Delayed thrombosis of left internal jugular vein and left subclavian vein: complication related to drainage of left superior vena cava

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Received 3 May 2003; received in revised form 25 July 2003; accepted 10 August 2003

Abstract

Objectives: To present a complication which occurred in relation to drainage of left superior vena cava. Methods: A 25-year-old patient underwent intracardiac repair for Tetralogy of Fallot. Left superior vena cava was present. It was drained by insertion of a left ventricular sump vent catheter via coronary sinus. The immediate postoperative period was uneventful. The patient presented on the 18th postoperative day with painful swelling on the left side of the neck, shoulder and upper arm. The patient was subjected to post-contrast CT scan and Duplex scan of neck vessels. He received anticoagulants for 3 months after the detection of thrombus in the left internal jugular vein and left subclavian vein. Results: Post-contrast CT scan and Duplex scan of neck vessels revealed organized thrombus in proximal portions of the left internal jugular vein and left subclavian vein, while the distal portions were free of thrombus and collateralized. Conclusions: The left internal jugular vein and left subclavian vein may get thrombosed due to drainage of left superior vena cava by a left ventricular sump vent catheter. Anticoagulants give immediate relief from symptoms and also prevent major thromboembolic complications.

Keywords: Superior vena cava; Thrombosis; Internal jugular vein; Vent

1. Negative results

A 25-year-old male patient was operated on for Tetralogy of Fallot in our hospital. Preoperatively, he was polycytemic. Echocardiography revealed the presence of left superior vena cava (SVC) and suggested the possibility of a coronary artery anomaly. Angiography revealed no coronary artery abnormality. The angiography also confirmed the presence of left SVC. The left SVC was filling from right SVC (via a bridging vein), left vertebral vein, left subclavian vein and left internal jugular vein (IJV). A 16-gauge cannula was inserted in the left hand for infusion of fluids and drugs. Anaesthesia was induced with a standard technique. A triple lumen cannula was inserted in the right IJV after induction of anaesthesia. After sternotomy, a small bridging vein connecting the left SVC and the right SVC was seen. Intraoperatively, heparin was given according to standard protocol and the activated clotting time was maintained at more than 480 s. Aprotinin was added to the prime. Venous drainage for cardiopulmonary bypass (CPB) was accomplished using right SVC and inferior vena cava cannulation. The connecting vein between right and left SVC was very small in size and it would not have drained L SVC adequately. Hence left SVC was drained by insertion of an 18 Fr left ventricular sump vent catheter (Argyle, Sherwood Medical, USA) via coronary sinus and snugged at an extracardiac site. The tip of the vent catheter was placed just in the extracardiac portion of L SVC. Low suction was applied to the L SVC vent catheter using roller pump revolutions of about 20–40/min. The L SVC was drained for about 150 min. Intracardiac repair was performed and the patient was weaned off CPB. The duration of CPB was 307 min. Heparin was reversed with protamine after successful weaning from CPB. Postoperatively, the patient maintained stable haemodynamics and was weaned off the ventilator after 18 h of ventilation. The patient did not receive any prophylactic anticoagulation therapy in the immediate postoperative period. Haemoglobin was 12 gm% on the 4th postoperative day. The patient was discharged on the 15th postoperative day. He returned to the hospital 3 days after

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discharge with slight oedema of the left upper limb, and painful swelling on the left side of the neck and left shoulder. There were engorged veins over the left shoulder region and left arm. X-Ray chest and neurological examinations revealed no abnormality. Indirect laryngoscopy performed by an Ear-Nose-Throat consultant showed diffuse bulging of the left pharyngeal wall without signs of infection within the nose or throat. Duplex scan of neck vessels revealed left subclavian vein thrombosis and no flow across the thrombosed lumen. Layers of thrombus were filling the lumen of the left IJV in its entire course in the neck (Fig. 1). Both carotid arteries, right IJV and right subclavian vein were normal. Post-contrast CT scan confirmed the findings on Duplex scan and showed thrombosis of the intrathoracic portion of the subclavian vein (Fig. 2). It also showed that the left SVC was patent.
The patient was kept under observation in the intensive care unit. He received 2500 IU of heparin by subcutaneous injection 8 hourly for a week, oral aspirin 150 mg once a day, and oral warfarin 4 mg once a day. Prothrombin time was maintained at about 1.5 times the control value. Supportive treatment included antibiotics, analgesics, and antacids. The neck swelling subsided rapidly and pain disappeared within 48 h of treatment. There was no incidence of pulmonary embolism or superior sagittal sinus thrombosis. He was discharged after a week with advice to continue oral warfarin and aspirin for 3 months. Duplex scan done after 3 months showed that the distal portions of both internal jugular and subclavian veins were free of thrombus and well collateralized, while the proximal portions of both the veins near the clavicle had organized thrombus. The patient did not have features of pulmonary embolism. Considering the organized nature of the thrombus no invasive procedure was done. Warfarin and aspirin were continued again for 3 months and the patient was kept under regular follow-up.

