



Collaboration Between Interventional Neurosurgery and Vascular Surgery in the Hybrid Operating Room

■ Henry G. Smeltzer, Jr., BS, RN, CCRN; Jacquelyn R. Scott, BSN, RN, CCRN; Stephanie A. Frey, RT(R)(CV); Betsy M. Stambaugh, RT(R); Brian J. Tancredi, RT(R); Neda Jafari, DO; and Nancy Harthun, MD

ABSTRACT: With the development of hybrid operating room (OR) capabilities and rapid advances in neuroendovascular surgical techniques, the list of options able to be offered to patients with cerebral vascular pathology has grown enormously. Despite advances in equipment and technique, many treatable anomalies remain inaccessible because of pathologic and age-related features in vessels that must be traversed to reach the cerebral vasculature. This case study illustrates how the hybrid OR environment enables collaboration between surgeons from complementary subspecialties that results in net benefit to this patient with aneurysmal subarachnoid hemorrhage and forbiddingly tortuous vasculature. (*J Radiol Nurs* 2014;33:127-131.)

KEYWORDS: Aneurysm; Aneurysmal subarachnoid hemorrhage; Neuroendovascular surgery; Hybrid operating room.

BACKGROUND

The incidence of aneurysmal subarachnoid hemorrhage (aSAH) varies widely when regional, cultural, genetic, behavioral, and case evaluation variables are taken into account. Female gender, hypertension, age more than 50 years, aneurysm size greater than 7 mm, significant life events within the last month, alcohol and tobacco use, illicit substance abuse (e.g., cocaine, methamphetamine), and a history of familial aneurysms are among the dominant factors. One quarter of patients with aSAH die, and roughly half of the remaining cohort are left with some re-

sidual neurologic deficit (Connolly et al., 2012). Evidence suggests that treatment of unruptured aneurysms is likely to be cost-effective and reduce morbidity and mortality. This case study highlights the utility of the hybrid operating room (OR) in facilitating collaboration between complimentary surgical specialties.

Traditional Open Clipping

Before the development of interventional neuroendovascular surgical techniques, treatment options for cerebrovascular aneurysms were limited to open craniotomy with surgical clipping. Although open craniotomy and surgical clipping are still considered the definitive treatment technique, neuroendovascular coiling of aneurysms offers a minimally invasive alternative, with an excellent clinical efficacy profile to patients who would otherwise be considered too high risk for open craniotomy.

The risks of open craniotomy include, but are not limited to, intracranial hemorrhage, stroke, infection, and death (Meyers et al., 2009). The patient's postoperative course is typically long and complex, requiring

Henry G. Smeltzer, Jr., BS, RN, CCRN, Jacquelyn R. Scott, BSN, RN, CCRN, Stephanie A. Frey, RT(R)(CV), Betsy M. Stambaugh, RT(R), Brian J. Tancredi, RT(R), Neda Jafari, DO, Nancy Harthun, MD, Wellspan York Hospital, 1001 South George Street, York, PA.

Corresponding author: Henry G. Smeltzer, Wellspan York Hospital, 1001 South George Street, York, PA 17405. E-mail: hsmeltzer@wellspan.org

1546-0843/\$36.00

Copyright © 2014 by the Association for Radiologic & Imaging Nursing.

<http://dx.doi.org/10.1016/j.radnu.2014.02.002>

intensive care unit (ICU) care for a period of several days to 2–3 weeks.

It has been demonstrated that older patients (age >70 years) are at greater risk for complications from the open craniotomy/surgical clipping approach versus the endovascular approach (Darsaut, Jack, Kerr & Raymond, 2013). Clinical exclusion criteria include age, comorbidities, to include cardiac and pulmonary issues that would make the risk of general anesthesia and open craniotomy unacceptable, and the location and type of aneurysm.

