

Clinical Experiences with the Hybrid Room

Endovascular and Surgical Treatment of a Temporal Hematoma

Courtesy of Yuichi Murayama, MD, Division of Endovascular Neurosurgery,
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Patient history

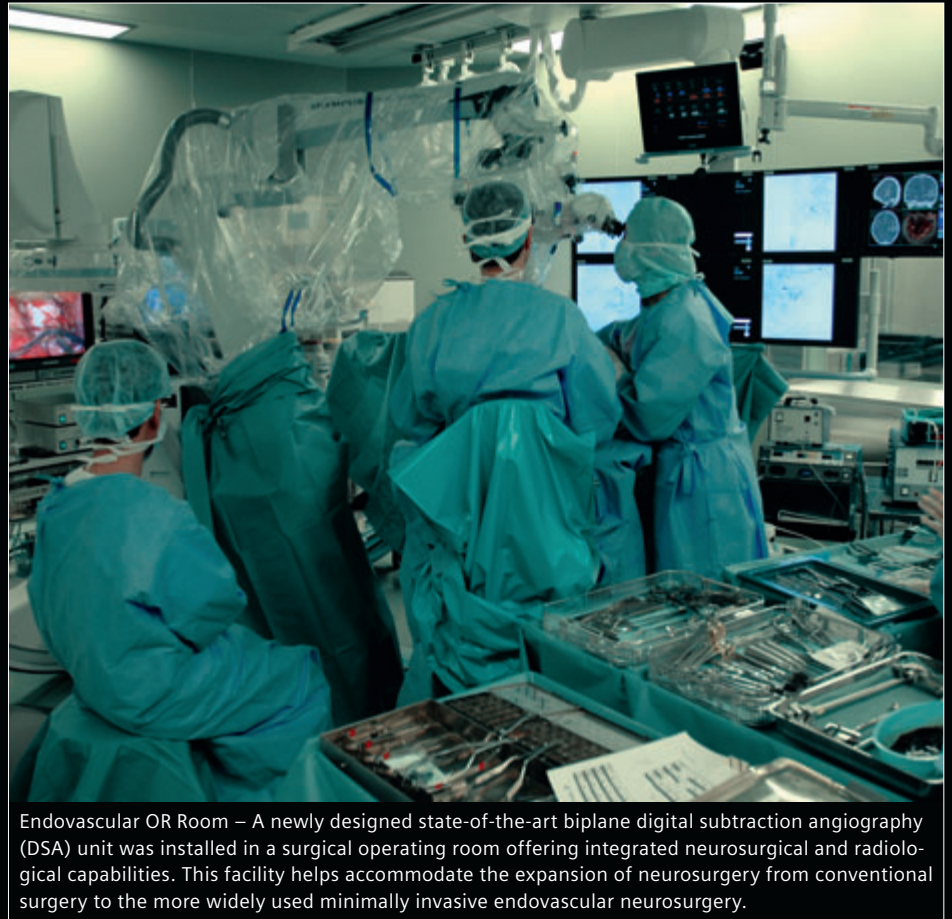
7-year-old male presented with right side weakness and aphasia.

Diagnosis

Brain CT scan demonstrated a left temporal hematoma [Fig. 1]. The patient was immediately transferred to an endovascular operative suite for diagnostic and therapeutic procedures.

Treatment

Endovascular treatment was performed. Cerebral angiography [Fig. 2] revealed a small left frontal arteriovenous malformation (AVM). The decision was made for emergency craniotomy without embolization. Additionally a preoperative *syngo* DynaCT run was performed [Fig. 3]. With *syngo* DynaCT imaging, the hematoma and AVM could be successfully removed in the endovascular OR room [Fig. 4 + 5]. The patient recovered without deficit.

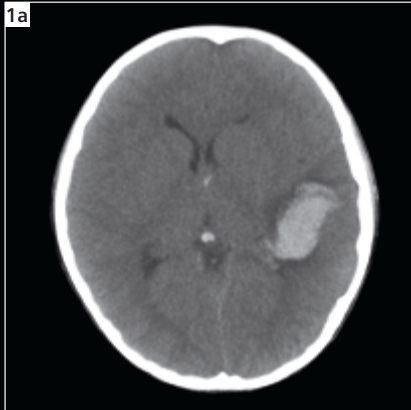


Endovascular OR Room – A newly designed state-of-the-art biplane digital subtraction angiography (DSA) unit was installed in a surgical operating room offering integrated neurosurgical and radiological capabilities. This facility helps accommodate the expansion of neurosurgery from conventional surgery to the more widely used minimally invasive endovascular neurosurgery.

