Short reports

Late perforation by central venous cannulae

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SUMMARY Three cases of hydrothorax secondary to late perforation of the superior vena cava by central venous cannulae are presented. The care of central venous cannulae is discussed.

Many complications have been described after percutaneous catheterisation of the superior vena cava via the internal jugular vein.¹ The overall complication rate is, however, much lower than with the subclavian route and the incidence of major complications is low.^{1,2}

Catheterisation of the internal jugular vein is performed in over 250 infants under 1 year of age annually at the Hospital for Sick Children. Three cases of delayed vascular perforation of the superior vena cava with hydrothorax have recently been observed and are reported here.

Case reports

Case 1. A five day old boy (3.2 kg) with severe pulmonary stenosis underwent retrograde pulmonary valvotomy under general anaesthesia. A 17.5 g 57 mm teflon cannula (H G Wallace, UK) was inserted into the right internal jugular vein to facilitate rapid blood replacement at the time of operation. Correct positioning was confirmed by easy aspiration of blood and the presence of a venous pressure waveform on the monitoring screen. On return to the ward the patient was breathing spontaneously and blood gas measurements were as follows: pH 7.41, P_{CO_2} 5.2 kPa, P_{O_2} 6.6 kPa, base excess -3.6, $F_{I_{O_2}}$ 0.3.

Sixteen hours after operation he developed acute respiratory distress with tachypnoea and tachycardia. His arterial blood gases were pH 7.18, P_{CO_2} 9.6 kPa, P_{O_2} 4.9 kPa, base excess -3.5. He was intubated and ventilated. A chest radiograph showed a right hydrothorax and some 40 ml of clear fluid was aspirated from the right chest. The patient's condition improved rapidly and after 12 hours he was extubated.

Case 2. A 3 month old boy (3.5 kg) with tracheomalacia was admitted for tracheopexy. The child had undergone previous operations for tracheo-oesophageal fistula, oesophageal atresia, and imperforate anus. A 17.5 g 57 mm teflon cannula was inserted into the right internal jugular vein after the induction of anaesthesia. The cannula position was confirmed by free backflow of blood into the infusion tubing and the presence of respiratory oscillations. After operation the child developed left sided pulmonary infection which was treated with intravenous antibiotics.

On the eighth day after operation the child had a respiratory arrest and was intubated and ventilated. His blood gas measurements after resuscitation were good. An intravenous injection of morphine and pancuronium given via the superior vena cava line to sedate the child while full ventilation was established failed to have any effect. A chest radiograph showed a right hydrothorax and some 120 ml of clear fluid was aspirated from the pleural cavity. The child rapidly made a full recovery.

Case 3. A 3 month old boy (3.0 kg) with intestinal obstruction underwent laparotomy for release of adhesions and gastrostomy. The child had a past history of necrotizing enterocolitis and had undergone laparotomy and resection of necrosed bowel and ileostomy at age 10 days. Further resection and re-anastomosis was performed at age 7 weeks. Pulmonary infection and septicaemia had necessitated mechanical ventilation during this time.

A 17.5 g 57 mm teflon cannula was inserted into the left internal jugular vein for operative monitoring and postoperative parenteral feeding. Correct positioning was confirmed by free backflow of blood. The child was ventilated after operation. On the third postoperative day he became unsettled on the ventilator (blood gases pH 7.27, P_{CO_2} 8.3 kPa, P_{O_2} 9.2 kPa, base excess -10, $F_{I_{O_2}}$ 0.5). The soft tissues of the neck at the site of the cannula were found to be oedematous. Blood could not be aspirated from the cannula. A chest radiograph showed bilateral hydrothorax and some 75 ml of

milky yellow fluid was aspirated from the right chest and 90 ml from the left chest. The child subsequently made a good recovery.

Discussion

Late vascular perforation of central venous cannulae may result in either hydrothorax or tamponade if the superior vena cava or right atrium is perforated.^{3 4} In the patients described hydrothorax resulted from the infusion fluid collecting in the pleural space. Haemothorax was not observed, presumably because the cannula passes through and then plugs the hole made in the superior vena cava. Correct intravenous positioning was confirmed after insertion of the cannulae and the catheters performed satisfactorily at the time of operation and in the immediate postoperative period. At the time the cannulae were removed, blood could not be aspirated from the cannulae; further evidence that perforation had occurred.

The incidence of this complication may be reduced to a minimum by observing the following precautions. The catheter should be of a soft material and its length proportional to the size of the patient. The right internal jugular vein should be chosen in preference to the left. Correct positioning of the cannula should be confirmed and checked daily by observing free backflow of blood into the distal part of the infusion system when it is lowered below atrial level. Respiratory oscillations should be seen but these may still be present after vascular perforation if the tip of the cannula is within the thorax.

If free backflow of blood is not observed the cannula tip may be against the vessel wall. Central

venous pressure measurements made in this position are unlikely to be reliable. The cannula should be repositioned so that blood can be aspirated freely. If this cannot be achieved the cannula should be removed since movement of the cannula tip against the vessel wall may result in devascularisation, erosion, and perforation. Forceful flushing of a poorly functioning central venous pressure line is not recommended. The cannula should be firmly secured to the skin to prevent movement of its tip against the vessel wall.

Cannulation of the superior vena cava via the internal jugular vein has justifiably achieved widespread acceptance in recent years. The need for such lines should be constantly under review and as soon as they have fulfilled their initial usefulness they should be removed. If long term central venous access is required a silastic catheter should be inserted under general anaesthesia with full aseptic technique.

References

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Intravenous pulse methylprednisolone in chronic idiopathic thrombocytopenia

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SUMMARY Two children with chronic idiopathic thrombocytopenic purpura unresponsive to either standard corticosteroid treatment or high dose intravenous gammaglobulin, or both, were treated with intravenous methylprednisolone (15 mg/kg/day) given in pulses over three consecutive days. Both children showed a positive response and are still in remission after three months.

The term chronic idiopathic thrombocytopenic purpura should be considered when a platelet count of below $60 \times 10^9/l$ persists for 6 to 12 months or longer. Until now splenectomy has been considered the treatment of choice,¹ but alternative forms of treatment such as plasmapheresis² and high dose intravenous gammaglobulins³ have been proposed in recent years. The successful use of intravenous pulses of methylprednisolone has been reported in a woman with chronic idiopathic thrombocytopenic