Hemomediastinum Resulting from Subclavian Artery Laceration During Internal Jugular Catheterization

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The complications associated with internal jugular vein catheterization are inadvertent arterial puncture, pleural and mediastinal injuries, pneumothorax, hemothorax, and hemomediastinum. Complications caused by laceration of a subclavian artery are rare. We present a case of hemomediastinum resulting from laceration of the subclavian artery during central venous catheterization. After right internal jugular vein catheterization, the left lateral decubitus position was maintained for 6 h during surgery. The severe hypotension was first noted in the supine position after transfer to the postanesthesia care unit. Chest radiograph showed a bulging of the right upper mediastinum. During the upper half sternotomy, a 5-mm long laceration was found at the posteroinferior side of the right subclavian artery near its origin from the innominate artery.

(Anesth Analg 2003;97:1257–9)

Complications associated with internal jugular vein catheterization include inadvertent arterial puncture, pleural and mediastinal injuries, pneumothorax, hemothorax, and hemomediastinum (1). Among these, complications related to laceration of a subclavian artery are rare. A case of hemomediastinum caused by a subclavian artery laceration during an internal jugular catheterization is presented.

Case Report

A 61-yr-old man was presented for the removal of a right renal cell carcinoma and an inferior vena cava thrombus. After anesthesia was induced, a catheter was placed in the left radial artery. The right internal jugular vein was punctured with a 22-gauge seeker needle at the angle formed by the 2 bellies of the sternocleidomastoid muscle near the level of the cricoid cartilage. The vessel was cannulated with an 18-gauge straight introducer needle to a depth of 2–3 cm. The blood flowing from the needle was dark in color and nonpulsatile. A J-tip guidewire was threaded through a needle, and a 7F double-lumen catheter (Sungwon, Hwasong, Korea) was inserted over the wire. Even though blood was aspirated from the proximal port in the double-lumen catheter, blood could not be aspirated from the distal port, so the double-lumen catheter was removed.

At the same site and with the same technique, vessel cannulation with an 18-gauge straight needle was achieved. A J-tip guide wire was inserted and an 8.5F introducer sheath (Baxter Edwards) was placed over a dilator. Blood aspirated from the introducer sheath was also nonpulsatile and dark in color.

The patient underwent surgery in the left lateral decubitus position for 6 h. During the operation, the vital signs were stable and central venous pressure was maintained within the normal range. We used the central venous catheter for the infusion of 7 L of fluid. After the operation, a chest tube was inserted, and the patient was returned to the supine position. The introducer sheath was removed, and the site was sutured in the operating room. The patient was transferred to the postoperative anesthesia care unit (PACU). Immediately after arrival in the PACU, the patient's blood pressure declined and his heart rate increased. Breath sounds from the right-upper chest decreased and chest radiograph showed a bulging of the right-upper mediastinum (Fig. 1). The patient's trachea was reintubated, and he was transferred to the intensive care unit. In 4 h, the chest radiograph revealed an increase in the size of right-upper mediastinal opacity; hence an upper half sternotomy was planned. After retracting the clavicle and the lung, 1500 mL of clotted blood was removed, the right subclavian artery was isolated, and a 5-mm laceration was found at the posteroinferior side of the right subclavian artery near the origin of the carotid artery (Fig. 2). No injuries were present in adjacent vascular structures. Pleura in the cupola and mediastinum were intact. After the second operation, he was discharged without any problems in 2 wk.

Accepted for publication June 20, 2003.

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DOI: 10.1213/01.ANE.0000085639.82967.81

