Doi: 10.5152/TJAR.2021.978

Case Report
Intensive Care

Turkish Journal of Anaesthesiology & Reanimation

No Local Findings after Subclavian Catheter Removal. Is Everything Alright? Case Report

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Cite this article as: Kıhtır HS, Başaran AE, Eroğlu HN, Kadem N. No Local Findings after Subclavian Catheter Removal. Is Everything Alright? Case Report. *Turkish J Anaesth Reanim.* 2021;49(5):420-423.

Abstract

A 10-year-old male patient was admitted to the paediatric intensive care unit due to septic shock and oliguric acute renal failure. A haemodialysis catheter (11.5 Fr) was inserted into left subclavian vein for haemodialysis and cytokine-adsorption therapy. Haemodialysis and cytokine adsorption filter was applied to the patient for a total of two days, and then haemodialysis catheter was not used. The catheter was removed from the patient who was decided to transfer to the service on the fifth day of his admission. Tachycardia and hypotension developed and general condition deteriorated immediately after removal of the catheter. With rapid interventions, shock findings were corrected and the patient was reintubated and followed up in mechanical ventilation. On chest X-ray and thorax ultrasonography, the left hemithorax was completely filled, and a total of 1,500 mL of blood was drained by inserting a thorax tube. The patient was transferred to the paediatric pulmonology clinic after nine days of intensive care stay. Haemothorax development after subclavian catheter removal is a rare but a life-threatening condition. For these reasons, we believe that cases with removed subclavian or internal jugular vein catheters should be followed up for a suitable period of time.

Keywords: Subclavian veincentral venous cathetershaemothorax

Introduction

Central venous catheters are frequently used in intensive care units for haemodynamic monitoring, medicine and fluid treatments, total parenteral nutrition and extracorporeal treatments.[1] Subclavian vein catheterisation may be associated with mechanical complications such as pneumothorax, haemothorax and cardiac tamponade.[2] Although haemothorax can often develop immediately after the procedure or rarely in the late period, it is very rare to develop it immediately after removal of the central catheter.[3] We present our case due to the fact that it was uncomplicated in the early period after blind left subclavian vein catheterisation but massive haemothorax developed very rapidly after catheter removal.

Case Report

A 10-year-old male patient with no previously known disease was admitted to emergency department due to complaints of diarrhoea, vomiting and poor general condition. The patient was admitted to the paediatric intensive care unit with a prediagnosis of sepsis and acute renal failure due to the increase in BUN, creatinine and procalcitonin. Physical examination of the patient showed that, consciousness was lethargic (Glasgow Coma Score was 12, E:3 M:5 V:4), body temperature 38.5°C, arterial blood pressure 85/42 mmHg, peripherally oxygen saturation (SpO_2) 99% (in room air), respiratory rate 35 min^{-1}, heart rate 168 min^{-1} and capillary refill time 5 seconds. Tenderness, defence and rebound were present in abdominal physical examination. Laboratory tests revealed the following platelet 30 × 10^3 mm^{-3}, procalcitonin > 100 ng mL^{-1} (0-2 ng mL^{-1}), CRP 211 mg L^{-1} (0-5 mg L^{-1}), blood urea nitrogen 69 mg dL^{-1} (8-20 mg dL^{-1}), creatinine 4.02 mg dL^{-1} (0.5-1.2 mg dL^{-1}), prothrombin time (PT) 20.5 seconds (9.5-13.2 seconds), activated partial thromboplastin time (aPTT) 40.9 seconds (25-37.5 seconds), INR 1.84 (0.8-1.2), leukocyte (26/HPF), leukocyte esterase (+++) and bacteria (+++) were detected in the complete urine analysis and Ph 7.32, PCO_2 30 mmHg, HCO_3 16.3 mequiv. L^{-1} and lactate 3 mmol L^{-1} in blood gas analysis. The patient was considered intra-abdominal infection and decompensated septic shock due to impaired

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Received: 27.07.2020 Accepted: 11.08.2020
Available Online Date: October 21, 2021

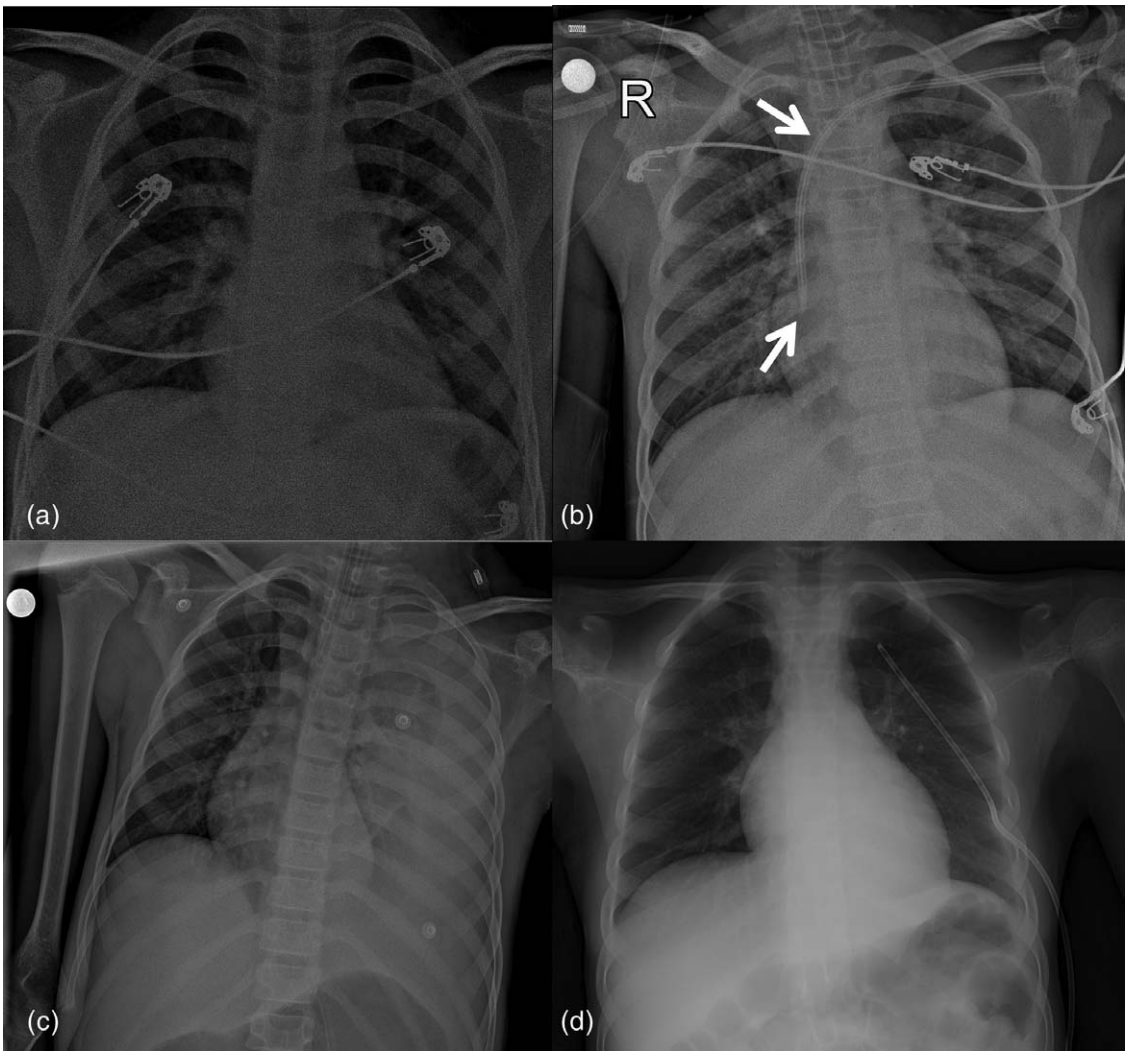

Figure 1 a-d. Chest radiographs taken during the patient's hospitalisation. (a) First hospitalisation day. (b) First hospitalisation day. After catheter insertion. White arrows show left subclavian haemodialysis catheter. (c) Fifth day of hospitalisation. After catheter removal. (d) Ninth day of hospitalisation. Before transfer to pulmonology clinic.

consciousness, prolonged capillary recovery time, hypotension and increased acute phase reactants. Crystalloid fluid resuscitation, antibiotics and inotropic treatments (epinephrine) were started. Patient was intubated after adequate fluid resuscitation and normotension is achieved, to reduce respiratory work load and ensure secure airway. Abdominal ultrasonography showed bilateral hydroureteronephrosis and trabeculation in the bladder, and no findings were compatible with abdominal free fluid or appendicitis. There was a large amount of urine outflow after the bladder catheter insertion. Despite adequate fluid resuscitation and vasopressors (epinephrine and norepinephrine), circulatory failure was continued. It was decided to use a cytokine adsorption filter (Cytosorp™ CytoSorbents Europe GmbH) due to severe septic shock. A 11.5 Fr double lumen temporary haemodialysis catheter was inserted into the left subclavian vein using the infraclavicular blind Seldinger technique. No image findings suggesting haemothorax or pneumothorax were seen in the chest X-ray taken after the procedure, while the catheter tip was seen in the appropriate position (Figure 1). A cytokine adsorption filter was applied to the

Main Points

- The subclavian vein can be used safely for vascular access in the critically ill children by experienced paediatric intensive care specialists.
- Haemothorax is the life threatening complication of subclavian catheter insertion, generally seen during or immediately after the procedure.
- Defects that may occur on the parietal pleura during or after the insertion procedure may also cause severe and life threatening haemothorax immediately after catheter removal.
- Subclavian catheter removed cases should be closely monitored for a while due to this life-threatening condition.

patient with a continuous venous–venous haemodialysis procedure with heparin anticoagulation for a total of 2 days. Heparin dosage was adjusted with activated coagulation time follow up (between 180 and 220 seconds). While no complication was observed during application, the inotropic requirement decreased rapidly and ceased completely on the second day. The patient was extubated on the second day of hospitalisation and clinical findings completely regressed in the following four days. It was decided to transfer the patient to the paediatric ward for the continuation of treatments on the fifth day of hospitalisation. The patient's platelet count was 47 × 10^3, PT 14.1 seconds and aPTT 35.2 seconds. The haemodialysis catheter was removed from the patient, because not expected to need further haemodialysis. No local bleeding was observed after removal of the catheter, and insertion site was dressed. Few minutes after the procedure, it was noticed that the patient developed tachycardia, tachypnoea and confusion. The patient was hypotensive (75/35 mmHg). It was thought that acute massive haemothorax in the patient whose respiratory sounds in the left lung could not be obtained, and the heart sounds were observed to shift to the right. Hypotension was corrected by fluid resuscitation and adrenaline infusion. The patient was reintubated and connected to the mechanical ventilator. On the chest X-ray, the left lung region was completely closed. Thorax ultrasonography showed haemorrhagic massive fluid in the left hemithorax. After giving the tranexamic acid, platelet and erythrocyte suspension, a drain was inserted into the thorax and a litre of blood was drained. The patient was extubated on the second day after haemothorax development and was followed up extubated during intensive care stay. Total of 1,500 mL blood drained from the left hemithorax drain. The patient was transferred to the pulmonology service on the ninth day of hospitalisation. Patient recovered and was discharged after 30 days of hospitalisation.

Discussion

Internal jugular, subclavian and femoral veins are the most frequently cannulated veins in intensive care units.[4] Central vein catheterisation complications are classified as early (mechanical) and late (infectious) complications.[5] Mechanical complications in the femoral vein region are in the range of 12.8-19.4% and are more common than the subclavian vein region (6.2-10.7%). However, the rates of mechanical complications requiring serious intervention are similar in femoral and subclavian veins.[2] Haemothorax is an acute and may be fatal complication of subclavian vein catheterisation.[6] However, haemothorax is rarely seen in the late period after catheter insertion, and this is often explained by long term erosion of the venous wall and pleura.[7] It is reported that in the literature, ultrasound guided central vein cannulation significantly reduces failure (from 55% to 8%) and mechanical complications (from 41% to 4%) compared to blind Seldinger techniques.[8] In our case, the catheterisation was performed with a blind Seldinger technique, and there was no evidence of complication findings during early and late follow-ups. For these reasons, we believe that the blind Seldinger technique could not be directly related to the developing post-removal haemothorax complication. Chest X-ray and ultrasonographic techniques are often used to confirm the localisation of the catheter tip.[9,10] In our case, no abnormality related to complication was found on chest X-ray after catheterisation. Haemothorax after the removal of the central venous catheter are very rare, and only a few case reports are available in the medical literature.[3,11,12] In the case reported by Collini et al,[12] the increase in flow in the subclavian vein of the arteriovenous fistula located in the extremity on the same side of the catheter is shown as a possible cause for venous and pleural perforation. In the case presented by Lee et al,[3] a possible reason could not be provided. In our case, we did not have a chance to show a vascular or pleural lesion, surgically or radiologically, but a contact of thick (11.5 Fr) haemodialysis catheter with pleura and causing local erosion seems to be the most likely cause. In our case, we think that pleural erosion may cause significant blood flow into the negative-pressure pleural cavity from the catheter entry site on the vein with the contribution of the hrombocytopenia.

Conclusion

Catheter removal can be done in clinics outside the intensive care unit or operating room. Although massive haemothorax is rarely reported after catheter removal, we believe that all cases which subclavian or internal jugular vein catheter removed should be monitored for an appropriate period.

Informed Consent: Informed consent was not obtained due to the retrospective nature of this case.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - H.S.K., A.E.B., H.N.E., N.K.; Design - H.S.K., A.E.B., H.N.E., N.K.; Supervision - H.S.K., A.E.B., H.N.E., N.K.; Resources - H.S.K., A.E.B., H.N.E., N.K.; Materials - H.S.K., A.E.B., H.N.E., N.K.; Data Collection and/or Processing - H.S.K., A.E.B., H.N.E., N.K.; Analysis and/or Interpretation - H.S.K., A.E.B., H.N.E., N.K.; Literature Search - H.S.K., A.E.B., H.N.E., N.K.; Writing - H.S.K., A.E.B., H.N.E., N.K.; Critical Review - H.S.K., A.E.B., H.N.E., N.K.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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