

Acute Fatal Hemothorax Following Placement of a Subcutaneous Implanted Port in a Cancer Patient

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The placement of subcutaneous implanted ports has become a common procedure in the management of cancer patients, but it is not without risk. We report a patient, with cachexia associated with endometrial cancer, who died of acute hemothorax following placement of a subcutaneous implanted port. Death was most likely secondary to repeated venipuncture attempts in the right subclavian vein by an 18-gauge needle, resulting in perforation of the intrathoracic great vessels. (*Chang Gung Med J* 2006;29(4 Suppl):43-6)

Key words: subcutaneous implanted port, Port A catheter, hemothorax, subclavian vein, guidewire, vessel dilator.

The placement of a subcutaneous implanted port with a Port-A catheter has become a common procedure in the management of cancer patients.⁽¹⁾ The incidence of complications is higher after cannulation of the subclavian vein than after placement using the internal jugular vein. A direct venous cut-down or Seldinger's technique can be used for venous access during the insertion of a Port-A catheter.⁽²⁾ In this report, we describe a death caused by acute hemothorax presumably secondary to perforation of the intrathoracic great vessels as a result of repeated venipuncture attempts in the right subclavian vein by an 18-gauge needle during the placement of a subcutaneous implanted port.

CASE REPORT

A 53-year-old mentally retarded woman underwent implantation of a subcutaneous port with a Port-A catheter during management of endometrial cancer. She was short (127 cm.) and was underweight (22 kg) as a result of cachexia secondary to

malnutrition.

General anesthesia was induced with thiamylal 125 mg intravenously and endotracheal tube intubation was facilitated by cisatracurium 4 mg intravenously. Monitoring included EKG, non-invasive blood pressure, pulse oximetry and end-tidal CO₂. Anesthesia was maintained by sevoflurane 3% with 100% oxygen. In order to approach the right cephalic vein, the surgeon made a cutdown incision at the right subclavicular region. However, the cephalic vein could not easily be located because of tissue fibrosis around this area. The right subclavian vein was then chosen for percutaneous venipuncture, and repeated attempts were made by an 18-gauge needle. Blood was aspirated with a syringe, and nonpulsatile venous flow was identified. By means of the Seldinger technique, a J-shaped guidewire was threaded through the 18-gauge needle. The vessel dilator (No. 9F) with a peel-away introducer was inserted over the guidewire into the right subclavian vein at a length of 10 cm. The dilator and guidewire were withdrawn from the peel-away introducer

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sheath. The catheter was advanced through the peel-away introducer sheath, and its tip was placed at the junction of the superior vena cava and right atrium, the position of which was confirmed by fluoroscopy. Venous blood could easily be aspirated from the Port-A catheter by a syringe. The subcutaneously implanted port was securely sutured on the muscular fascia, and the skin was closed.

Several minutes after skin closure, the patient's blood pressure suddenly dropped from 95 mmHg to 40 mmHg, and her heart rate slowed from 120 to 30 beats per min. Atropine 1 mg and adrenaline 2 mg were given intravenously, but without sustained pharmacologic effects. External cardiac massage was initiated, and adrenaline 8 µg/min was continuously infused. Upon auscultation, the breath sounds in the right lung were slightly diminished. Her hemoglobin level decreased from 10.1 mg/dl to 4.1 mg/dl. A right-side hemothorax was suspected. Chest radiography showed a massive hemothorax over the right side, and the tip of the Port-A catheter was located within the superior vena cava at a level just above the right atrium (Fig. 1). A chest tube was inserted into the right thorax, through which more than 500 ml of blood was drained. The hemodynamic condition of the patient remained unstable, and she was transferred to the intensive care unit for further management. Despite infusions of dopamine and norepinephrine, the patient lost consciousness due to hypoxic encephalopathy during resuscitation. Continuous bleeding from the chest was observed. She died at the next day because of multiple organ failure.

