



Introduction

Aneurysmal subarachnoid hemorrhage is a devastating neurologic disease where timely definitive management of cerebral aneurysms is necessary. As a greater proportion of aneurysms are being treated endovascularly, the number of surgical clipping has decreased. Those deemed unsuitable for embolization are often more complex with higher risks. OsiriX is open source software in which the amalgamation of different modalities enhances the surgeon's ability to combine real time image-navigation with preoperative imaging studies.



Interface showing integration of the 3D preoperative imaging (red) with the operating surgeon who is able to review and manipulate the imaging using the mouse pad immedded in the operating chair (green).

Methods

In 2011, a prospective protocol was adopted which explored the integration of this system for surgical clipping of cerebral aneurysms. All patients with cerebral aneurysms underwent 3D CTA. The images were uploaded into OsiriX and processed to build 3D reconstructions. The surgeon used the reconstructions to predict the location and orientation of the aneurysm and plan the appropriate surgical approach. The system was then connected to the operative microscope to allow the reconstructions to be displayed within the microscope eyepieces.

Results

We found the integration of this system to be feasible for all of our cerebral aneurysm patients. Image processing did not cause any surgical delays. Since initiation of this protocol, there have been no technical malfunctions. The surgeons found the system easy to use for both developing the digital reconstructions and navigating the 3D reconstructions.

Conclusions

The volume of surgical clipped cerebral aneurysms has declined in recent years since the advancement of the endovascular field. Successful clipping requires careful preoperative planning, surgical skill, and intraoperative adaptability. We found the OsiriX system allowed the surgeon to anticipate potential difficulties in the clipping procedure, but also provided an atlas of anatomical relationship of vessels to current operative location. Both aspects allowed for patient specific planning and gave the surgeon additional information, potentially making aneurysm clipping safer.