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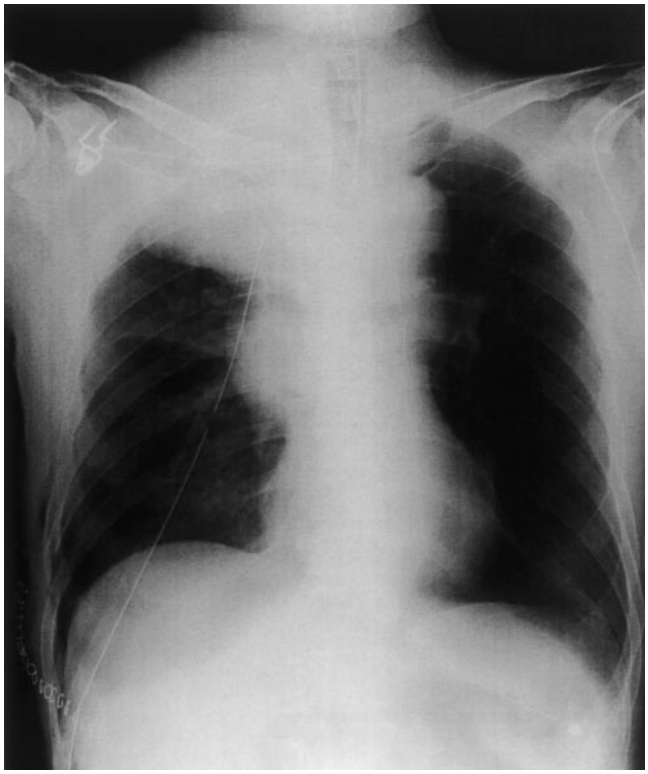

Figure 1. Chest radiograph in the recovery room. Chest radiograph showed bulging of the upper-right mediastinum.

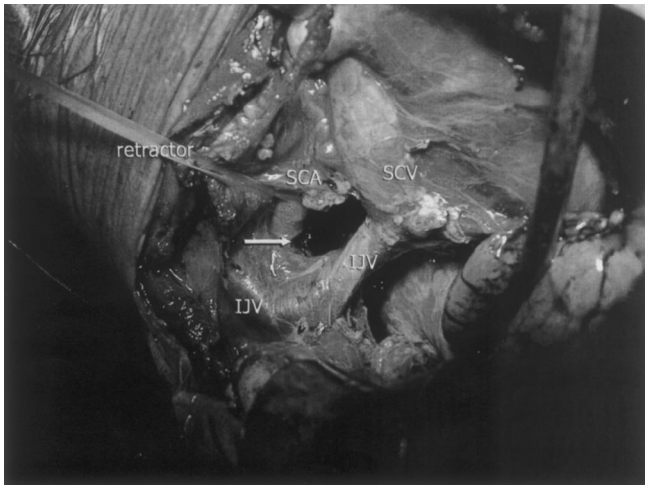

Figure 2. Right neck viewed from the frontolateral in the supine position. The head is to the left, the chest to the top, and the right arm to the bottom of the frame. A 5-mm laceration (arrow) was found at the posteroinferior side of right subclavian artery (retracted) near the origin of the carotid artery. IJV = internal jugular vein; SVC = subclavian vein; SCA = subclavian artery.

Discussion

Hemomediastinum resulting from laceration of the subclavian artery during internal jugular catheterization has not been reported. Hemothorax caused by the same procedure has been reported rarely (2–7), with arterial puncture described in five cases (2–6). One report described hemothorax during a J-wire change of an internal jugular vein catheter (7). Most cases showed hemodynamic instability, and the puncture sites were close to the innominate artery (2–4, 7). In contrast, our case had stable vital signs. Some possible reasons may be the prolonged lateral positioning, intact pleura, and restricted blood drainage into the mediastinum by gravity. The lung was ventilated with positive pressure during the operation, and the inflated lung and formed hematoma compressed the arterial puncture site. At the end of the operation, the patient was returned to the supine position and breathed spontaneously; both factors predisposed to the bleeding. Another possibility is that the finder needle or the J-wire cut only the outer wall of the subclavian artery, and the intima of the vessel remained intact at the time of the internal jugular vein puncture. As the patient's blood pressure increased during recovery, the intima of the subclavian artery was disrupted and the blood drained into mediastinum.

During the second operation, we approached the puncture site via an upper sternotomy. After opening the upper mediastinum and retracting the subclavian artery, we identified a puncture site on the posteroinferior side. If we had performed lateral thoracotomy, we would not have found the puncture site easily, nor could we have controlled the bleeding.

The correct placement of the catheter was confirmed only by the color and pulsatility of the blood. If we had used the transduction method or a sterile IV tubing extension (8,9), we could have potentially detected the arterial puncture and possibly prevented this kind of complication.

Laceration of the subclavian artery resulting in hemothorax and/or hemomediastinum can be a lethal complication of internal jugular catheterization. If hemodynamic status deteriorates immediately after internal jugular cannulation, hemothorax or hemomediastinum resulting from laceration of an artery should be suspected; however, as this case illustrates, hemodynamic compromise could be delayed.

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