2. Discussion

A patient with IJV thrombosis usually presents with painful cervical swelling, progressive inflammatory signs overlying sternomastoid muscle, and functional limitation [1]. Our patient had all these features and we could rule out common possible causes of IJV and subclavian vein thrombosis. Prolonged cannulation of subclavian vein for haemodialysis [2] and pacemaker implantation [3] is known to cause thrombosis. IJV thrombosis may occur due to polycythemia [4], prolonged catheterization [5], cervical traction [6], functional neck dissection [7], and infections in the neck and throat region [8,9]. Use of aprotinin does not affect the incidence of deep venous thrombosis [10–12]. We could not find any report in the literature regarding IJV and subclavian vein thrombosis, which followed venting of left SVC. The left SVC can be cannulated directly from its extracardiac portion or through coronary sinus ostium [13]. In our case, the left SVC cannula might have injured the vascular intima of the left SVC in its extracardiac portion. This might have created a nidus for the formation of thrombus. The left SVC could remain patent because of continuous blood flow from the left vertebral vein and the bridging vein, which connected the left SVC to the right SVC.

Superior sagittal sinus thrombosis may occur after IJV cannulation. Thrombosis of IJV and subclavian vein can lead to several complications like SVC syndrome [14], pulmonary thromboembolism, and septicemia, which warrant early diagnosis and therapeutic intervention. Harris et al. [15] reported a 43% incidence of pulmonary embolism despite therapy for subclavian vein thrombosis. There is a high association between subclavian vein and IJV thrombosis. Colour Doppler investigation of subclavian vein and IJV is often necessary for diagnosis [16]. We could diagnose left IJV and subclavian vein thrombosis with duplex scan. Both CT scan and ultrasound examination are reliable and accurate for the diagnosis of IJV thrombosis [14]. Contrast enhanced CT scan could demonstrate thrombosis of the intrathoracic portion of the subclavian vein and patency of the left SVC.

The usual treatment for IJV thrombosis involves anticoagulation and antibiotics. Surgery is not frequently needed [1]. Therapeutic options for subclavian vein thrombosis include anticoagulation, thrombolysis, endovascular repair, and direct surgical intervention. The most effective method remains undetermined [17]. Recent major surgery (within 3 weeks) is a relative contraindication for thrombolytic therapy [18]. In view of the recent major surgery and the absence of pulmonary embolism or left SVC thrombosis, we did not use intravenous heparin therapy. Our patient received subcutaneous heparin and oral warfarin. Subcutaneous intermittent heparin has a comparable efficacy to continuous intravenous heparin in the treatment of deep venous thrombosis. Anticoagulation is continued over a minimum of 3 months for the treatment of upper extremity venous thrombosis. Subtotal occlusion and venous thrombosis of the left subclavian vein with collateralization has been reported despite anticoagulant and antiplatelet therapy for 4 months [19]. Our patient did not have post-thrombotic symptoms. Duplex scan revealed well collateralized IJV and subclavian vein. Colour Doppler flow ultrasonography might be preferable to venography for follow-up because the discomfort of injection and risk of contrast material-induced phlebitis are eliminated [20].

In summary, drainage of LSVC by a left ventricular sump vent catheter inserted via the coronary sinus might be complicated with thrombosis of left IJV and left subclavian vein. Trauma to the LSVC could be the possible mechanism of this complication. The incidence of this complication should be minimized by (1) using a LSVC drainage catheter of small size, (2) inserting the catheter smoothly via the coronary sinus into the LSVC, (3) avoiding high placement of the catheter in the LSVC, and (4) avoiding application of high negative suction for drainage. Thrombosis of left IJV and left subclavian vein may occur despite following adequate precautionary measures. Early diagnosis and treatment of thrombosis of left IJV and left subclavian vein prevent major catastrophes like pulmonary thromboembolism and superior sagittal sinus thrombosis.

References


