

Central venous catheter draining oxygenated blood- An unusual cause in an infant with congenital heart disease

Pradeep Bhaskar, MD; Reyaz Ahmad Lone, MS, Mch*; Jiju John, MD; Ahmed bin Sallehuddin, FRCS, MBA

*Reyaz Ahmad Lone, MS, Mch

Division of Pediatric Cardiac Surgery, Department of Cardiothoracic Surgery, Hamad Medical Corporation, PO Box 3050, Doha, QATAR

Phone: +974-44392995, Fax: +974-44392324; Email: drreyazlone@gmail.com

Abstract

Central venous catheter (CVC) insertion is a routine procedure during cardiac surgery. Malposition or migration of CVC after insertion is a known occurrence. Correct positioning of CVC is important to prevent complications and for optimal utilization. Aspiration of venous blood, demonstration of a venous waveform and pressure on transduction and a blood gas analysis helps in confirming the catheter placement in a vein. A routine radiography after the procedure is commonly performed to confirm the catheter position. We report a case of central venous catheter malposition in to pulmonary vein that happened in the operating room.

Keywords

CVC insertion; cardiac surgery; pulmonary vein

Introduction

Central venous catheter insertion is a routine procedure during cardiac surgery. Malposition of CVC in to a pulmonary vein can cause a diagnostic dilemma at times especially when there is no radiological assistance to confirm the position of the catheter. In patients with cardiac defects central venous catheters can drain oxygenated blood at times due to left to right shunts. A case of central venous catheter draining oxygenated blood due to malposition in to pulmonary vein that happened in an infant undergoing cardiac surgery is reported.

Case Report

A neonate, weighing 4 kg, with transposition of great arteries, intact interventricular septum and a patent foramen ovale was scheduled for arterial switch operation. A balloon atrial septostomy was done on ninth day of life. The child was hemodynamically stable with oxygen saturation in early 80's on room air. On the day of operation after induction of anesthesia, the left internal jugular vein was cannulated with a 4.5F, three lumen catheter of 6 cm length by seldinger technique in first attempt.

A routine blood gas analysis of sample from the distal lumen of the catheter showed pH 7.418, pCO₂ 32 mmHg, pO₂ 318 mmHg with SaO₂ 99.9%. Arterial blood gas analysis of sample obtained simultaneously from left radial artery showed pH 7.378, pCO₂ 35 mmHg, pO₂ 39 mmHg with SaO₂ 73%.

The distal lumen when transduced showed a venous waveform with a pressure of 8 mm of Hg. A postoperative chest radiography done in the pediatric intensive care unit showed the catheter tip positioned outside the cardiac silhouette in the left hemithorax (Figure 1). The radiographic finding together with the blood gas analysis suggested that the catheter tip might have entered into one of the left pulmonary veins which probably had an anomalous communication with the innominate vein. The catheter was replaced with a femoral venous catheter in the pediatric intensive care unit. The child had an uneventful post-operative course and was discharged home on 8th postoperative day.

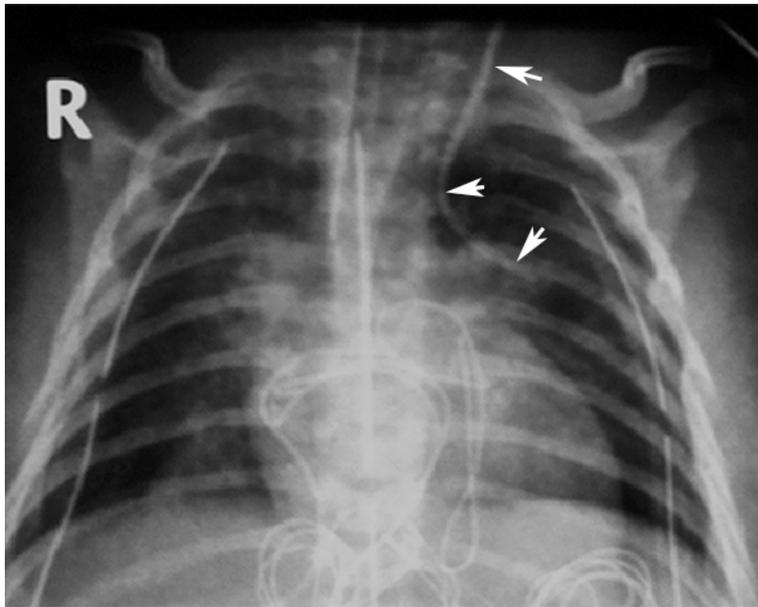


Figure: Chest X ray showing the central venous catheter tip (marked with arrows) positioned outside cardiac silhouette in the left hemithorax.

Discussion

Partial anomalous pulmonary venous drainage (PAPVD) into systemic veins or right atrium is a rare congenital anomaly and involves more commonly the right lung. These patients are usually asymptomatic; however with significant shunt they can develop pulmonary vascular disease over a period of time. A recent study shows that surgical treatment may not be necessary in patients with partial anomalous left pulmonary vein alone as untreated partial anomalous left pulmonary vein remained unobstructed during midterm follow-up [1]. Malposition of CVC into a pulmonary vein can cause a diagnostic dilemma at times especially when there is no radiological assistance to confirm the position of the catheter. In our case the catheter malposition happened inside the operating room in a patient scheduled to undergo repair of a cyanotic congenital heart defect. The differential diagnosis where the left internal jugular catheter drains low pressure arterialized blood includes catheter tip placement into an aberrant pulmonary vein, into a persistent left superior vena cava draining to left atrium due to an unroofed coronary sinus or into the left atrium through an interatrial communication. The possibility of a PAPVD never occurred to us and we presumed it to be one of the other two causes mentioned above. The diagnosis of PAPVD was made only in the pediatric intensive care unit after correlating the blood gas analysis with the position of the catheter tip in the left hemithorax. A venogram would have helped in further confirming the diagnosis.

Diagnosis of PAPVD as an incidental finding following insertion of central venous catheters in the intensive care unit have been described in adult patients [2-5]. In all of these reports the diagnosis of

PAPVD was made based on radiological finding as a chest X-ray is routinely obtained following central venous cannulations in the intensive care setting. In the operating room, radiological confirmation of catheter position is not a common practice. Use of electrocardiographic guidance while inserting the central venous catheter can help in correct catheter tip placement avoiding malpositions. Waiker et al has described the incidental finding of a central venous catheter tip in a vertical vein following a left internal jugular venous cannulation in an infant undergoing left modified Blalock-Taussig Shunt through left thoracotomy [6]. Early removal of catheter may be warranted when malposition happens into smaller veins in order to prevent the thrombotic complications.

Conclusion

In summary, malposition of central venous catheter can happen in to anomalous pulmonary veins. The possibility of a PAPVD should be considered when low pressure oxygenated blood is drawn from a central venous catheter placed through the neck veins in patients with congenital heart defects. Radiological imaging along with venogram can help in confirming the diagnosis.

References

1. Kotani Y, Chetan D, Zhu J, et al. The natural and surgically modified history of anomalous pulmonary veins from the left lung. *Ann Thorac Surg* 2013;96(5):1711-20.
2. Dote K, Sato H, Tateishi H, Uchida T, Ishihara M. Myocardial stunning due to simultaneous multivessel coronary spasms: a review of 5 cases. *J Cardiol*. 1991;21:203-14.
3. Sobrinho G, Salcher J. Partial anomalous pulmonary vein drainage of the left lower lobe: incidental diagnostic after central venous cannulation. *Crit Care Med* 2003;31(4):1271-2.
4. Chintu MR, Chinnappa S, Bhandari S. Aberrant positioning of a central venous dialysis catheter to reveal a left-sided partial anomalous pulmonary venous connection. *Vasc Health Risk Manag* 2008; 4(5):1141-3.
5. Wylam ME, Schmidt GA. Serendipitous discovery during jugular catheterization. Partial anomalous pulmonary venous connection. *Chest* 1990; 98(2):493-5.
6. Waikar HD, Lahie YK, Narenthiran S, et al. Central venous catheter: a journey through the central vein--destination pulmonary vein! *J Cardiothorac Vasc Anesth* 2007; 21(4):625-6.

Manuscript Information: Received: July 05, 2017; Accepted: September 18, 2017; Published: September 20, 2017

Authors Information: Pradeep Bhaskar, MD; Reyaz Ahmad Lone, MS, Mch*; Jiju John, MD; Ahmed bin Sallehuddin, FRCS, MBA

Division of Pediatric Cardiac Surgery, Department of Cardiothoracic Surgery, Hamad Medical Corporation, PO 3050, Doha, Qatar

Citation: Bhaskar P, Lone RA, John J, Sallehuddin AB. Central venous catheter draining oxygenated blood- An unusual cause in an infant with congenital heart disease. *Open J Clin Med Case Rep*. 2017; 1318.

Copy right statement: Content published in the journal follows Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>). © Lone RA 2017

Journal: *Open Journal of Clinical and Medical Case Reports* is an international, open access, peer reviewed Journal focusing exclusively on case reports covering all areas of clinical & medical sciences.

Visit the journal website at www.jclinmedcasereports.com

For reprints and other information, contact editorial office at info@jclinmedcasereports.com