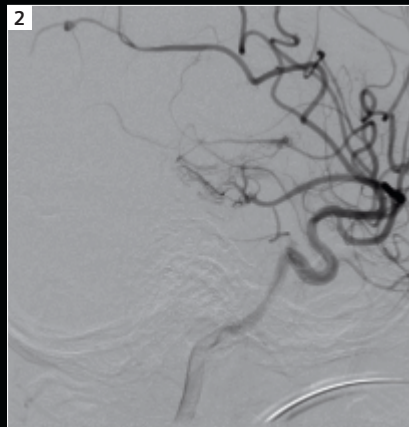
Comments

syngo DynaCT has the benefit of immediately creating CT-like images in the angiography suite without having to move the patient. This new imaging method enables real-time feedback during neurosurgery, enables bleeding to be observed during the procedure and can aid in diagnosing a critical state, as in the case described above. Prior to the introduction of this hybrid room, technical complications that occurred during a procedure would require patients to be transferred immediately to the operative suite from the an-

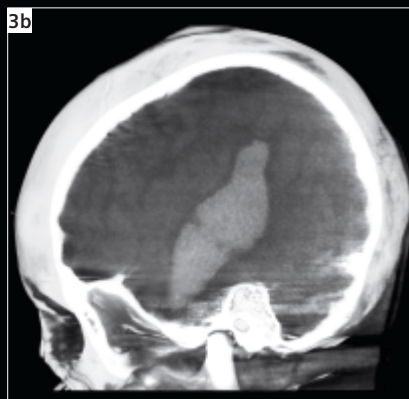
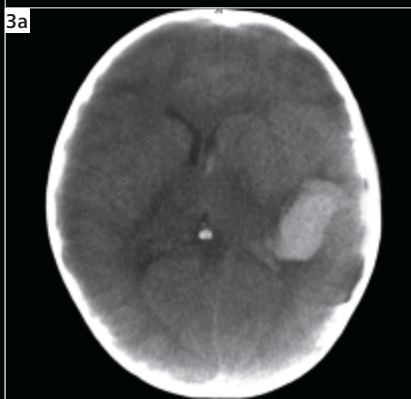
giography suite, increasing the risk of delayed emergency procedures and adverse clinical outcomes. With the new installation, the workflow is seamless and efficient: endovascular surgery, diagnosis, and open surgery are all performed in the same room without transferring the patient. Both endovascular and surgical capabilities are important to fully treat the spectrum of neurovascular disease. The newly designed endovascular OR room provides a resource for systemic neurosurgical practice.



1 [a+b] Pre-operative CT images clearly show the left temporal hematoma.



2 Pre-operative DSA images revealed the left frontal AVM.



3 [a+b] *syngo* DynaCT was performed additionally to the angiographic images.

4 *syngo* DynaCT

5 DSA images proved that the hematoma could be removed successfully.



Hybrid Solution Angio MR Miyabi

Diagnosis and Treatment of a Venous Malformation in the Right Foot

Courtesy of Prof. Joachim Kettenbach, MD, Prof. Johannes Lammer, MD, Allgemeines Krankenhaus (University Hospital), Vienna, Austria

Patient history

A 40-year-old female with local swelling and pain in the forefoot

Diagnosis

Widespread vascular venous malformation primarily at the first metatarsal and dorsomedial phalangeal forefoot. Dynamic contrast-enhanced 3D MR angiography showed a low-flow venous malformation with individual slow-pooling cavernous cavities. Fluoroscopy-guided sclerotherapy with simultaneous MRI monitoring is planned.

Treatment

Within 4-6 weeks three percutaneous sclerotherapy sessions were performed and treatment outcome was assessed using MRI before and after sclerotherapy.