DISCUSSION

Fatal hemothorax following subcutaneous port implantation via the subclavian vein has not been reported previously. This death was very likely related to perforation of a great vessel caused by repeated venipuncture attempts in the right subclavian vein by an 18-gauge needle. Among the numerous complications associated with central venous catheterization, pneumothorax is probably most frequent during subclavian venipuncture, with a reported incidence ranging from 0% to 6%. Hemothorax has been reported less often, but was fatal in four of nine cases in other series. These complications were ascribed to the infusion of blood into the pleural space, laceration of



Fig. 1 Postoperative chest radiography shows a massive hemothorax over the right side. The tip of the Port-A catheter is located within the superior vena cava at a level just above the right atrium. The white arrow indicates the tip of the Port-A catheter.

the subclavian vein, perforation of an apical branch of the pulmonary artery, or unidentified events.

Complications during venipuncture of the subclavian or internal jugular vein, occur more frequently when a 16-gauge needle is used.⁽³⁻⁷⁾ Recent evidence has demonstrated that the possibility of arterial laceration could be substantially reduced if small needles are used. The insertion of an 18-gauge needle was deemed to be too large in this patient because of her very small body size. The risk of lacerating the great vessel was therefore increased, especially with repeated manipulation of the needle.⁽⁷⁾ Another possible cause of this complication may be associated with insertion of a guidewire or vessel dilator during central venous catheterization.⁽⁹⁾ In the Seldinger technique, guidewires with J-shaped tips are most commonly used, but those with straight

tips are still occasionally employed. Complications related to the latter are usually related to a shearing or lacerating injury of the vessel wall.⁽¹⁰⁾ This was not the case for our patient because a guidewire with a J-tip was used, and therefore laceration of the vessel wall was unlikely. After the insertion of the guidewire, a dilator with a peel-away introducer is routinely used to insert the needle beneath the skin into the subclavian vein, which may have lacerated the great vessel, resulting in hemothorax. This theory was further substantiated in a report by Oropollo in which two cases of fatal hemothorax were caused by advancing the dilator too deeply into the vein during insertion of a double-lumen catheter for hemodialysis.⁽¹¹⁾ They suggested it is unnecessary to insert the dilator into the vessel more than 8 cm. They also found that a smaller, shorter dilator than the commonly used one (such as 8-F, 10 cm) can be employed in many cases. This allows smooth passage of the catheter without constriction of its lumen. In our patient, a regular size dilator (9-F and 19 cm) with a peel-away introducer was inserted over the guidewire at a length of 10 cm deep into the subclavian vein, and this may have caused penetration of the vessel within the thorax.

The cutdown approach to the cephalic vein for chronic indwelling devices into the central vein was successful in 82% of cancer patients without immediate postoperative complications such as pneumothorax, hemothorax, or injury to the great vessels.⁽¹²⁾ Cutdown of the external jugular vein appears to be a highly successful and safe alternative route when use of the cephalic vein is not technically feasible. It may be considered a potential primary route for chronic indwelling devices for central venous access in cancer patients.⁽¹³⁾ Peripheral placement of devices during central venous access has become popular because of ease of placement and safety.⁽¹⁾ Use of the cutdown approach via the cephalic or external jugular vein is the first priority for insertion of a subcutaneous implanted port. Thus, if patients need long-term venous access, a peripheral approach appears to be an alternative.

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癌症病人於皮下植入中央靜脈人工血管裝置後 發生急性致命血胸

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癌症病人於皮下放置植入式中央靜脈人工血管裝置已是一個很常用的處置，但並非全無風險。我們報告一位患有子宮內膜癌合併惡病質的病例，於放置皮下植入式中央靜脈人工血管裝置後，發生急性致命血胸。最可能原因是於右側鎖骨下靜脈穿刺時，使用 18 號針頭多次作穿刺而造成胸內大血管的破裂。(長庚醫誌 2006;29(4 Suppl):43-6)

關鍵字：皮下植入式中央靜脈人工血管裝置，血胸，鎖骨下靜脈，導線，擴張器。

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