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A DECADE OF EXPERIENCE WITH A HYBRID NEUROVASCULAR OPERATING ROOM

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Resumen

Advanced cerebral angiography includes rotational angiography, 3D reconstruction, C-arm based CT scan (“dyna CT”), and robot-controlled C-arm. We explored these advantages using the first North American neurosurgery O.R. installation of a Siemens Artis Zeego®.

From January 2008, over 200 procedures involved Zeego. These were for: aneurysm/AVM, cranial/spinal dural AVF, ECIC bypass, carotid revascularization, subdural hematoma, ventricular drain placement and skull base tumor. Using a radiolucent Mayfield headrest and custom dovetail table adapter, intraoperative 2D- and 3D- digital subtraction angiography are performed. In certain situations, image overlay and dyna CT are used.

Robotic C-arm provides a wide open surgical environment. Excellent 2D-DSA is obtained. Postoperative DSA is not needed. 3D angiography is increasingly successful. Dyna-CT is used to assess for hemorrhage, ventricular drain placement, brain shift, and cranial reconstruction. In aneurysms, complete clipping and adjacent branch patency are confirmed. In AVMs and dural AVFs, 2D- and 3D-DSA is used to locate nidus, feeders, drainers, and to locate AVM remnant. Repeat craniotomies are unnecessary. Image overlay is used during ECIC bypass and spinal dural AVF. During ECIC, image overlay maps recipient MCA branches onto scalp before craniotomy. For spinal dAVF, image overlay projects pre-operative angiography onto live intraoperative fluoro image. Surgery is completed via hemilaminectomy using minimally invasive techniques with only 4-5 cm incisions. For selected aneurysms, live neurovascular roadmap guidance is possible.

Intraoperative angiography with 3D reconstruction and dyna CT are feasible during neurovascular and other neurosurgeries. An expert technologist, combined with careful positioning of the head clamp and table adapter are essential for rotational studies. Further improvements will increase the use of intraoperative 3D and dyna CT and provide live neurosurgery image guidance.

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