

The Siemens logo is displayed in a teal color. The background of the entire slide is a photograph of a hybrid operating room. A large white robotic arm is positioned in the foreground, extending towards the center. In the background, several medical professionals in blue scrubs and masks are standing around a patient who is lying on an operating table. The room is equipped with various medical devices, including monitors and surgical lights. The floor is blue with yellow and black safety markings.

SIEMENS

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at first sight

Treatment of a giant meningioma in a hybrid OR

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Illustrated workflows in hybrid operating rooms, No. 10

PLA Stroke Care & Research Center

Prof. Jiang Weijian, MD

PLA Stroke Care & Research Center is the first center in the People's Republic of China with a neurovascular hybrid operating room featuring Artis zeego, a robot-supported 3D angiography system. The center is one of the world's most renowned centers for the management of cerebral vascular disease. It provides comprehensive diagnostic and therapeutic care for patients with disorders of blood vessels of the brain, including

- Ischemic and hemorrhagic stroke
- Transient ischemic attack
- Chronic carotid occlusion or stenosis
- Cerebral hemorrhage
- Cerebral aneurysms and subarachnoidal hemorrhage
- Dural arteriovenous fistula (DAVF)
- Arteriovenous malformation (AVM)
- Hypervascular brain tumors

Other on-site facilities include a neurological intensive care unit, a hybrid operating room, neuro-endovascular therapy suites and a multi-media conference room.

Since 2012 Prof. Jiang Weijian, MD has been head of the New Era Stroke & Research Institute and vice president of The Second Artillery General Hospital of Chinese PLA.



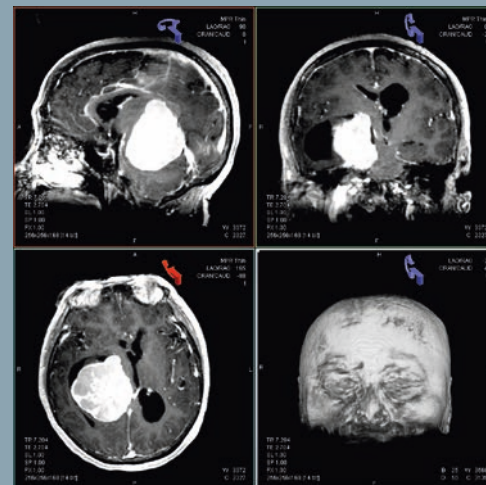


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Clinical Case

Removal of a giant meningioma

A 61-year-old female patient with walking unsteadiness was diagnosed with a brain tumor which was regularly controlled for over two years. The patient decided for surgical tumor removal due to significant increase of the walking unsteadiness. MRI showed a giant tumor located in the right temporal-occipital lobe, size approximately 7 cm x 5.7 cm x 7.5 cm. Image fusion was planned as guidance for open surgery.



