Artis zeego

Artis zeego from Siemens delivers unmatched patient positioning by allowing you to position the patient as desired. This brings ease to the execution of many procedures. Artis zeego eco knows how the tabletop and the patient are positioned and moves smoothy into the requested position at the user's request. Unique for C-arm systems, Artis zeego eco is a system that enables intra-procedural 2D, 3D, and syngo DynaCT imaging even when the patient is sitting.

In addition to conventional neuroendovascular procedures, the system was used as an intraoperative imaging tool for various neurosurgical procedures such as aneurysm clipping and spinal instrumentation.

It represents a suitable option for online surgical navigation during cochlear implant surgery. This imaging technology will push further advances in cochlear implant surgery and lateral skull base surgery, particularly if linked to intraoperative navigation [1].

STN DBS for Parkinson's disease

Delavallée et al., presented the results of 10 consecutive patients implanted under general anaesthesia (GA) using intraoperative robotic three-dimensional (3D) fluoroscopy (Artis Zeego).

Ten patients (nine men, one woman) with a mean age of 57.6 (range, 41-67) years underwent surgery between October 2013 and January 2015. The mean duration of PD was 9.2 [1-10] year. The procedure was performed under GA: placement of the stereotactic frame, implantation of the electrodes (Lead 3389; Medtronic, Minnesota, MN, USA) and 3D intraoperative fluoroscopic control (Artis Zeego) with image fusion with the preoperative MRI scans. All patients were evaluated preoperatively and 6 months postoperatively.

The mean operative time was 240.1 (185-325) min. The mean Unified Parkinson's Disease Rating Scale (UPDRS) II OFF medication decreased from 23.9 preoperatively to 15.7 postoperatively. The mean OFF medication UPDRS III decreased from 41 to 11.6 and the UPDRS IV decreased from 10.6 to 7. The mean preoperative and postoperative L-Dopa doses were 1,178.5 and 696.5 mg, respectively. Two complications were recorded: one episode of transient confusion (24 h) and one internal pulse generator (IPG) infection.

With improvement in preoperative magnetic resonance imaging (MRI) and the ability to control the position of the leads intraoperatively using Artis Zeego, they now perform this procedure under GA.

The results are comparable to others reported. The significant decrease in the duration of surgery could be associated with a reduced rate of complications (infection, loss of patient collaboration). However, this observation needs to be confirmed [2].

Cerebrovascular surgery

An Artis Zeego FD system, mounted on a robotic C-arm was used during the clipping of an aneurysm to acquire intraoperative FD-CT and 3D-RA images. These images were then fused via the use of BrainLab iPlan 3.0 software and sent to a Vector Vision Sky neuronavigation system (NNS; BrainLAB, Heimstetten, Germany) to provide intraoperative image guidance.

The use of intraoperative FD-CT and 3D-RA with a NNS allowed for accurate visualization of the vascular anatomy and localization of pathology. In a case of a patient harboring two aneurysms, one that was surgically clipped and a second that was treated endovascularly, the 3D-RA clearly showed neck remnants at both aneurysms. Use of the NNS assisted in further clip placement for obliteration of these neck remnants.

Hybrid operating suites equipped with FD-CT, 3D-RA, and NNS capabilities can be used to provide intraoperative 3D image guidance during cerebrovascular surgery with excellent accuracy and without the need for preoperative angiography. Furthermore, this technique required less than 15 minutes for image acquisition and utilizes digitally subtracted angiographic images that are superior to conventional CT or MRI for the imaging of cerebrovascular pathology [3].

Five hundred one neurosurgical procedures were successfully conducted in the hybrid OR with the robotic DSA. During surgical procedures such as aneurysm clipping and arteriovenous fistula treatment, intraoperative 2-/3-dimensional angiography and C-arm-based computed tomographic images (DynaCT) were easily performed without moving the OR table. Newly developed virtual navigation software (syngo iGuide; Siemens AG) can be used in frameless navigation and in access to deep-seated intracranial lesions or needle placement.

This newly developed robotic DSA system provides safe and precise treatment in the fields of endovascular treatment and neurosurgery [4].

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