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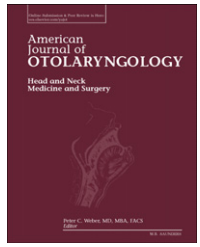

Successful endovascular management of venous sinus thrombosis complicating trans-labyrinthine removal of vestibular schwanomma☆,☆☆,★

Nauman F. Manzoor, MD[a], *Abhishek Ray, MD*[b], *Justin Singer, MD*[b], *Ryan Nord, MD*[a], *Jeffrey Sunshine, MD*[c], *Cliff A. Megerian, MD*[a], *Nicholas C. Bambakidis, MD*[b], *Maroun T. Semaan, MD*[a,*]

[a] *Ear, Nose and Throat Institute, University Hospitals Case Medical Center, Cleveland, OH*
[b] *Department of Neurosurgery, Neurological Institute, University Hospitals Case Medical Center, Cleveland, OH*
[c] *Department of Neuroradiology, University Hospitals Case Medical Center, Cleveland, OH*

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ABSTRACT

Cerebral venous sinus thrombosis (CVST) is a rare complication of surgical treatment of vestibular schwanomma. We present a rare case of extensive venous sinus thrombosis after trans-labyrinthine approach that was refractory to systemic anti-coagulation. Mechanical aspiration thrombectomy was utilized to re-canalize the venous sinuses and resulted in successful resolution of neurological symptoms. Indications of utilizing endovascular approaches are discussed that will enable skull base surgeons to address this uncommon yet potentially fatal complication.

1. Introduction

CVST (cerebral venous sinus thrombosis) is an infrequent yet serious complication of CPA (cerebellopontine angle) surgery [1]. Venous hypertension and eventual development of increased ICP (intra-cranial pressure) depend on the degree of thrombosis, laterality of dominant sinus as well as collateral venous drainage. Venous outflow obstruction and increase in ICP lead to development of severe headache, visual symptoms and papilledema [2]. In severe cases, more devastating complications such as intracranial hemorrhage and venous infarction can develop as well [3]. The incidence of sigmoid and/or transverse sinus thrombosis complicating translabyrinthine or retrosigmoid approach for CPA tumors is reported as 4.6–11.6% [1,4]. Diagnosis is confirmed with use of MR (magnetic resonance) venography, CT (computed tomography) venography and DSA (digital subtraction angiography). Once diagnosed, treatment options depend on neurological symptoms and extent of thrombosis. Systemic therapeutic anticoagulation should be started immediately [5]. Adjunctive maneuvers including CSF

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* *Corresponding author at:* Otology, Neurotology and Balance Disorders, Ear Nose and Throat Institute, University Hospitals Case Medical Center, Cleveland, OH 44106. Tel.: +1 216 844 8013.
E-mail address: maroun.semaan@uhhospitals.org (M.T. Semaan).

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(cerebral spinal fluid) diversion should be employed when there is evidence of increased intracranial pressure. In cases of acute neurological compromise, additional endovascular approaches including chemical or mechanical thrombectomy can be employed as well [6]. Previous reports of CVST complicating CPA surgery have focused on use of systemic anticoagulation in asymptomatic cases [1] whereas symptomatic cases were managed with drainage of CSF, including ventriculo-peritoneal drain placement [4].

We describe a case of unusually extensive venous sinus thrombosis complicating translabyrinthine removal of vestibular schwanomma with involvement of sigmoid, transverse and superior sagittal sinuses that was successfully managed with endovascular approach utilizing mechanical thrombectomy with the Penumbra aspiration thrombectomy system (Penumbra, Alameda, CA). This is the first reported case of successful use of state of the art mechanical thrombectomy approach leading to resolution of extensive CVST complicating a lateral skull base procedure.

2. Case description

A 21-year-old female underwent right trans-labyrinthine craniotomy for resection of vestibular schwanomma (Fig. 1A). Immediate post-operative course was unremarkable and post-

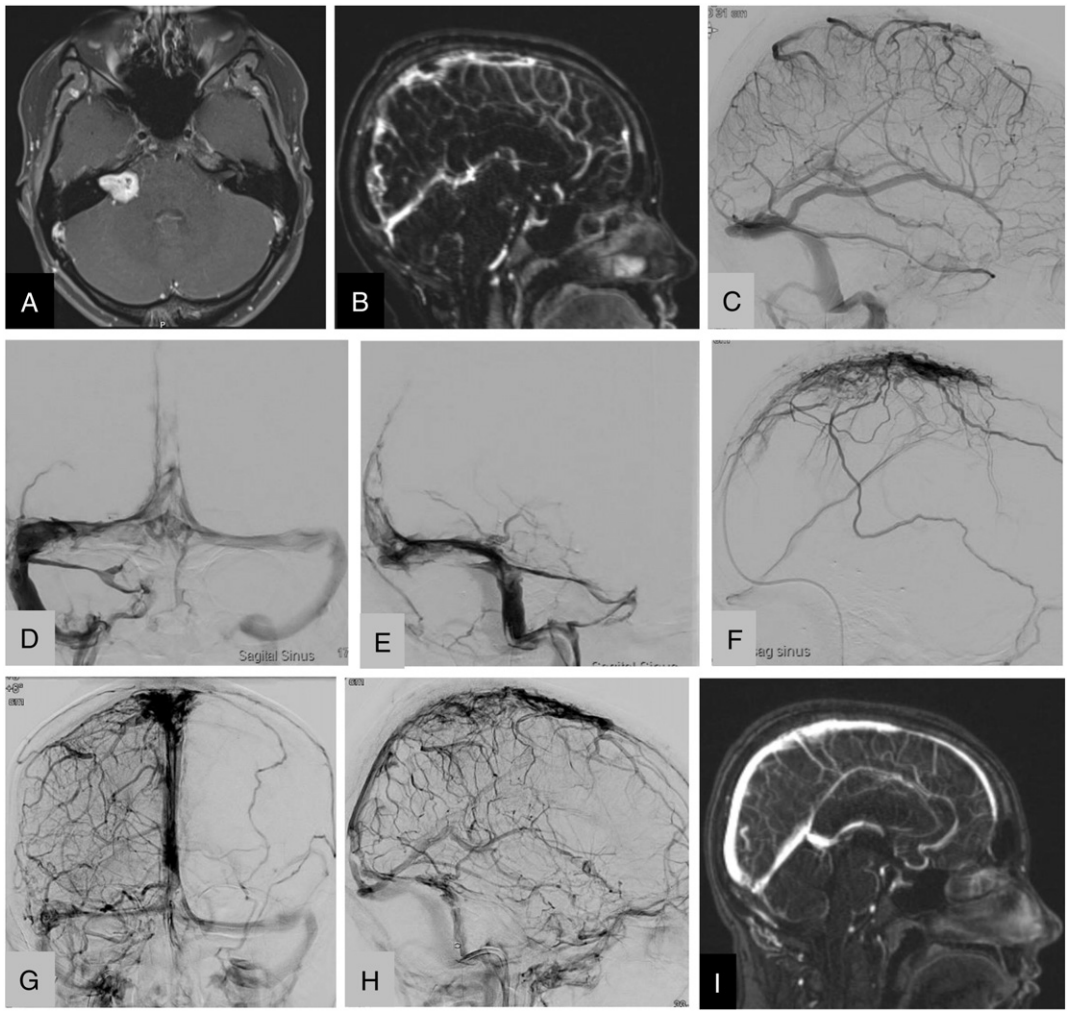

Fig. 1 – Magnetic resonance imaging (MRI) with gadolinium axial sequence (A) shows a 2 cm contrast-enhancing mass arising from the right internal auditory canal, consistent with a vestibular schwanomma. Magnetic resonance venography (MRV) with gadolinium sagittal sequence (B) and venous phase right internal carotid angiography (C) show occlusion of the superior sagittal sinus. Venous phase posteroanterior (PA) (D) and lateral (E) right common carotid artery (CCA) angiogram after two attempts at mechanical thrombectomy with the 5 Max Reperfusion catheter (Penumbra, Alameda, CA) shows partial recanalization of the posterior superior sagittal sinus, the right transverse, and right sigmoid sinuses. Interval superior sagittal sinus microinjections lateral view (F) shows opacification of venous channels surrounding a large flow void in the expected area of the superior sagittal sinus, which drain into smaller cortical veins. After 3 thrombectomy passes with the 5 Max catheter, PA (G) and lateral (H) venous phase right CCA angiogram shows significantly improved flow in the superior sagittal, right transverse, and right sigmoid sinuses with residual areas of non-flow limiting thrombus. Two-week follow-up MRV sagittal sequence (I) shows a patent superior sagittal sinus.