

Clinical Records

Superior mediastinal and internal jugular venous thrombosis presenting to the otolaryngologist

CARMEN DE CASSO, FRCS, SUDIP GHOSH, FRCS, MICHAEL TIMMS, FRCS, PRADEEP MORAR, FRCS

Abstract

Venous thromboembolic disease has an estimated annual incidence of one in 1000 people. However, thrombosis of the superior mediastinum and neck veins is less frequent and it is usually due to direct trauma to the neck by intravenous catheters, drug abusers or neck dissection surgery. Local or distant malignancy (Trousseau's syndrome) is also an important cause.

Thrombosis of the superior mediastinal and internal jugular veins is rarely a cause of primary referral to the otolaryngologist. On these rare occasions, it can present as a painful neck mass, but may also present with stridor, dysphonia or dysphagia. The four patients presented here illustrate different ways of presentation. Different imaging techniques such as ultrasound, computed tomography (CT) scan, magnetic resonance imaging (MRI) and venogram, will produce a diagnosis of thrombosis, occasionally with a mass, but only a biopsy will confirm or rule-out malignancy.

Spontaneous thrombophlebitis can be the first manifestation of an occult neoplasm and any investigation into venous thrombosis must include a thorough general examination and follow up.

Key words: Thrombosis; Superior Vena Cava Syndrome; Jugular Veins; Organizational Case Studies

Introduction

Venous thromboembolic disease has an estimated annual incidence in developed countries of one in 1000 people.¹ The disorder commonly affects the legs, but may occur in other veins. The veins in the head and neck, even in the presence of localized disease, appear to be less susceptible to thrombosis, as they are mostly valveless and gravity aids in emptying in the upright position. Currently, the major causes of thrombosis of the superior vena cava (SVC) and brachiocephalic vein (BCV) and its branches include iatrogenic trauma to the veins such as central venous access lines and neck dissection surgery, haemodialysis, injections into the large neck veins by intravenous drug abusers and external trauma to the neck.^{2–5} The presence of local or distant malignancy is an important aetiological factor, which must always be remembered.^{8,13–17}

The modern otolaryngologist is infrequently involved in the management of thrombosis of the superior mediastinal vessels because of a sharp fall in the number of deep neck space and ear infections

due the widespread use of antibiotics.^{5,6,7,9–12} Most of the current cases would present in an intensive care or acute medical setting. This paper presents four cases of jugular and superior mediastinal vessel thrombosis that were referred to the otolaryngologist because of head and neck symptoms as the sole mode of presentation.

Case reports

The following four patients were referred to the otolaryngology department from primary care physicians.

Case 1

A 54-year-old woman presented with a four-day history of a painful swelling on the right anterior triangle of the neck. Past medical history included hiatus hernia, achalasia, and seronegative rheumatoid arthritis. She was being treated with sulphasalazine and hormone replacement therapy. She was a non-smoker. Ultrasound scanning of the neck demonstrated the swelling to be thrombosis of the internal jugular vein (IJV) surrounded by soft