Comments

After sclerotherapy there were no clinically relevant complications and the patient was discharged the day after intervention. Oral pain medication and local skin cooling reduced temporary local swelling of the treated tissue after administration of the sclerosant agent and will resolve within the first 24 hours.



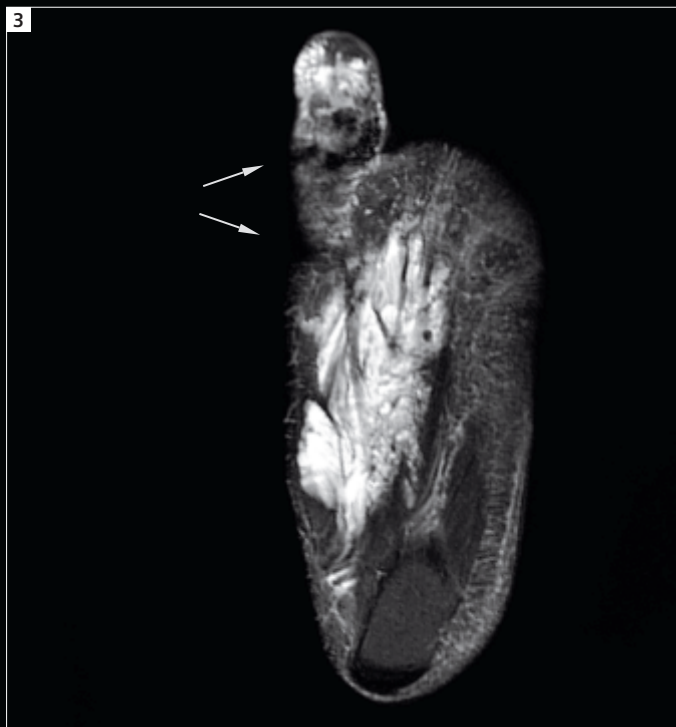
Prof. Kettenbach and his team with their Angio-MR MIYABI, Department of Cardiovascular and Interventional Radiology, Allgemeines Krankenhaus (AKH) in Vienna, Austria. Two years ago an Angio-MR MIYABI was installed. The system is used for the treatment of vascular malformations. These vascular malformations can be either treated by percutaneous sclerotherapy or by transarterial embolisation using a microcatheter. Vascular malformations are very well displayed at MRI, allowing classification, easy detection and to determine whether the vascular bed has been occluded, or only partially treated. Using fluoroscopy for real-time control of therapy and MRI for the excellent soft-tissue information is realized with the Angio-MR MIYABI.



1 MRI before sclerotherapy. The sagittal view shows both, spherical markers and the extensive venous vascular malformation at the forefoot and the phalangeal region. The spherical markers (arrow) attached to the patients skin were used to plan the best insertion site for the puncture needle.

2 Sclerotherapy: Puncture of the venous malformation at the right toe near the proximal first phalanx after applying a venous tourniquet at the lower right limb. A 21G butterfly needle was used to inject radiopaque contrast media, followed by the sclerosant into the dorsoplantar region.

3 MRI after sclerotherapy confirmed loss of the high-signal at the proximal phalanx, demonstrating a good distribution of the sclerosant within the malformation. After the third sclerotherapy treatment, local pain and swelling decreased significantly, however there are still further vascular malformations to be treated in the forefoot.



Hybrid Solution Angio MR Miyabi

Diagnosis and Treatment of a Venous Malformation on the Upper Lip

Courtesy of Prof. Johannes Lammer, MD, Harald Kubierna, MD
Allgemeines Krankenhaus (University Hospital), Vienna, Austria

Patient history

A 23-year-old female with local swelling of the upper lip, slowly increasing in size since the past years.