Coiling via the Intravascular Approach

The development of interventional neuroendovascular surgical techniques adds critical options to the armamentarium of neurosurgical interventions for treatment of cerebral aneurysm. The rate of change in development of techniques and instrumentation is rapid, requiring practitioners to constantly update their skills and innovate within the scope of their practice. The lower risk profile inherent in these new and developing techniques allows inclusion of patients with age and comorbidity-related restrictions who would have historically been excluded from consideration for treatment (Meyers et al., 2009).

Vascular access is most commonly obtained via the femoral artery but may also be obtained via brachial or radial arteries. A series of sheaths, catheters, and guidewires are then guided to the site of the aneurysm, where specifically designed detachable coiling wires are delivered to fill the aneurysmal sac and reestablish laminar blood flow. Stents are sometimes deployed within the vasculature, supplying the aneurysm to help the deployed coils to be retained within the aneurysmal sac in cases where the aneurysmal neck is not well defined. Correct interpretation of real-time images intraoperatively is essential in choosing the most appropriate treatment option. A neurosurgeon with neuroradiology fellowship preparation obviates the need for intraoperative radiologist input.

The risks of endovascular approach also include intracranial hemorrhage, stroke, infection and death, and the potential for formation of a pseudoaneurysm at the vascular access site. Although many of the risks are the same, their incidence is significantly reduced with the endovascular approach. Postoperative course is also significantly shorter and less complicated, benefiting both the patient and the system as a whole.

CASE DESCRIPTION

Presentation

The patient is an 87-year-old man. His presenting symptoms included severe occipital headache and neck pain. His comorbidities included previous cerebral

aneurysm that had been successfully clipped in the remote past, coronary artery disease with previous bypass grafting, thoracic and abdominal aortic aneurysms, and hypertension. History of licit or illicit substance use was denied. Issues complicating and ultimately prohibiting the standard peripheral endovascular approach in this patient included tortuosity, stenosis, and atherosclerotic disease.

Specifically, complicating the patient's treatment via a standard interventional neuroendovascular approach was a severe stenosis of the takeoff of the left vertebral artery supplying the aneurysmal territory. This stenosis precluded access to the aneurysm via a peripheral vascular approach as the caliber of the stenosed vessel was too narrow to allow cannulation with currently available catheters. The neurosurgeon consulted with several colleagues of complimentary disciplines who recommended an open approach to cannulating the left vertebral artery directly. After consideration of their recommendations, the neurosurgeon consulted with an attending vascular surgeon and decided to approach the aneurysm from just beyond the stenosed region, the proximal V2 segment, of the left vertebral artery by having the vascular surgeon directly expose the vertebral artery for direct cannulation as the artery was noted to be widely patent after the stenosed takeoff area.

This treatment approach took advantage of the flexibility inherent in the hybrid OR. This fully integrated neurovascular hybrid room provides surgical sterility combined with flat-panel vascular imaging, biplanar three-dimensional imaging capabilities, post-processing, and image storing capabilities. Endovascular and open surgical repairs benefit equally from this dual capacity working environment (Hudorovic, Rogan, Lovricević, Zovak, & Schmidt, 2010). This environment provides enhanced safety and economy for the patient. In the event an open procedure is required, the risk and time element inherent in transferring the patient to another suite is removed.

Procedure

After induction of general anesthesia, the vascular surgeon set to work exposing the left vertebral artery. A longitudinal incision was made at the anterior border of the sternocleidomastoid muscle. Dissection was carried down past the internal jugular vein and common carotid artery. The vertebral artery was identified just lateral to a vertebral body. As it most commonly arises from the left subclavian artery, shortly after the subclavian artery's origin from the aortic arch, accessing the left vertebral artery required deep dissection of the cervicothoracic region (see Figures 1–3).

Download English Version:

<https://daneshyari.com/en/article/2667989>

Download Persian Version:

<https://daneshyari.com/article/2667989>

[Daneshyari.com](https://daneshyari.com)