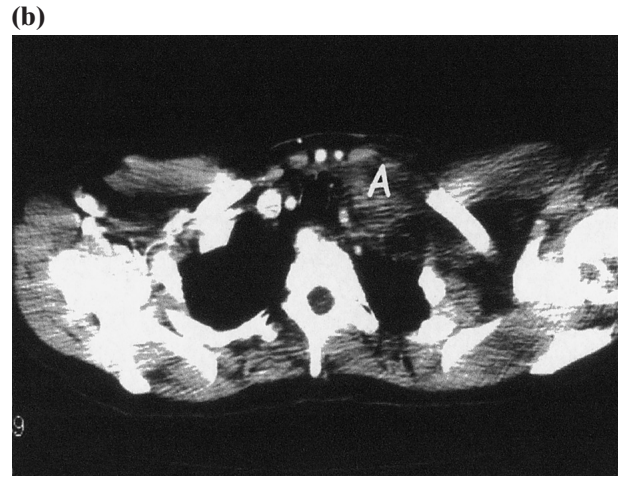
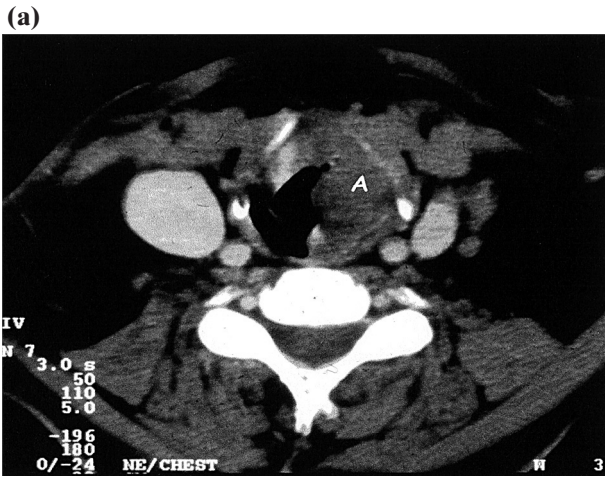


FIG. 1

(a) and (b) CT scan of neck (a) and chest (b) (*Case 2*) showing a neck mass (A) extending to superior mediastinum (A), with occlusion of the IJV, subclavian and axillary veins.

tissue oedema displacing the right lobe of the thyroid. A subsequent CT scan of the neck confirmed extensive thrombosis of the right IJV spreading to the superior mediastinum with an enlarged supraclavicular lymph node that was proved by fine needle aspiration (FNA) cytology to be metastatic squamous cell carcinoma. An oesophagoscopy showed an irregularity of the oesophageal mucosa and biopsy demonstrated squamous cell carcinoma of the oesophagus.

She was treated with intravenous heparin followed by warfarin for six months, and was given radiotherapy to the neck mass, upper mediastinum and oesophagus. There was resolution of the thrombosis and good regression of the oesophageal carcinoma. The patient died two years after diagnosis from recurrence.

Case 2

A 47-year-old woman presented to the Accident and Emergency department complaining of a five-day history of swelling and pain in the left side of the neck, which appeared after mild trauma whilst exercising. On examination she had a mass in the

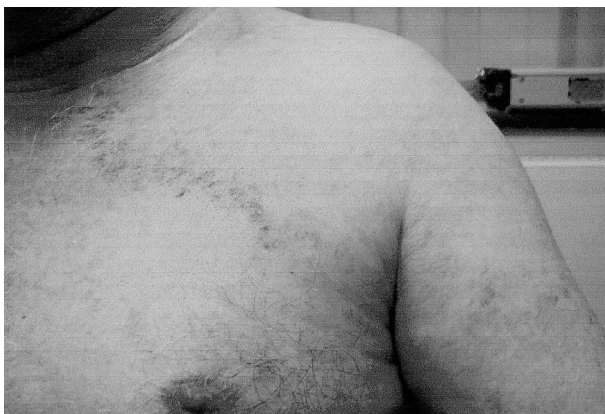


FIG. 2

Collateral circulation present in the chest wall and left arm, with swelling of the left arm (*Case 3*).

posterior triangle of the neck which was tender, warm, red and firm on palpation. She had no past medical history of importance and was not on any medication except for hormone replacement therapy.

An ultrasound of the neck showed thrombosis of the internal jugular vein with a mass at the root of the neck. Subsequent CT scanning revealed thrombosis of the internal jugular, subclavian and part of the axillary veins. The mass appeared to extend from the root of the neck to the upper mediastinum (Figure 1). She was initially treated with intravenous heparin and underwent surgical exploration of the neck with biopsy of the mass. The histology report showed only inflammatory tissue with no signs of malignancy. Post-operatively she was warfarinized and discharged after her INR became stable. The thrombosis and surrounding inflammatory mass resolved over a period of some weeks. Warfarin was stopped after six months and no signs of recurrence were found after one year follow up.

Case 3

A 73-year-old male was referred complaining of a week's history of a painful, red, hot swelling in the left side of his neck. On examination there was swelling of the left arm and obvious collateral circulation over the chest wall (Figure 2). Fibre-optic examination of larynx and hypopharynx was normal. Ultrasound of the neck showed a deep vein thrombosis of the IJV and adjacent soft tissue swelling. The CT scan of the neck and chest demonstrated IJV, subclavian and axillary vein thrombosis, with attenuation of the brachiocephalic vein; there was also a soft tissue mass in the superior mediastinum (Figure 3) and biopsy of this mass showed inflammatory tissue. He was treated with low molecular weight heparin and was sent home on warfarin long term. At nine months he is free of disease.

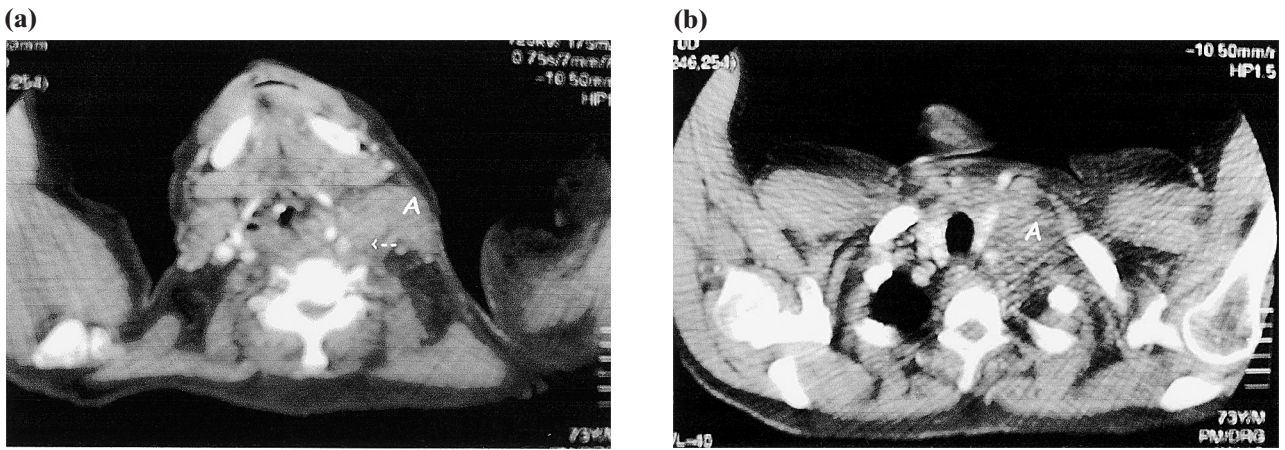


FIG. 3

(a) and (b) CT scan of the neck and chest (*Case 3*) showing soft tissue mass in the left side of the neck extending to the mediastinum (A). Brachiocephalic vein encased and attenuated. The IJV (see ←), SC and axillary veins are occluded.

Case 4

A 56-year-old woman was admitted complaining of dysphagia for solids, hoarseness and dyspnoea. Clinical examination showed profuse collateral circulation in the chest wall (Figure 4) and left vocal fold palsy. A chest radiograph showed a large mediastinal mass surrounding the great vessels (Figure 5) and CT scan showed thrombosis of the brachiocephalic, subclavian and axillary veins with the superior vena cava considerably compressed and displaced (Figure 6) by the mediastinal mass. Biopsy of the mediastinal mass showed small cell carcinoma of the lung. Cavogram (Figure 7) was performed with the intention of inserting a stent. It confirmed complete occlusion of the right subclavian and axillary veins, with a thrombus in the right brachiocephalic vein, but the vena cava, although marginally compressed, appeared patent. The patient died six weeks after diagnosis, as a result of a cerebrovascular episode, with seizures and progressive coma.

Discussion

As made clear from the above series, thrombosis of the superior mediastinal and neck veins can present in different ways, although it is a rare cause of

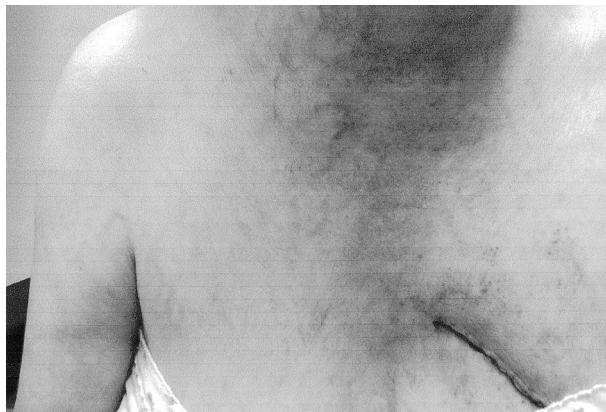


FIG. 4

Collateral circulation present in the chest wall and neck. Scar from left mediastinal mass biopsy (*Case 4*).

primary referral to the otolaryngologist. Most commonly it presents as a painful neck mass, but patients can be referred also complaining of stridor, dysphonia or dysphagia. It is important to remember that these symptoms can arise from the primary pathology, if any, or from the thrombosis itself. A life-threatening complication is pulmonary embolism, which can present in seven to 59 per cent of cases.^{2,20} Other complications include septic emboli, septicaemia, laryngeal or bronchial oedema and pseudotumor cerebri leading to coma.^{4,8,15}

Superior vena cava thrombosis presenting with superior mediastinal outlet obstruction is usually seen in advanced thoracic neoplasms (as seen in *Case 4* of this series). Thus, in addition to SVC obstruction, there are also features of obstruction to the airway and oesophagus and, commonly, recurrent laryngeal nerve palsy.

Causes

Although uncommon, reports of venous thrombosis in the neck, arms and upper thoracic veins have increased, mostly in the intensive care setting. Since central venous catheters, haemodialysis and pacemakers are used frequently, they are a common

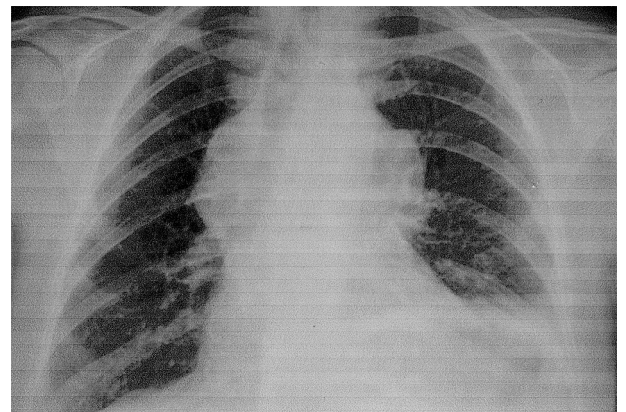


FIG. 5

Chest X-ray showing wide mediastinum with a mass surrounding the great vessels (*Case 4*)

