Placement of an internal jugular dialysis catheter into the superior intercostal vein

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The value of a routine radiograph following an uneventful placement of an internal jugular haemodialysis catheter has been questioned. The argument is that unsuspected findings occur in less than 1.5% of routine chest radiographs after uneventful placement of internal jugular catheters [1]. We describe an unusual venous anomaly that was revealed by a routine post-procedure chest radiograph and review the potential complications that may have resulted if dialysis had been initiated.

Case

A 79-year-old woman with a history of chronic renal insufficiency was admitted to the hospital after suffering a myocardial infarction. She became progressively fluid overloaded and required ventilatory support. A 16-cm dialysis catheter was placed in the left internal jugular vein for haemodialysis access. Non-pulsatile dark blood was aspirated and the haemodialysis catheter was placed without difficulty using the Seldinger technique. No complications were suspected. A subsequent chest radiograph (Figure 1) revealed the tip of the catheter projecting on the lateral aspect of the proximal descending thoracic aorta. An angiogram (Figure 2) was performed which showed an occluded left brachiocephalic vein. Drainage of the left internal jugular and subclavian systems was through a superior intercostal vein that communicated with an accessory hemiazygos vein and subsequently drained into the azygos vein. The absence of any relevant medical history suggested that the anomaly was most likely congenital in origin. The catheter was removed due to the concern that the caliber of the blood vessel would not be sufficient to tolerate haemodialysis blood flows or cause complications.

Discussion

Hypoplasia or absence of the brachiocephalic vein necessitates alternate pathways whereby blood from the left upper extremity and left internal jugular vein may reach the right atrium. Possibilities include a persistent left sided superior vena cava which drains into the coronary sinus, as well as several variations through which blood drains via superior intercostal veins into the accessory hemiazygos vein and subsequently into the azygos system [2].

The left paramedian location of the catheter on the anteroposterior radiograph raised the possibility of placement in a remnant left-sided superior vena cava, or internal thoracic (mammary) vein which runs anteriorly [3–6], or superior intercostal vein which runs posteriorly [7–10] (Figure 3). Placement in the pericardiophrenic vein was possible although less likely as it usually runs laterally along the cardiac border [11–14]. A lateral film would have been helpful in distinguishing these possibilities but was difficult given the requirement for ventilatory support. Placement of a central venous catheter in the pericardiophrenic vessel has resulted in pericardial tamponade [13] while placement in the internal thoracic vein has resulted in pleural effusions, chest wall abscess, pulmonary oedema, dyspnea and chest pain [5,6]. Placement in the superior intercostal/hemiazygos or azygos systems has resulted in back pain [8,15]. The angiogram confirmed the posterior location of the catheter and probable drainage through the superior intercostal vein to the accessory hemiazygos vein and finally to the azygos system. The vertical flow of contrast was inconsistent with that followed by a persistent left-sided superior vena cava. The angiogram also confirmed an occluded brachiocephalic vein which therefore precluded realignment of the catheter in the left brachiocephalic vein, a procedure that is often recommended [11,12,14].
Placement of an IJD catheter into the superior intercostal vein

Fig. 1. Anteroposterior supine chest radiograph after placement of left internal jugular temporary venous haemodialysis catheter. The tip of the catheter projects upon the lateral aspect of the proximal descending aorta.

Fig. 2. Angiogram after injection of contrast through the tip of the haemodialysis catheter. The left brachiocephalic vein is occluded. The distal tip of the catheter (white arrowhead) is located within a large superior intercostal vein (long white arrow). The superior intercostal vein communicates with the accessory hemiazygos vein (thin black arrow) which drains into the azygos system (short white arrow). The thick black arrow is the Swan–Ganz catheter.

Fig. 3. Tributaries of the left brachiocephalic vein. Reprinted with permission from the Journal of Parenteral and Enteral Nutrition (1983; 7: 291).

References