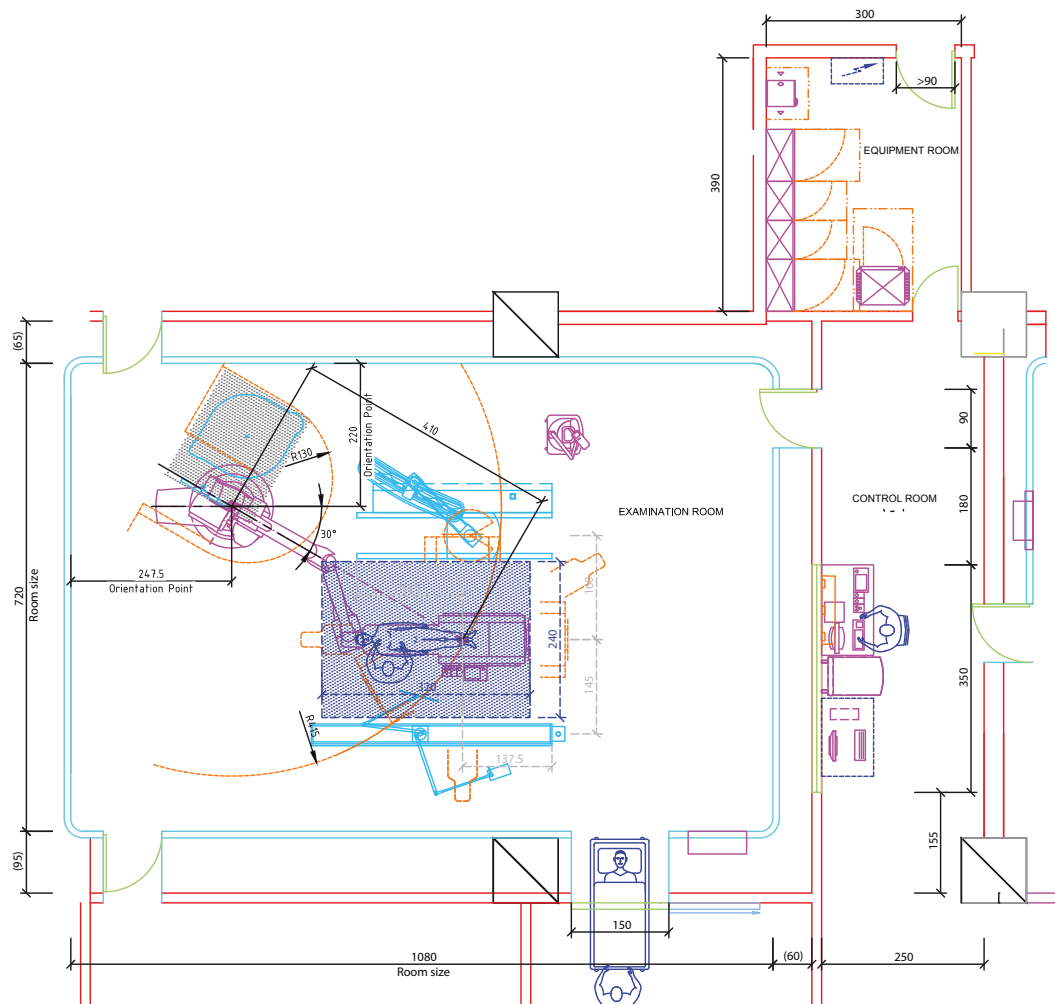
The hybrid operating room

The PLA Stroke Care & Research Center installed one of the first neurovascular hybrid ORs in People's Republic of China. This hybrid operating room is equipped with a Siemens Artis zeego robot-supported 3D angiography system. Artis zeego is fully integrated with the Artis OR table and adapts automatically to any movement of the table.

The size of the room is about 111 m² (1194 ft²) including control and equipment rooms. The adjacent control room provides a direct view into the hybrid operation room.

The hospital decided to install a Dräger anesthesia boom, a Maquet SATELITE ceiling-mounted system with 3 POWERLED OR lamps, and an OPMI Pentero Infrared 800 microscope by Carl Zeiss. The display ceiling suspension with five monitors is installed at the foot end of the table enabling flexible positioning of the monitors at any side of the table to display reference and fluoroscopic views. A laminar air flow field is installed to maintain the highest hygienic standards.



