Unusual association of diseases/symptoms

Superior vena cava syndrome caused by embolisation of liquid Onyx

Robbert Crusio, Kishan Ramachandran, Kavan Ramachandran, Yizhak Kupfer, Sidney Tessler

Department of Medicine, Division of Pulmonary & Critical Care Medicine, Maimonides Medical Center, Brooklyn, New York, USA

Correspondence to Sidney Tessler, stessler@maimonidesmed.org**Summary**

Superior vena cava syndrome (SVCS) is usually caused by a malignancy or the presence of an intravascular device in a central vein. A 74-year-old male with a history of a superior vena cava (SVC) stent underwent embolisation of a brain arterio-venous malformation through the right meningeal artery with liquid Onyx. Two weeks later he presented with acute respiratory failure, upper airway obstruction, plethora, varices of the chest wall and stridor. He was intubated and placed on mechanical ventilatory support. Chest imaging revealed a linear structure in the SVC, extending to the right atrium. Interventional radiology removed the material, which was determined to be liquid Onyx. Venous pressures of the right internal jugular vein decreased after removal of the material. The symptoms resolved and patient was successfully extubated. This is the first reported case of SVCS caused by liquid Onyx.

BACKGROUND

Endovascular therapy plays an important role in the treatment of brain arterio-venous malformations (BAVM). Liquid embolisation material has been used to obliterate high grade BAVMs, or to decrease size and flow in conjunction with surgery and radiosurgery.¹⁻³ Recently, ethylene

vinyl alcohol copolymer (Onyx - EV3, Irvine, California, USA) became available and is popular for its ease of use and relatively low complication rates.⁴⁻⁶ We report a case in which Onyx use was complicated by a superior vena cava syndrome (SVCS).

Figure 1 Chest radiograph showing a linear structure (arrow heads) starting at the superior vena cava stent (arrow), extending well into the right atrium.

Figure 2 Coronal view from a preop chest CT-scan. Linear structure (arrow heads) attached to the SVC stent (arrow) extending into the right atrium.

CASE PRESENTATION

A 74-year-old man presented to our hospital for treatment of a symptomatic dural arterio-venous malformation (AVM) at the right posterior fossa. He had episodes of altered mental status, headaches, dizziness and seizures which led to the diagnosis of the BAVM. His past medical history was significant for multiple myeloma for which he was treated with radiation therapy and chemotherapy. He was in remission for 4 years. He had a right brachiocephalic and vena cava stent placed for venous stenosis caused by a chemoport. The chemoport was no longer in situ.

TREATMENT

The patient was treated with selective embolisation of the AVM through the right middle meningeal artery with liquid Onyx. Venous flow was significantly decreased post-procedure. The procedure was complicated by a small subarachnoid hemorrhage. The patient was asymptomatic; no further complications occurred and he was discharged with an appointment for repeat embolisation of the BAVM.

OUTCOME AND FOLLOW-UP

Two weeks later, the patient was admitted to our hospital for respiratory failure secondary to upper airway obstruction. There was audible stridor and during intubation, vocal cord oedema was noted. Physical examination was significant for bilateral upper extremity non-pitting oedema, plethora of the face and varices on the upper chest wall. No other abnormalities were noted on physical examination.

Chest radiography revealed a linear structure extending from the superior vena cava stent into the right atrium (figure 1). A CT of the chest confirmed the linear structure starting from the stent extending into the right atrium (figure 2). The patient successfully underwent interventional radiology-guided removal of the material via a femoral vein approach. Pathological evaluation determined that the material was liquid Onyx. The patient was found to have significant in-stent stenosis. The venous pressure of the right internal jugular vein was 33 mm Hg, compared to 15 mm Hg of the femoral vein. After angioplasty of the stent and removal of the Onyx material, the right internal

jugular venous pressure decreased to 22 mm Hg. The upper extremity oedema and facial swelling improved and the patient was extubated. Laryngoscopy revealed resolution of the vocal cord oedema. The patient was discharged with no further complications.

DISCUSSION

SVCS results from obstruction of the superior vena cava causing severe reduction of venous flow from the head, neck and upper extremities. Malignancies and intravascular devices account for the great majority of SVCS cases. Patients present with swelling of the face and neck, dyspnoea and cough. Laryngeal oedema reflects more severe disease. This patient had a history of central venous stenosis caused by an intravascular chemoport that was treated by removal of the device and stenting of the brachiocephalic superior vena cava. This is the first case, to our knowledge, of SVCS caused by Onyx.

Onyx is increasingly popular due to its ease of use. It is available in three formulations depending upon its viscosity. Onyx 18 and 20 are generally used for embolisation of a plexiform nidus, and Onyx 34 is used for embolisation of large AVMs.⁶ Its ease of use is related to its availability, its slower polymerisation and its being less adhesive. The overall complication rate of Onyx ranges from 6.9% to 16.5%. Commonly reported complications include vessel perforation, haemorrhage, stroke and catheter attachment to the AVM.^{1 4 7} We hypothesise that the pre-existing venous stents were a nidus for Onyx attachments and development of an acute obstruction with resultant clinical manifestations of SVCS. Prompt recognition of the SVCS and removal of the Onyx rapidly restored venous flow and led to a good clinical outcome.

In conclusion, we report a case of Onyx induced superior vena cava obstruction and SVCS. Removal of the Onyx relieved the obstruction and the SVCS resolved.

Learning points

- Liquid Onyx is increasingly used in the treatment of brain AV malformation.
- Migration of Onyx material can occur after embolisation of brain AV malformations.
- SVCS can result from migration of Onyx material. Removal of the material causes resolution of the SVCS.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Henkes H**, Nahser HC, Berg-Dammer E, *et al*. Endovascular therapy of brain AVMs prior to radiosurgery. *Neurol Res* 1998;**20**:479–92.
2. **Gobin YP**, Laurent A, Merienne L, *et al*. Treatment of brain arteriovenous malformations by embolization and radiosurgery. *J Neurosurg* 1996;**85**:19–28.
3. **Spetzler RF**, Martin NA, Carter LP, *et al*. Surgical management of large AVM's by staged embolization and operative excision. *J Neurosurg* 1987;**67**:17–28.
4. **Jahan R**, Murayama Y, Gobin YP, *et al*. Embolization of arteriovenous malformations with Onyx: clinicopathological experience in 23 patients. *Neurosurgery* 2001;**48**:984–95.
5. **Pierot L**, Januel AC, Herbreteau D, *et al*. Endovascular treatment of brain arteriovenous malformations using onyx: preliminary results of a prospective multicenter study. *Interv Neuroradiol* 2005;**11**(Suppl 1):159–64.
6. **van Rooij WJ**, Sluzewski M, Beute GN. Brain AVM embolization with Onyx. *AJNR Am J Neuroradiol* 2007;**28**:172–7.
7. **Heidenreich JO**, Hartlieb S, Stendel R, *et al*. Bleeding complications after endovascular therapy of cerebral arteriovenous malformations. *AJNR Am J Neuroradiol* 2006;**27**:313–16.

This pdf has been created automatically from the final edited text and images.

Copyright 2011 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit

<http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Crusio R, Ramachandran K, Ramachandran K, Kupfer Y, Tessler S. Superior vena cava syndrome caused by embolisation of liquid Onyx. *BMJ Case Reports* 2011; 10.1136/bcr.11.2010.3502, date of publication

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow