CME CREDIT

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Diagnosis and management of superior vena cava syndrome

ABSTRACT

Superior vena cava (SVC) syndrome is a relatively common complication of lung cancer or lymphoma, and in fact is often the initial manifestation of these diseases. However, benign causes also exist, and physicians should not automatically assume that SVC syndrome is due to cancer. A definitive histologic diagnosis of cancer should be obtained before starting radiotherapy or chemotherapy to treat SVC syndrome.

KEY POINTS

In patients with SVC syndrome, biopsy poses an increased risk of bleeding due to elevated central venous pressure. Try a less-invasive procedure first such as sputum cytology, bronchoscopy with washing, or a limited biopsy to make a pathologic diagnosis.

In most patients, symptoms improve rapidly with treatment, generally local external-beam radiation.

If the condition does not respond to antineoplastic therapy within 1 week, a large venous thrombus should be suspected. Such patients may need anticoagulant therapy.

Several benign causes of SVC syndrome, especially catheter-related SVC thrombosis, may mimic the signs and symptoms of SVC syndrome associated with malignancy.

SUPERIOR VENA CAVA (SVC) SYNDROME arises from a mediastinal mass compressing the SVC and the veins that drain into it. The resulting obstruction of blood flow back to the heart causes a variety of signs and symptoms, sometimes acutely (TABLE 1).

Today, more than 95% of cases of SVC syndrome are due to malignant diseases that either arise as primary tumors in the mediastinum or that metastasize there. However, as recently as 30 years ago, 40% of cases were due to tuberculosis or syphilis. Therefore, even though benign causes (TABLE 2) are relatively uncommon, one should not assume that all cases are due to malignant disease—especially in patients who do not have a preexisting diagnosis of cancer.

TABLE 1

Clinical features of superior vena cava syndrome

FEATURE	FREQUENCY
Symptoms	
Shortness of breath	50%
Chest pain	20%
Cough	20%
Dysphagia	20%
Signs	
Thorax vein distention	70%
Neck vein distention	60%
Facial swelling	45%
Upper extremity or trunk swelling	40%
Cyanosis	15%

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TABLE 2

Nonmalignant causes of superior vena cava syndrome

- Granulomatous infections
  - Tuberculosis
  - Syphilis
- Goiter
- Aortic aneurysms
- Fibrosing mediastinitis
- Thrombus formation (secondary to the presence of a central venous catheter)

THE SVC IS VULNERABLE TO OBSTRUCTION

The location and anatomy of the SVC make it particularly vulnerable to obstruction. Surrounded by the mediastinum, sternum, right mainstem bronchus, and lymph nodes (which are common sites of tumors), it is also thin-walled and easily compressible. In particular, tumors involving the lymph nodes or lung in this region can increase the pressure on the thin-walled SVC and subsequently obstruct it.

Depending on how fast obstruction develops, collateral circulation may or may not be a prominent feature. For example, when the obstruction develops over a period of several weeks to months, the physician and patient frequently observe visibly distended veins in the chest wall.

Suspect the central venous catheter as a source of thrombosis

THROMBOSIS AS A MECHANISM OF SVC OBSTRUCTION

Autopsy studies have revealed that 30% to 50% of patients with SVC syndrome have evidence of thrombosis. Therefore, if a patient does not rapidly improve after antineoplastic treatment is started (see below), a blood clot should be suspected as a possible reason for failure of the therapy.

In addition, more and more cancer patients are having indwelling central venous catheters inserted for venous access (eg, Hickman catheters, Broviac catheters, subcutaneous portal devices), and this increase has resulted in a major new nonmalignant cause of SVC syndrome. Patients who develop catheter-related SVC obstruction may need anticoagulant treatment and, possibly, catheter removal. Alternatively, thrombolytic agents can be given through the catheter itself, an approach that may preserve catheter function. Some centers have used low doses of warfarin to prevent catheter thrombosis, but this approach is not currently widely used in cancer patients, due to limited experience in prospective trials.