Diagnosis

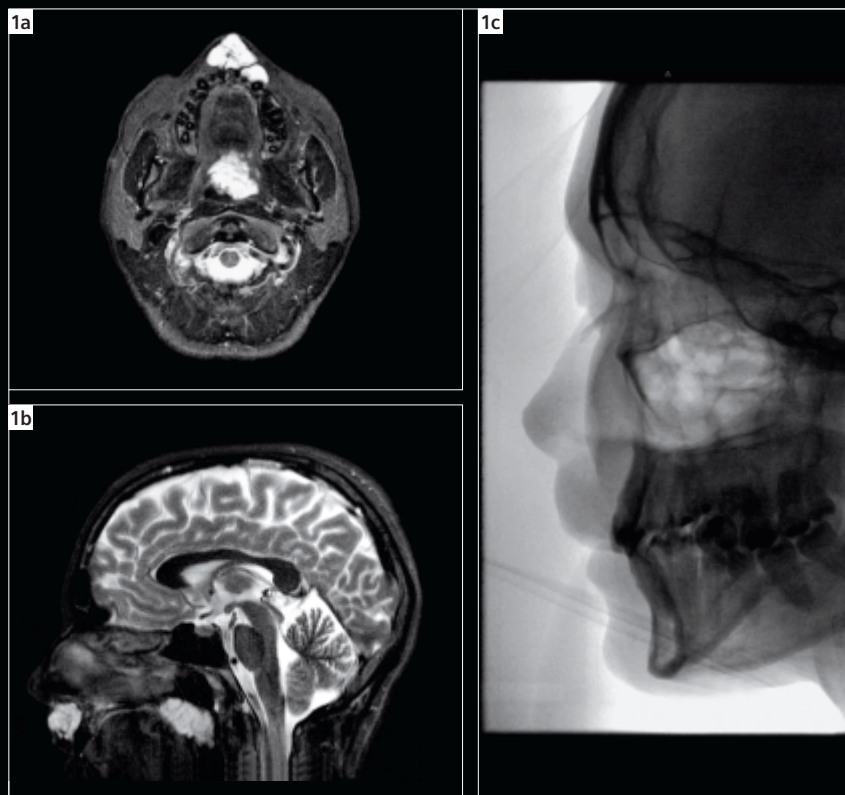
Clinical inspection, ultrasound and MRI confirmed a slow-flow (thus venous) vascular malformation of the upper lip. MRI also confirmed another vascular malformation on the roof of the mouth probably connected to the one on the upper lip. The patient would like cosmetic correction of the upper lip only. The malformation on the roof of the mouth is not causing any problems and the patient has therefore declined treatment of that area for the time being.

Treatment

Three fluoroscopic-guided percutaneous sclerotherapy treatments were performed including pre- and post treatment follow-up MRI in a year's time.

Comments:

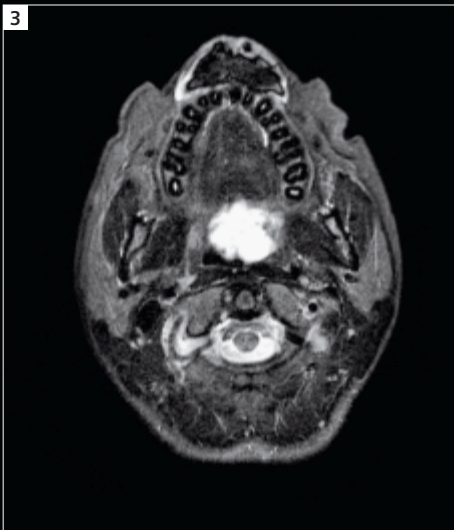
All interventions were performed without clinical relevant side effects or complications and the patient was released with no complaints.



1 [a+b] Axial (1a) and sagittal [Fig. 1b] MRI using a T2-STIR weighted sequence before sclerotherapy clearly depicts the vascular malformation at the upper lip. [c] Angiography before the second treatment. The local swelling of the upper lip can be seen on the lateral fluoroscopic view of the face and upper lip just before sclerotherapy.

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- 2** [a] Lateral fluoroscopy after sclerotherapy. After injection the local distribution of the sclerotic agent and the contrast media within the tubular malformation can be easily seen. [b] Lateral fluoroscopy during sclerotherapy. A butterfly-needle (21 Gauge) is inserted within the vascular malformation at the upper lip. After exclusion of a direct puncture of an artery, the sclerotherapeutic agent (ethoxysclerol 3%, 1 ml iodine contrast agent and 3 ml of room air, altogether mixed to create a sclerotherapeutic foam) was slowly injected into the malformation.
- 3** MRI post sclerotherapy. The treated area shows now a hypointense signal due to the sclerotic effects after injection within the vascular malformation.