



# Intracranial Hemorrhage In a Patient with a Stenosed AV Fistula

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## Introduction

Intracranial hemorrhage in association with a hemodialysis fistula and central venous stenosis is an exceedingly rare event. We present a case of intracranial hemorrhage and unexpected findings at cerebral angiography. Perhaps this association might be more frequent than previously thought.

## Case

A 59 year old woman on chronic hemodialysis via a left arm AV fistula presented with headache and altered mental status. Non contrast head CT demonstrated a subarachnoid hemorrhage frontal area fig 1a. DWI MR showed no cerebral infarct, fig. 1b.

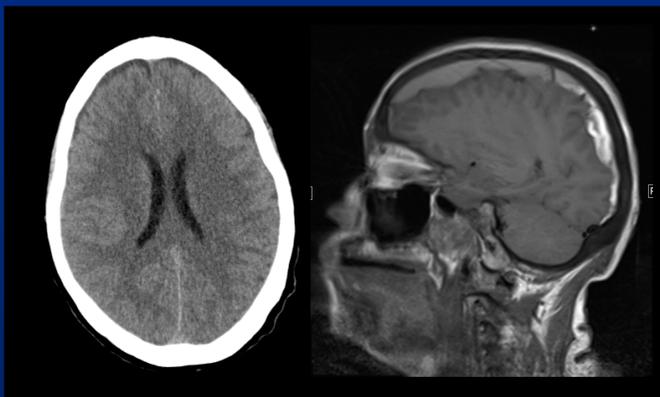


Fig.1a non-contrast head CT and 1b DWI showing SAH (black arrows) without cerebral infarction

Cerebral angiography was performed to evaluate for treatable intracranial pathology. Late filling of the right and left internal jugular vein is seen in fig. 2.

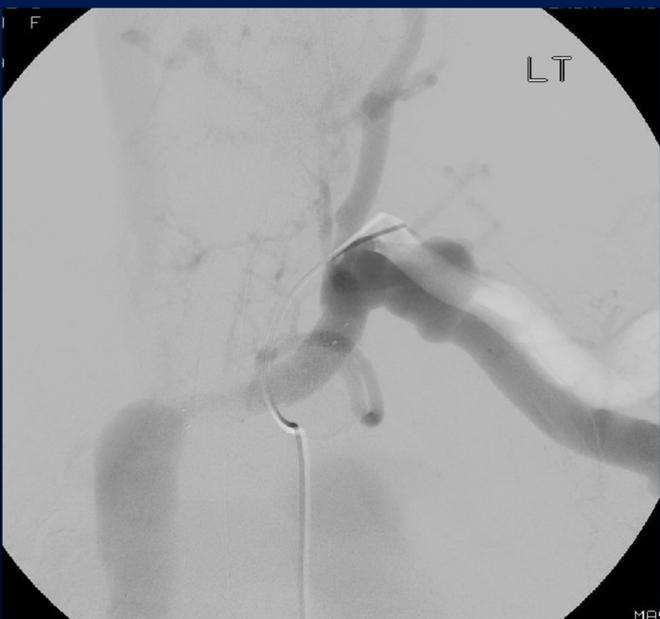


Fig. 2. Subclavian angiogram showing retrograde filling of the left jugular system and delayed ante grade flow in the right jugular system. The brachiocephalic vein has a high grade stenosis.

Lateral projection shows retrograde filling of the sigmoid and transverse sinuses, fig 3. Patient was referred to Interventional Radiology for further evaluation and management of this high grade stenosis.



Fig. 3. Lateral projection showing retrograde filling of the sigmoid and transverse sinuses after left subclavian arteriogram.

## Methods

The earlier images were reviewed and the fistula was accessed near the arterial anastomosis. Fistulogram revealed a patent AV-fistula in the left arm and an enlarged axillary subclavian segment with enlarged left internal jugular venous system. In stent stenosis was again evident near the SVC junction, fig4.



Fig. 4. Left arm fistulogram illustrating in stent venous stenosis near the SVC confluence.

High pressure balloon angioplasty was performed over an 035 wire using a 4cm x 12 mm and 4cm x 14 mm high pressure balloon with good resolution of the in stent stenosis, fig 5

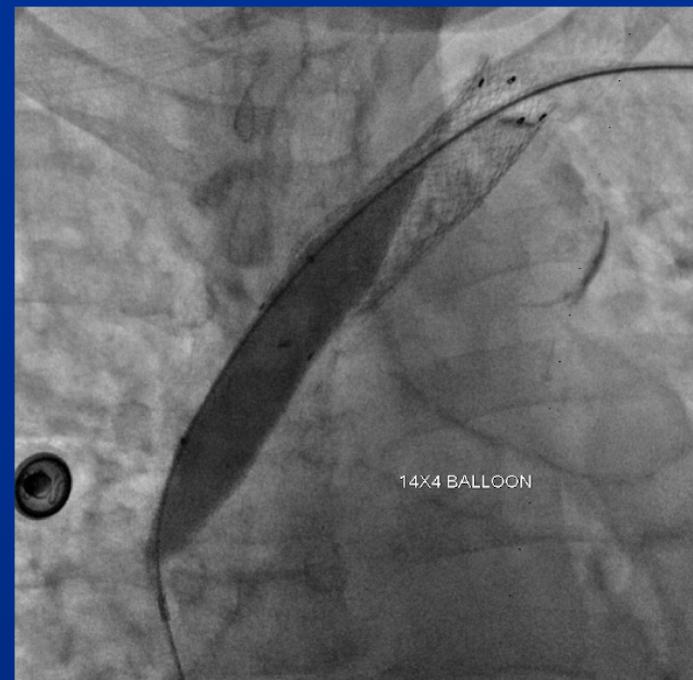


Fig. 5. In stent venous stenosis successfully treated with balloon angioplasty.

## Result

Flow through the stent was significantly improved. There was no retrograde filling of the cerebral circulation. Subsequently the patient had a right frontal craniotomy and evacuation of the hematoma. Her condition improved but has had several subsequent interventions for restenosis.

## Discussion

Central venous stenosis occur in about 30 % of patients on hemodialysis. Irrespective of the treatment modality , angioplasty or stenting, recurrence is the rule<sup>1</sup>. A recent search of the PubMed database in 2015 returned over 29,000 articles on intracranial hemorrhage and only one associated with AV fistula and central venous stenosis<sup>2</sup>. Seldom if ever, would one consider the association of brachiocephalic venous stenosis and intracranial venous hypertension or bleeding.

## Conclusion

When central stenosis is identified in patients with AV fistulas no further attention is usually paid to the collateral pathways. However in the setting of intracranial hemorrhage, imaging of any retrograde cervical venous flow should be entertained

## References

1. Bakken AM, Protack CD, Saad WE et al. Long-term Outcomes of primary angioplasty and primary stenting of central venous stenosis in hemodialysis patients. J Vasc Surg. 2007 Apr;45(4):776-83
2. Herzig DW, Stemer AB, Bell RS, et al. Neurologic sequelae from brachiocephalic vein stenosis. J Neurosurg. 2013 May;118(5) 1058-62.