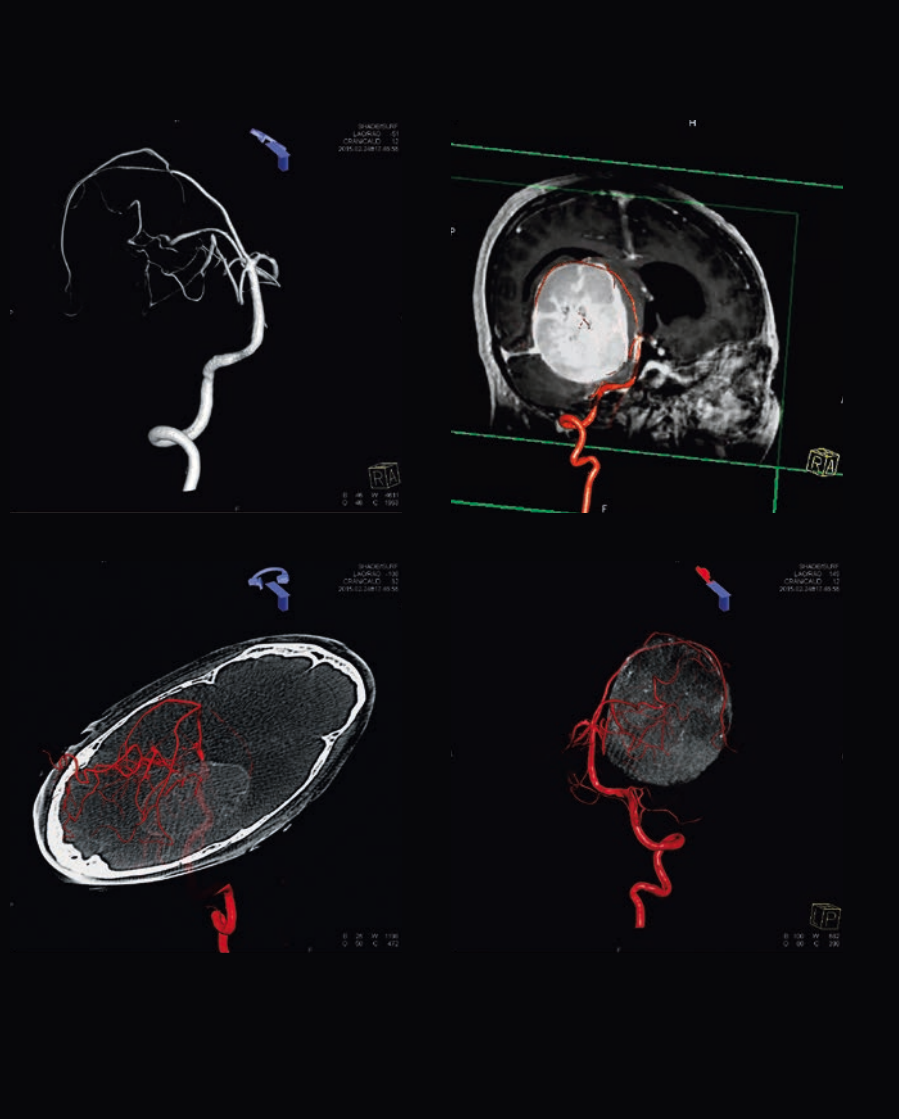


Combining embolization with open neurosurgery

For this patient, the team chose a hybrid approach that combines endovascular and minimally invasive open surgery techniques. Artis zeego was used to perform a digital subtraction angiography (DSA) to detect the blood supply and in particular whether the tumor was fed by a prominent artery amenable to embolization. A 3D DSA reconstruction of the cranial vessels was completed. To be even more precise and to see the exact correlation of the vessels and tumor, the 3D DSA was fused with pre-operative MRI. Even the smallest vessels were evaluated to determine which tumor-feeding arteries would undergo embolization with the help of the *syngo* Fusion Package and *syngo* 3D Roadmap.

First, a branch of the superior cerebellar artery, the main tumor-feeding artery, underwent embolization. This significantly reduces the blood loss during open tumor resection and allows for surgery in a highly perfused area. In addition, the initial tumor embolization helped identify tumor margins more easily and remove the tumor with less effort and blood loss. This first step is essential to reduce intraoperative bleeding and consequently increase patient safety.





Completion of embolization and conversion to open surgery

Complete embolization of the tumor's feeding arteries was achieved endovascularly. After embolization, Prof. Zhao Jizong and team converted to open surgery in the same room without moving the patient to another table. The patient was kept under general anesthesia. With a single press of a button, Artis zeego was moved to a park position away from the table, allowing quick and easy patient access for all staff members.