MALIGNANCY AND SVC SYNDROME

Lung cancer is the cause of approximately 80% of cases of SVC syndrome, and lymphomas cause another 15%. Small-cell carcinoma of the lung is responsible for approximately 50% of cases of SVC syndrome due to lung cancer, even though this tumor type accounts for only approximately 25% of all cases of lung cancer. A major reason why small-cell lung cancer is such a common cause of SVC syndrome is that it often arises in the central or perihilar areas of the lung.

DIAGNOSTIC EVALUATION OF SVC SYNDROME

In malignancy-associated SVC syndrome, the chest radiograph almost always reveals a mass, usually in the mediastinum, and usually on the right side. Hilar adenopathy is observed in 50% of patients, and pleural effusions in 25%.

In general, a patient with classic signs and symptoms of SVC syndrome does not need additional diagnostic evaluation beyond a chest radiograph. Venograms can demonstrate the precise location of the obstruction, but such information is usually not required for optimal treatment planning. Other tests that may help in selected patients include duplex ultrasonography, spiral computed tomography, and magnetic resonance venography.

A cancer diagnosis is necessary

How rapidly should treatment of cancer-associated SVC syndrome be initiated? The question remains somewhat controversial. Until relatively recently, the mere presence of SVC syndrome was considered a medical emergency, with treatment to be started as soon as logistically feasible.

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However, this philosophy was problematic because many persons with lymphoma or lung cancer actually present with SVC syndrome as an initial manifestation of their disease, before the presence of malignancy is histologically documented. In such patients, the question was often whether to begin antineoplastic treatment first, and then confirm the presence and type of cancer later.

Recent data strongly indicate that one should wait to make a definitive diagnosis of cancer before starting therapy in most patients presenting with SVC syndrome. However, an exception can be made in very rare circumstances, such as if a patient has severe respiratory compromise or evidence of central nervous system dysfunction believed to result from increased venous pressure. In such cases, it is acceptable to start treatment and stabilize the patient's medical condition first.

Biopsy may be risky

Persons with SVC syndrome face an increased risk of bleeding during biopsy in the upper chest, owing to elevated central venous pressure. Therefore, the initial attempt to pathologically document the cause of the obstruction should employ the least invasive technique available. In specific clinical settings, such procedures might include sputum cytology, bronchoscopy with washings, and limited biopsies. These relatively noninvasive procedures can provide a diagnosis in 60% to 70% of patients.

If it is necessary to obtain more tissue to make a definitive diagnosis, one should initially perform a biopsy in the more superficial abnormal-sized lymph nodes, where bleeding can be relatively easily controlled. However, it may occasionally be necessary to perform a mediastinoscopy or thoracotomy to document the presence and type of malignancy.

TREATMENT OF MALIGNANCY-ASSOCIATED SVC SYNDROME

In malignancy-associated SVC syndrome, treatment should focus on the malignant disease process. As many as 75% of patients note symptomatic improvement within 3 to 4 days of starting radiotherapy or chemotherapy, and 90% experience major relief within 1 week.

Local radiation of the chest lesion and surrounding tissue is used in most patients. The total dose depends on the type of tumor to be treated. For example, lymphomas are considerably more sensitive to radiation than non–small-cell lung cancer, and require lower doses.

Antineoplastic agents may be a reasonable approach in patients with SVC syndrome resulting from small-cell lung cancer or lymphoma, which are usually highly sensitive to cytotoxic chemotherapy.

Anticoagulant or fibrinolytic therapy. In the approximately 10% of patients with malignancy-associated SVC syndrome whose symptoms do not improve within the first week of radiotherapy or chemotherapy, a large obstructing thrombus should be suspected. In this situation, the physician should consider starting anticoagulant or fibrinolytic agents.

Unfortunately, many patients have large, necrotic, friable tumor masses, and the area of the tumor is under increased venous pressure. For these patients, anticoagulant or fibrinolytic therapy poses a considerable risk of bleeding. Thus, this strategy should not be used routinely, but only if necessary in a patient who does not respond to local therapy of the malignant disease process.

Diuretics may provide temporary relief of symptoms for patients with severe respiratory compromise.

Steroids may be particularly useful in patients with lymphomas causing SVC syndrome. However, they are of limited or no benefit in patients with SVC syndrome caused by lung cancer.

SVC syndrome may be the first sign of lung cancer or lymphoma

SUGGESTED READING

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