Vascular radiologists have seen a rise in their venous interventional workload. This is largely due to the greatly increased demand for central venous access and the management of its complications. Venous stenotic conditions such as superior vena cava obstruction, subclavian-axillary vein thrombosis and iliac vein compression syndrome are rewarding areas for interventional radiologists to treat.

In most patients the malignant lesion causing SVCO is at an advanced stage and is therefore usually unresectable. Treatment by surgical venous bypass has been reported (Lochridge et al. 1979; Doty et al. 1999), but is invasive, technically challenging and rarely indicated because of the limited life expectancy of these patients.

Historically treatment with radiotherapy (Davenport et al. 1978; Perez et al. 1978; Chan et al. 1997) or chemotherapy (Citron et al. 1983; Spiro et al. 1983) has been the mainstay of SVCO management. Often with chemotherapy or radiotherapy a period of approximately 2 weeks is required before the venous obstruction is relieved and symptoms
resolve (Rowell and Gleeson 2002). Chemotherapy and radiotherapy can cause significant side effects including anorexia, oesophagitis, nausea, vomiting and skin irritation. Furthermore, despite radiotherapy or chemotherapy a proportion of patients fail to respond to treatment and symptoms persist.

The endovascular management of SVCO with angioplasty alone has a poor technical success rate and a high incidence of early restenosis (Gross et al. 1997). This is due to the non-compliant nature of malignant tumours. Hence angioplasty of SVCO does not provide adequate palliation and consequently the use of stents has been extensively investigated.

Self-expandable metallic stents were introduced in the early 1980s and the first report of superior vena cava (SVC) stenosis stenting was in 1986 (Charnsangavej et al. 1986). Subsequently several papers using different types of stents have confirmed the effectiveness of SVC stenting. Stent insertion should be considered for patients to provide the rapid palliation of symptoms (National Institute for Clinical Excellence Guidelines 2005). Many different types of stents have been used, but early experience was predominantly with the Gianturco Z stent (Uchida et al. 1988; Rosch et al. 1988; Gaines et al. 1994; Furui et al. 1995). However, the large strut interspaces of the Gianturco Z stent are potentially poor at fixing fresh thrombus and may allow restenosis by tumour ingrowth through the stent (Crowe et al. 1995). More recently other self-expandable metallic stents have come into use and these include the Wallstent (Hennequin et al. 1995). The Wallstent has greater flexibility than the Gianturco Z stent, which is beneficial when deploying the stent around a bend into a brachiocephalic vein. The Wallstent has the disadvantage that radial expansion occurs over several weeks after deployment and it may therefore shorten to uncover the SVC obstruction (Qanadli et al. 1999).

16.2.2 Technique for Superior Vena Cava Stenting

Planning with cross-sectional imaging before intervention is helpful to detect the presence of central venous thrombus and to determine the size of the SVC (Fig. 16.1). The extent of the stenosis should be accurately delineated by a venogram in two different projections. Stent placement is usually possible via a femoral or internal jugular vein approach. Stents must be introduced over a stiff guidewire to prevent

![CT image in a patient with symptoms of SVCO showing large mass at right trachiobronchial angle almost occluding the SVC. Venography confirms the severe SVC stenosis. Follow-up CT 6 weeks after successful placement of SMART stent (Cordis, Waterloo, Belgium) within the SVC stenosis. The SVC remains widely patent](image-url)