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3D Model in the Planning of Endovascular Surgery and Clipping for the Treatment of Aneurysms

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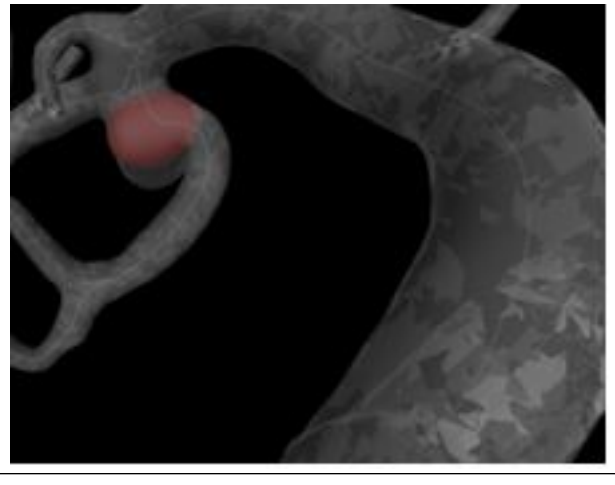
Introduction

Micro-surgical clipping of aneurysms is the standard in the treatment of cerebral aneurysms, however with the advent of endovascular techniques, aneurysm treatment has been increased by endovascular therapy through embolization, however aneurysms that escape endovascular treatment due to its complexity, it is also a challenge for the neurosurgeon to perform the clipping of the same, before this scenario it is imminent to count with a three-dimensional model, with which the clipping of the aneurysm can be planned.

Methods

A 3 D printer was acquired (Creality CR 10), then the angiotomography images were processed with the OSIRIX program (http://www.osirix-viewer.com), then the prototype 3d was modeled with the MEVISLAB program (https: / /www.mevislab.de/download/) The vascular model of the aneurysm and the bony model of the skull were printed with Polylactic Acid Absorbable Plates (PLA) so that the neurosurgeon could perform a surgical planning, from the approach to the clipping of the aneurysm without losing the anatomical references.

Once the model was printed, it was shown to the neurosurgeons in order to plan the surgery and have a real approximation of the results of the surgery.

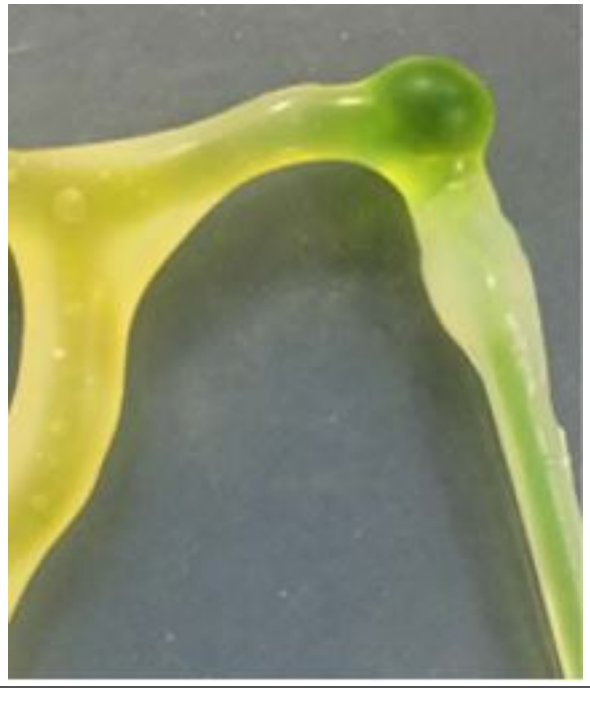


Results

We managed to successfully print the three-dimensional model of an aneurysm, along with the skull, the neurosurgeon compared the use of model 3 d for surgical planning vs the use of tomography with 3d reconstruction, considering that the use of 3d model reproduces The anatomical structure of the aneurysm, including wall thickness, allowed the neurosurgeon and the resident of neurosurgery to simulate the surgery from the approach to the clipping of the aneurysm with the use of the microscope.

Conclusions

In recent decades, surgeries for the treatment of cerebral aneurysms have been guided by imaging studies with 3D reconstruction. However, this practice is limited by the use of flat screens for the visualization of three-dimensional image data. An emerging technique, known as 3D printing or rapid prototype, overcomes this limitation by producing three-dimensional objects that can be touched by the neurosurgeon simulating with more precision the neurosurgical scenario that faces, as well as the results that will be obtained from surgery.



Learning Objectives

Create a three-dimensional brain aneurysm prototype in order to plan surgery and obtain better functional results.

References

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