Percutaneous translumbar inferior vena cava cannulation under computed tomography guidance

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Abstract Percutaneous translumbar inferior vena cava (IVC) cannulation is an alternative approach for central venous catheterization, but there have been sporadic reports of puncture-related complications. To avoid complications during IVC puncture, percutaneous translumbar IVC cannulation was performed under computed tomography (CT) guidance in addition to fluoroscopy in two patients. To perform chemotherapy for recurrent breast cancer, we planned subcutaneous port catheter placement for central venous access. Under CT guidance, the direction and insertion distance of a long elastor needle were adjusted, and the IVC was punctured at the level of the third lumbar vertebra while taking care to avoid the right urinary tract. A guidewire was inserted through the long elastor needle, and a catheter was placed over the guidewire. It was possible to perform central venous catheterization by percutaneous translumbar inferior vena cava cannulation under CT guidance.

Key words Translumbar · Vena cava · Catheter · Vascular access · Percutaneous

Introduction

For central venous catheterization, the subclavian vein, internal jugular vein, femoral vein, or upper extremity peripheral vein is generally targeted. However, when these vascular accesses are unavailable, it is necessary to consider placing a percutaneous inferior vena cava (IVC) catheter by translumbar cannulation, transhepatic cannulation, or transhepatic vein cannulation as an alternative. To avoid complications during IVC cannulation, we performed percutaneous translumbar IVC cannulation under computed tomography (CT) guidance for two patients.

Case reports

Case 1

The patient was a 60-year-old woman with a height of 151 cm and a body weight of 45 kg. She underwent left mastectomy for left breast cancer 8 years previously and had since repeatedly undergone chemotherapy and radiotherapy for bone, skin, lymph node, and liver metastases. Here, we planned subcutaneous port catheter placement for central venous access to perform chemotherapy. The patient had an invasive 12-cm tumor in the left anterior chest wall. The skin around the tumor was red, reaching the right anterior chest wall. The tumor in the left anterior chest wall reached the anterior mediastinum and was located in the vicinity of the area where the left and right brachiocephalic veins merged. Subsequently, cervical, clavicular, and upper extremity approaches were ruled out; and percutaneous translumbar IVC cannulation was selected.
Case 2

The patient was a 58-year-old woman with a height of 159 cm and a body weight of 50 kg. The patient underwent left mastectomy for right breast cancer 3 years previously and had since repeatedly undergone chemotherapy and radiotherapy for bone, skin, lymph node, and liver metastases. Here, we planned subcutaneous port catheter placement for central venous access to perform chemotherapy. The patient had multiple skin metastases in the bilateral anterior chest wall and neck. Subsequently, cervical, clavicular, and upper extremity approaches were ruled out; and percutaneous translumbar IVC cannulation was selected.

Procedure

After obtaining informed consent, subcutaneous port catheter placement for central venous access was performed by percutaneous translumbar IVC cannulation in both patients.

The patient was placed in the prone position. During the procedure, electrocardiography (ECG), percutaneous oxygen saturation, and blood pressure were monitored. The maximal barrier precaution technique was employed. The procedure was performed under conscious sedation (hydroxyzine).

At the height of the iliac crest, local anesthesia was induced by injecting 1% lidocaine (Xylocaine; AstraZeneca, Osaka, Japan) 7 cm right of the dorsal midline; a 1-cm incision was then performed to serve as a temporary entry site. Under fluoroscopic guidance, a 10-cm 21-gauge needle was inserted through the temporary entry site into the right margin of the third lumbar vertebra to a depth of 8 cm to anesthetize the puncture pathway additionally. Next, a 15-cm 21-gauge long elastor needle (Medikit, Miyazaki, Japan) was inserted in the same direction to a depth of 8 cm. Then, while adjusting the direction and distance under CT guidance, the IVC was punctured at the level of the third lumbar vertebra. While advancing the needle, caution was exercised to avoid the right urinary tract in front of the ilio-psoas muscle (Fig. 1). CT was performed four times in case 1 and six times in case 2 to puncture the IVC using the long elastor needle. After confirming that the tip of the long elastor needle was within the IVC, a 0.025-inch wire (fixed core wire guide Safe-T-J; Cook, Bloomington, IN, USA) was inserted through the outer cannula of the long elastor needle. The wire tip passed through the right atrium and was placed in the brachiocephalic vein. Using the wire, the 4F angiosheath was replaced with a 9F 25 cm long peel-off introducer (Medikit). The 8F catheter was passed through the peel-off introducer, and the introducer was then peeled away. The tip of the catheter was placed in the right atrium. The port was connected to the catheter and was then implanted in the subcutaneous pocket, and the wound was closed.

Abdominal radiography and contrast-enhanced CT were performed to check for complications (Figs. 2, 3). The contrast-enhanced CT was employed after placing the catheter in case 1 and before inserting the 9F 25 cm long peel-off introducer in case 2. The patient of case 1 was hospitalized for 2 days, and the patient of case 2 was hospitalized after the procedure continuously for chemotherapy. It was possible to perform chemotherapy using the port reservoir.