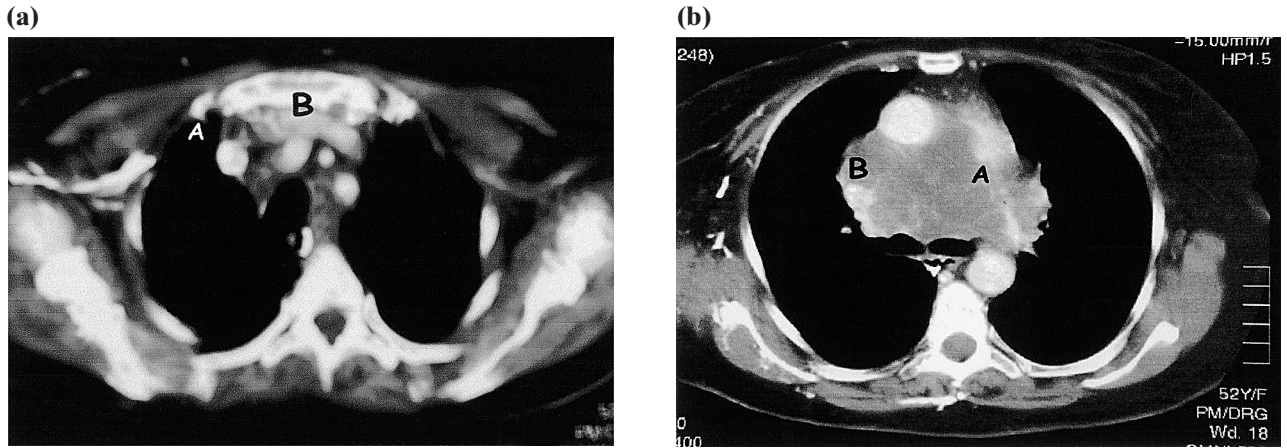


FIG. 6

(a) and (b) CT of the chest showing thrombosis of the brachiocephalic (B), subclavian (A) and axillary veins (a). Mediastinal mass surrounding the great vessels (A) with SVC compressed (B) (Case 4)

cause of trauma to the IJV, SCV and BCV with subsequent thrombosis. SVC and BCV thrombosis has been found in 0.06 per cent (23 of 34 567) of patients admitted to hospital in a study by Otten *et al.* Of these 23 patients, 17 (74 per cent) had cancer and 15 (65 per cent) had a central venous catheter, 8.7 per cent of these developed PE.⁴

Other important causes of thrombosis, which can be encountered by the otolaryngologist, include Trousseau's syndrome (migratory thrombophlebitis associated with gastric carcinoma)¹³⁻¹⁵ and the functional neck dissection described by Suarez (cited by Prim *et al.*²³) in the 1960s and later by Bocca and Pignataro (cited by Prim *et al.*²³ and Quraishi *et al.*²⁵) (Table I). The SVC and BCV are more frequently affected in lung cancer (small cell, six to 11.5 per cent)^{8,16-18} (Table II). The incidence of post-operative thrombosis of the internal jugular vein in the functional neck dissection varies greatly depending on the series (0 to 37 per cent).²¹⁻²⁵ It is unclear if the use of musculocutaneous flaps may predispose to thrombosis, but the thrombosis itself may have a negative effect on the survival of the flap. The presence of salivary fistula or neck abscess seems to predispose to thrombosis, but post-operative radiotherapy does not.²⁵ Most series agree that although deep vein thrombosis (DVT) of the IJV is frequent in the early post-operative period, the majority re-canalize with time.

Diagnosis

Clinical diagnosis of DVT is unreliable, although painful swelling of the neck, together with upper limb swelling and collateral circulation, should give us a high index of suspicion. Screening tests include D-dimer tests, which are specific cross-linked derivatives of fibrin, produced when fibrin is degraded by plasmin; they are also raised in patients with DVT.¹

Venography^{1,4,26,27} is the gold standard for the diagnosis of DVT, but it is an invasive technique with a small risk of allergic reaction or venous thrombosis. So today, non-invasive techniques, such as ultrasonography, are used more frequently. Ultrasonography is considered an excellent diagnostic method and it shows an average sensitivity of 97 per cent.^{1,8,14,28} However, its assessment of intrathoracic contents is less accurate than CT or MRI scans. The CT and MRI scans have better definition of soft tissue structures and plains, and are more useful in demonstrating the underlying cause of the thrombosis.^{15,29} In upper mediastinal venous thrombosis they are the methods of choice. However, in two of the present cases an open biopsy was required to obtain the diagnosis of inflammatory tissue, and another patient needed an oesophagoscopy and biopsy to achieve the diagnosis of malignancy. Thus, although scanning can give us an idea of the invasive properties of a specific mass, biopsy, often combined with upper aero-digestive

TABLE I
CAUSES OF DVT

Causes of DVT	References
Lemierre's syndrome	9, 10, 11, 12
Neck abscess (<i>Staphylococcus</i> , <i>Streptococcus</i> , <i>Salmonella spp</i>)	2, 3, 4
Central vein catheter	5, 7, 8
Haemodialysis	6
Neck vein injections (drug abusers)	4
Non-malignant hypercoagulability, such as pregnancy, oral contraceptives, hyperlipaemia type II	19
Malignancy (Trousseau's syndrome): Ca lung, metastasis, lymphomas	8, 13, 14, 15, 16, 17, 18
Neck dissection	21-25, 32,
Trauma	12

