7] [8].

Volume rendering works directly from the available scan images, so the quality of data during acquisition will affect the result of the rendering [9].

All the available software, either commercial or open source, needs a volumetric acquisition to process the data sets [10] [11] [12] [13].

Indications

During surgery for intrinsic brain lesions, it is important to distinguish the pathological gyrus from the surrounding normal sulci and gyri. This task is usually tedious because of the pia mater-arachnoid membranes with their arterial and venous complexes that obscure the underlying anatomy. Moreover, most tumors grow in the white matter without initially distorting the cortical anatomy, making their direct visualization more difficult.

Harput et al., used free computer software OsiriX (OsiriX Medical Imaging Software) that allowed us to create three-dimensional reconstructions of the cerebral surface with and without cortical vessels. These reconstructions made use of magnetic resonance images from 51 patients with neocortical supratentorial lesions operated on over a period of 21 months (from June 2011 to February 2013). The 3-D anatomical images were compared with the true surgical view to evaluate their accuracy. In all patients, the landmarks determined by 3-D reconstruction were cross-checked during surgery with high-resolution ultrasonography; in select cases, they were also checked with indocyanine green videoangiography.

The reconstructed neurovascular structures were confirmed intraoperatively in all patients, and found this technique to be extremely useful in achieving pure lesionectomy, as it defines tumor's borders precisely.

A 3-D reconstruction of the cortical surface can be easily created with free OsiriX software. This technique helps the surgeon perfect the mentally created 3-D picture of the tumor location to carry out cleaner, safer surgeries [14].

Reconstruction

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 [15].

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