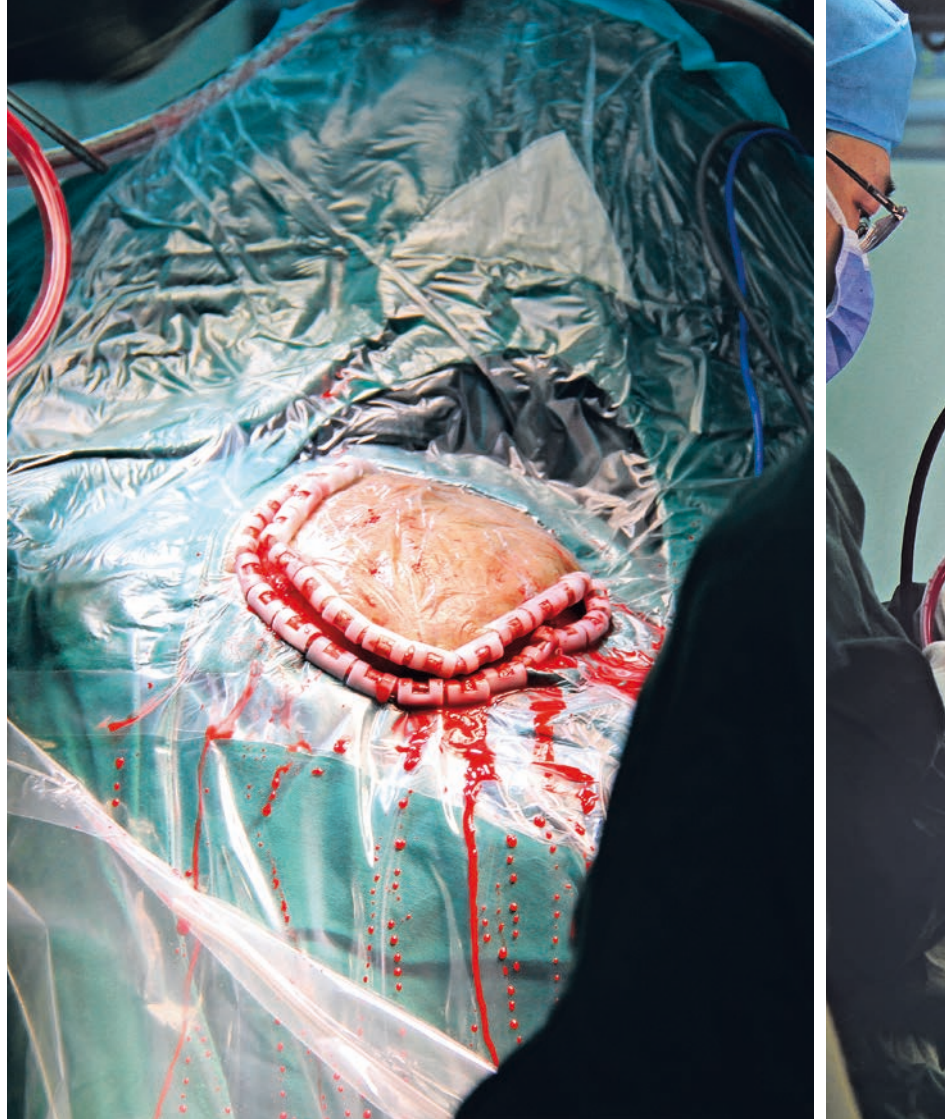
The patient was carefully repositioned for open surgery and the patient's head placed in a DORO radiolucent headrest system.





Tumor removal

A U-shaped incision was made to expose the skull. The burr hole trepanations were drilled to give surgical access to the tumor, and the craniotomy was performed. With the guidance of the intraoperative microscope, dissections were made until exposure of the tumor was appropriate. The tumor was successfully removed.





3D angiography and syngo DynaCT

A post-procedural DSA and 3D *syngo* DynaCT was acquired by rotating the C-arm 200 degrees around the patient. The post-procedural 3D images provided detailed insight into the tumor removal. Combined with the 3D visualization of vascular anatomy, the surgical team could immediately assess the success of the hybrid approach that was later confirmed by the positive patient's clinical outcome.





Configuration of the hybrid operating room

The Second Artillery General Hospital of Chinese People's Liberation Army, Beijing, China

- Artis zeego with VC14
- OPMI PENTERO Infrared 800 PAL Microscope by Carl Zeiss
- Artis OR table with wide and narrow tabletops
- 30x40 detector
- syngo X Workplace
- syngo DynaCT package
- Maquet monitor boom, equipped with five 19" screens
- DORO radiolucent headrest system
- Anesthesia boom by Dräger
- Laminar airflow field





The Benefits

- Potential cost savings and potentially reduced length of stay due to one-stop-shop procedure; no second surgery, and no second anesthesia are necessary
- Clearer identification of tumor margins and easier tumor removal due to initial tumor embolization
- Reduction of intra-procedural bleeding due to initial embolization provides great assistance to neurosurgeons
- Increased patient safety by reducing intraoperative bleeding
- Faster treatment in the hybrid OR avoiding patient transfer from interventional suite to operating room
- Soft tissue image fusion by Artis zeego (with preoperative MRI and CT) for accurate planning of endovascular and surgical procedure
- Intraoperative 3D imaging for assurance of procedural success in the OR



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