TABLE II
SUPERIOR VENA CAVA OBSTRUCTION

SVCO	Pathology
Lung cancer (80%) Metastasis (15%)	Small cell carcinoma (6-11.5%) and non-small cell (1.7%) Carcinoma of the pharynx, rectum, leiomyosarcoma uterus, hypernephroma, leukaemia, thymoma
Lymphomas (5%) Benign Unknown	Lymphocytic lymphosarcoma, hystiocytic lymphoma Goitre, intravenous catheter

tract endoscopy, is essential to establish a definitive diagnosis in superior mediastinal and neck thrombosis in addition to the scans. Advantages of MRI scans include sensitivity to blood flow rates, greater soft tissue contrast, and avoidance of contrast and radiation exposure.^{15,30}

Management

Traditional therapy for deep vein thrombosis is antibiotics and anticoagulation with heparin. Today low molecular weight heparin is used, followed by warfarin or Coumarin to prevent thromboembolic events. Fibrinolytics are less used and surgery such as thrombectomy or partial resection of the vessel is rare,^{1,13,14} unless associated with the surgical treatment of neoplasms.

Thrombosis in malignancy can respond to the anti-neoplastic treatment. A systematic review by Rowell and Gleeson⁸ found that 68.4 per cent (50–80 per cent) of patients with small cell lung carcinoma (SCLC) had relief after induction chemotherapy, while in non-small cell lung carcinoma (NSCLC) 20–40 per cent responded. Thrombosis in lymphomas also responds to chemotherapy. Radiotherapy is also an effective treatment for most malignant causes of SVC syndrome: 76.9 and 77.6 per cent in SCLC and NSCLC respectively.^{8,16,33} Steroids and diuretics have been used for symptomatic relief. If the patient fails to respond, or the SVC obstruction

recurs, a stent can be used to by-pass the obstruction giving 95 per cent resolution rate,^{8,17,18} but 10.7 per cent can recur.

SVC obstruction does not seem to influence survival in cancer patients,^{8,16,33} unless there are complications, such as pulmonary embolism, upper airway obstruction caused by laryngeal oedema or cerebral oedema.

Of all the neck masses an ENT surgeon can see, thrombosis of the upper thoracic, internal jugular and subclavian veins are very low in the list of differential diagnosis. Most patients present with a short history of non-specific swelling in the neck, which can be tender and red, suggesting an inflammatory or infective process, and only after failure of the process to resolve are we inclined to investigate further with USS or CT scan of the neck. It is important also to make a specific tissue diagnosis in every case and in cases of deep-seated tender masses the diagnosis of deep vein thrombosis of the neck and superior mediastinum must be remembered.

Spontaneous thrombophlebitis may be the first manifestation of an occult malignancy. The possibility of Trousseau's syndrome must be always in our minds and the patient must be fully investigated, taking into account that the neoplasm might be located in a distant site to the area of thrombosis.



FIG. 7

Cavogram confirming complete occlusion of right axillary and subclavian veins (A), with thrombus in the left BCV (B) and the SVC although compressed appears patent (C).

- Venous thromboembolic disease has an estimated annual incidence of one in 1000 people
- Thrombosis of the superior mediastinum and neck veins is less frequent
- These cases are rarely primarily referred to the otolaryngologist, but on occasions might present with a painful neck mass, stridor, dysphonia or dysphagia
- Four cases are reported which illustrate different ways of presentation and the use of different imaging techniques
- Spontaneous thrombophlebitis can be the first manifestation of an occult neoplasm

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Address for correspondence:

Carmen de Casso,
432 Norris Road,
Sale,
Manchester M33 2RE,
UK.

E-mail: cdecasso@doctors.org.uk

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