CASE REPORT

Use of transoesophageal echocardiography in endovascular stenting for superior vena cava syndrome

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SUMMARY

Endovascular stenting is a recommended primary treatment for superior vena cava syndrome in patients with tumours. We describe a case where the vena cava stenosis was located 1 cm above the cavoatrial junction. In order to avoid malpositioning of the stent and its potential complications, such as arrhythmia or cardiac tamponade, transoesophageal echocardiography was used for guidance during the stent deployment.

BACKGROUND

Endovascular stenting is the standard treatment for malignant superior vena cava syndrome (SVCS), as it provides immediate improvement in symptoms and does not interfere with subsequent management.^{1–3} When the stenosis is close to cavoatrial junction, there are risks of arrhythmia and cardiac tamponade following stent deployment.^{4–6} In order to minimise these risks and identify immediate complications such as venous wall rupture, we used transoesophageal echocardiography for guidance during the procedure.

CASE PRESENTATION

A previously asymptomatic 31-year-old man was admitted with acute chest pain, dyspnoea, profuse sweating and central cyanosis. Blood pressure was 70×45 mm Hg and heart rate 110 bpm. Cardiac auscultation demonstrated rhythmic and normophonic heartbeats, without murmurs. Troponin levels were slightly increased, 0.54 ng/mL (normal range 0.00–0.03) and creatine kinase-MB levels were within normal range. ECG showed normal sinus rhythm and echocardiogram demonstrated a

mediastinal mass in close contact with the right atrium and a large pericardial effusion. Cardiac tamponade was diagnosed and the patient underwent pericardial drainage, with improvement of symptoms.

INVESTIGATIONS

A CT was performed for aetiological investigation and demonstrated a heterogeneous anterior mediastinal mass, measuring 11×09×11 cm, in close contact with ascending aorta, right atrium and SVC (figure 1). A CT-guided biopsy revealed mediastinal biphasic synovial sarcoma.

Within 5 days in the hospital, the patient developed head and neck oedema, venous plethora and dyspnoea, a feature consistent with SVCS. After being evaluated by the Interventional Radiology team, he was referred for endovascular treatment.

TREATMENT

Under general anaesthesia, superior cavography was performed from a right transjugular approach using a 10-F sheath and digital subtraction technique. The angiography demonstrated a subocclusive stenosis between the SVC and the right atrium (figure 2). After systemic heparinisation, the stenosis was crossed with a hydrophilic 0.035" guidewire. Owing to the proximity of the stenosis to the right atrium transoesophageal echocardiography was used for a better anatomic delineation of the stenosis location. It demonstrated the tumour compressing the distal SVC and the right atrium and the most stenotic stricture being 1 cm above the cavoatrial junction (figure 3). Under fluoroscopic and echocardiographic guidance a self-expandable Wallstent

Figure 1 Thoracic CT scan. Heterogeneous anterior mediastinal tumour with close contact with ascending aorta, right atrium and superior vena cava. MT, mediastinal tumour; SVC, superior vena cava.

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Figure 2 Digital subtraction superior cavography. Subocclusive stenosis close to the cavoatrial junction. RA, right atrium; SVC, superior vena cava.

16×60 mm was deployed at the SVC, with its lower tip 0.5 cm below the cavoatrial junction. The stent was postdilated with a Zelos 16×40 mm angioplasty balloon. No residual stenosis was observed (figure 4). Transoesophageal echocardiography demonstrated the correct positioning of the stent and an increase in the luminal diameter, from 3 to 10 mm (figure 5).

OUTCOME AND FOLLOW-UP

The patient's symptoms improved substantially during the next 24 h, with relief of plethora, dyspnoea and cervical oedema. The patient underwent surgical resection after neoadjuvant treatment.

During a follow-up period of 7 months, the patient continues to remain well and asymptomatic. Follow-up CT scans demonstrated stent patency.

DISCUSSION

Endovascular stenting has been used in patients with malignant SVCS who failed to respond to conventional treatment (radio

Figure 4 Digital subtraction superior cavography. Vena cava stent with no residual stenosis. SVC, superior vena cava; RA, right atrium.

or chemotherapy) or recurrent symptomatic patients.² In the last decade, however, some authors advocated stenting as the first choice for malignant SVCS, as it provides immediate improvement in symptoms and does not interfere with tumour treatment.^{2 3} Overall technical and clinical success rates are very high, ranging from 95% to 100% and 80–95%, respectively, with complication rates between 0% and 19%.¹

An unusual but potentially fatal complication of SVC stenting is cardiac tamponade, a condition with mortality rate around 40%.^{4–6} The most common cause of this event is SVC rupture during balloon inflation.⁴ To avoid this potential complication, some authors advocate stent deployment above the pericardial reflection line.^{4 6} The landing zone has to be precise as faulty deployment can result in stent migration, arrhythmias, bleeding, etc.

In the present case reported, the SVC stenosis was very close to the right atrium, making the correct placement of the stent a challenging. We not only wanted to cover the entire stenosis, but also to avoid the deployment of the lower tip of the stent into the right atrium or below the pericardial sac reflection, in order to minimise the risks of arrhythmia or cardiac tamponade.

Figure 3 Transoesophageal echocardiography. Mediastinal mass compressing the superior vena cava and right atrium. LA, left atrium; RA, right atrium; SVC, superior vena cava.

Figure 5 Transoesophageal echocardiography. Stent well positioned in superior vena cava, with no residual stenosis. LA, left atrium; RA, right atrium.

In practice, the precise location of pericardial sac reflection is difficult to identify during an angiography.

Transoesophageal echocardiography overcomes this technical difficulty, as it is able to identify the exact location of these anatomical landmarks. Potential complications such as venous wall rupture or cardiac tamponade can be rapidly diagnosed, thus allowing immediate treatment. In our case, due to the extreme proximity of the stenotic lesion and the cavoatrial junction (<1 cm), it was not possible to place the stent above the pericardial reflection. The echocardiography, however, assessed the landing zone for stent deployment at the best possible position, that was, just 0.5 cm into the atrium.

The use of transoesophageal echocardiography in interventional radiology has been reported in procedures such as guidance for stent graft repair of thoracic aneurysms and pseudoaneurysms.^{7 8} To the best of our knowledge, its use in guiding stents in SVC has not been reported in the literature.

In conclusion, transoesophageal echocardiography seems to be a useful tool for SVC stenting in selected patients with venous stenosis close to the cavoatrial junction.

Learning points

- ▶ Endovascular stenting is the first choice for malignant superior vena cava syndrome; however, potentially fatal complications may arise when the stenosis is close to cavoatrial junction.
- ▶ The exact location of anatomical junctions such as cavoatrial junction and pericardial sac reflection may not be demonstrated precisely by angiography.
- ▶ Transoesophageal echocardiography may prove useful in guiding the stent deployment by overcoming these technical challenges.

Contributors All authors were involved in conception and design and analysis and interpretation of data. RNC, FLG contributed in acquisition of data. FN and RNC drafted the article. FLG and BBA revised the article critically. All the authors approved the final version of the article.

Competing interests None.

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