Spontaneous Spinal Subarachnoid Hemorrhage: Presentation and Outcome

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Background: Spontaneous spinal subarachnoid hemorrhage (SSAH) is a rare but serious condition that can lead to a variety of medical complications. *Methods:* Using the Mayo Clinic Rochester database, consecutive patients admitted to the Mayo Clinic Rochester, Minnesota hospital with spontaneous SSAH (not iatrogenic or traumatic) between January 2000 and December 2015 were retrospectively reviewed. Demographic and clinical data and functional outcomes as categorized by the modified Rankin Scale (mRS) score at the time of discharge and at postadmission follow-up were assessed. *Results:* Eight patients (median age 70 years, range 51-87) were identified. Seven patients presented with acute back pain or headache. Seven patients had poorly controlled chronic hypertension. Two patients had vasculitis and 1 had an arteriovenous malformation. Complications included cord compression (n = 4), hyponatremia (n = 5), sulcal subarachnoid hemorrhage (n = 2), chronic arachnoiditis (n = 1), vasospasm (n = 1), ischemic infarct (n = 1), and late cord ischemia (n = 1). All patients were managed medically including blood pressure control and repeat imaging. One patient had an aneurysm, which was embolized, and 2 received steroids for vasculitis. One patient died during hospitalization and 1 died within a week of discharge. Five patients had improved and 1 had unchanged mRS score at posthospitalization follow-up. *Conclusions:* SSAH should be considered in patients with sudden onset of severe back pain and headache, especially if as associated with lower extremity weakness or urinary retention. Our findings suggest that older patients with poorly controlled hypertension are at particular risk for spontaneous SSAH. In our study vascular anomalies were found in 25% of patients, vasculitis in 25%, hyponatremia in 63%, and cord compression in 50%. Cord compression may be managed conservatively. Mortality was 25% in the 3 months following the initial event, primarily due to other medical comorbidities.

Key Words: Subarachnoid—Hemorrhage—Spinal—Spontaneous—Bleed—Cord

Introduction

Spontaneous spinal subarachnoid hemorrhage (SSAH) is a rare but serious disease that accounts for less than 1% of all cases of subarachnoid hemorrhage. Conditions associated with spontaneous SSAH include hypertension, cavernous angioma, arteriovenous malformation (AVM), vasculitis, spinal artery aneurysm, blood dyscrasias, collagen vascular disease, coarctation of the aorta, and malignancy.[1–7] Common presenting symptoms include back pain and headache, though it can also present with myelopathy, radiculopathies, or sensory abnormalities. A high index of suspicion for spontaneous SSAH is helpful when evaluating patients with sudden onset of severe back pain, as early diagnosis may lead to better outcomes. Multiple imaging modalities may be helpful, as well as laboratory studies and lumbar puncture. Yet, available literature to this point has been primarily limited to single

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Received May 8, 2018; revision received June 1, 2018; accepted June 5, 2018.

Author contributions: Dr. Yost—Study concept and design, data collection, analysis and interpretation, Dr. Rabinstein—Critical revision, study supervision.

Disclosures: Dr. Yost reports no disclosures, Dr. Rabinstein reports no disclosures.

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1052-3057/$ - see front matter

https://doi.org/10.1016/j.jstrokecerebrovasdis.2018.06.005

case reports. Hereby, we describe a series of consecutive patients with SSAH to improve our understanding of its clinical presentation and outcomes.

Methods

Patients were identified from the electronic medical record database at the Mayo Clinic in Rochester, Minnesota. The Advanced Cohort Explorer tool was used to look for diagnosis of ''spinal'' with ''subarachnoid'', and ''spinal'' with "SAH" from January 2000 to December 2015, including only patients who had received imaging of the spine to further narrow the results. Inclusion criteria were spinal subarachnoid blood products due to hemorrhage into the spinal subarachnoid space not due to (1) redistribution of blood from intracranial subarachnoid hemorrhage, (2) trauma, (3) medical procedures, or (4) predominant hematomyelia who experienced symptoms and received treatment at our facility. We extracted information on demographics, comorbidities, clinical presentation, radiological findings, treatment, outcome, and neurologic sequelae from the medical records. Functional status was assessed upon discharge and last follow-up within the subsequent 6 months using the modified Rankin scale. The study protocol was approved by the Mayo Clinic Institutional Review Board.

Results

Subjects

Thirty-three patients were identified using our search criteria. Twenty-five patients were excluded for: (1) hemorrhage associated with trauma or medical procedure (N = 6), (2) spinal subarachnoid blood due to redistribution of intracranial subarachnoid blood (N = 11), (3) majority of workup done at an outside hospital and transferred to our facility late in the course, not requiring additional workup or treatment (N = 8). Eight patients (5 female and 3 male, median age 70 years, range 51-87) fulfilled the study criteria (Table 1) (Figs 1 and 2).

Causes and Risk Factors

Seven of the 8 patients (Table 1) had a previous diagnosis of hypertension, which was poorly controlled in most cases. Five of those 7 had documented labile blood pressure. In each case the hypertension was treated during hospitalization, in most cases with various intravenous medications initially. In addition to hypertension, several other patients had known risk factors for spontaneous SSAH. Two patients had vasculitis, 3 had elevated INRs, 1 had a 4-mm intercostal artery aneurysm, and 1 (patient 4) had an AVM.

Clinical Presentation and Hospital Course

The most common presenting signs and symptoms included back pain (n = 6), headache (n = 5), and lower extremity weakness (n = 4). Two patients had urinary retention during hospitalization, which had improved by the time of follow-up.

MRI imaging in all cases revealed spinal subarachnoid blood products anywhere from C6-L2. Two patients were also found to have sulcal subarachnoid blood on brain imaging, possibly due to redistribution of spinal blood products. Six patients had catheter spinal angiograms, 1 showing a intercostal artery aneurysm, 1 showing beading consistent with vasculitis, and 4 without appreciable abnormalities. Two patients had cerebral angiograms and both were normal. Four patients had cerebrospinal fluid analysis, which showed elevated protein concentration elevated red blood cells in all cases and xanthochromia in the 2 cases in which the fluid was centrifuged.

Four of the 8 patients experienced symptomatic cord compression with varying levels of recovery. One patient had a right-sided parieto-occipital infarct, which was suspected to be due to extreme fluctuations in blood pressure, and 1 experienced transient aphasia, which was attributed to vasospasm without evidence of intracranial SAH. On follow-up, 1 patient was discovered to have MRI findings of late cord ischemia, which was asymptomatic, and 1 patient developed chronic arachnoiditis.

Five of the 8 patients experienced hyponatremia during hospitalization with a median value of 125 meq/L. All of these patients were treated with free water restriction and 1 patient received 1.5% sodium chloride solution; in all cases the hyponatremia improved after free water restriction, and there was no documented increase in urine output, suggesting SIADH as the likely mechanism. One patient had an embolization of a 4-mm aneurysm at the T1 level, which was fed by the left supreme intercostal artery, and 1 patient had an AVM, which resolved spontaneously. The 2 patients with vasculitis were treated with steroids. All patients with cord compression were managed conservatively (ie none underwent surgical decompression).

Outcome

Seven of the 8 patients were previously independent in all activities of daily living, with the 1 remaining patient living in a nursing facility prior to hospitalization. Four patients were discharged to either an acute rehabilitation facility or skilled nursing facility, 3 patients were discharged home, and 1 patient died in the hospital. One patient died within days of discharge to a skilled nursing facility due to medical comorbidities. Five of the remaining 6 patients experienced functional recovery of at least 1 point on the modified Rankin Scale (median follow-up: 3 months). One patient had an unchanged modified Rankin Scale of only 1 on hospital discharge and follow-up.

Discussion

The most common apparent risk factor for spontaneous SSAH among the 8 patients in our study was hypertension.