

Case Report

An Unusual Location of a Pleural Catheter: Small is the Gate and Narrow the Road that Leads to it, and only a Very Few Find it

SW de Boer^{1*}, EA Kastelijns², T. Smith³, and FMNH Schramel²¹Department of Radiology, St. Antonius Hospital, The Netherlands²Department of Pulmonology, St. Antonius Hospital, The Netherlands³Department of Cardiothoracic surgery, St. Antonius Hospital, The Netherlands

*Corresponding author

SW de Boer, Department of Radiology, St. Antonius Hospital, Sint Antonius Ziekenhuis, Koekoekslaan 1, 3435 CM Nieuwegein, The Netherlands, Tel: 31-88-320-30-00; Email: sw.de.boer@antoniusziekenhuis.nl

Submitted: 13 June 2016

Accepted: 29 September 2016

Published: 01 October 2016

ISSN: 2333-6625

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Keywords

- Thoracocentesis
- Hematothorax
- Pleural Catheter
- Ultrasound

Abstract

Hematothorax is a rare but potential life-threatening complication following thoracocentesis, which is most commonly due to intercostal artery laceration during the insertion of the needle.

We report a case of a pleural catheter insertion into an intercostal vein. We describe the anatomic variation of the intercostal vessels and discuss the potential benefit of additional imaging during thoracocentesis.

ABBREVIATIONS

CT Scan: Computed Tomography Scan; Hb: Hemoglobin; ICS: Intercostal Space; US: Ultrasound

INTRODUCTION

Thoracocentesis is a common diagnostic and therapeutic procedure. Intercostal artery laceration during a thoracocentesis is a potentially life-threatening complication [1,2]. We report a case of a patient who presented with pleural effusion after aortic surgery. After pleural puncture and drainage the pleural effusion did not decrease which was caused by an unusual location of the pleural catheter in the intercostal vein. To our knowledge, no reports have been made about the placement of a pleural catheter in the intercostal vein during thoracocentesis.

CASE PRESENTATION

A 73 year-old male with a chronic type-A aortic dissection underwent supracoronary ascending aorta and arcus replacement with elephant trunk procedure, with an uncomplicated recovery.

Three weeks after surgery, patient presented at the emergency room with sudden collapse during coughing and shortness of breath. A computed tomography (CT) scan of the thoracic aorta showed right sided pulmonary embolisms and left sided pleural effusion but no signs of anastomotic leakage of the thoracic aorta. Anticoagulant therapy was started.

With ultrasound (US) guidance the right location for insertion of the needle was determined and a diagnostic pleural puncture was performed. Puncture showed hemorrhagic fluid with a haemoglobin (Hb) level of 5, 8 mmol/l. Hb in whole blood was 6, 2 mmol/l. A small pleural catheter (8 Fr) was placed on suction (-15 cm H₂O) in the 9th intercostal space (ICS). Within one day, 700 ml of blood was drained and a decline in whole blood Hb of 0.3 mmol/l was observed. The amount of pleural fluid on the chest X-ray did not change and concerns raised about an active bleeding focus. A new CT scan showed unchanged left sided pleural effusion. Further, the pleural catheter was not located in the pleural cavity (Figure 1a/1c), but followed the same trajectory as the 9th rib, in close relationship to the intercostal bundle. Additional digital subtraction imaging showed its location in the intercostal vein (Figure 1b).

Anticoagulant therapy was temporarily interrupted and the drain was placed on water seal. The next day, the pleural catheter was removed in the operating room and a large bore (28 Fr) pleural catheter was placed in left 5th intercostal space (ICS). It produced almost 2 liters of hemorrhagic fluid. The patient remained hemodynamically stable and the anticoagulant therapy was restarted. Patient recovered quickly and was discharged after four days. His further recovery was uneventful.

DISCUSSION

We described the rare complication of puncturing an intercostal vein during thoracocentesis.

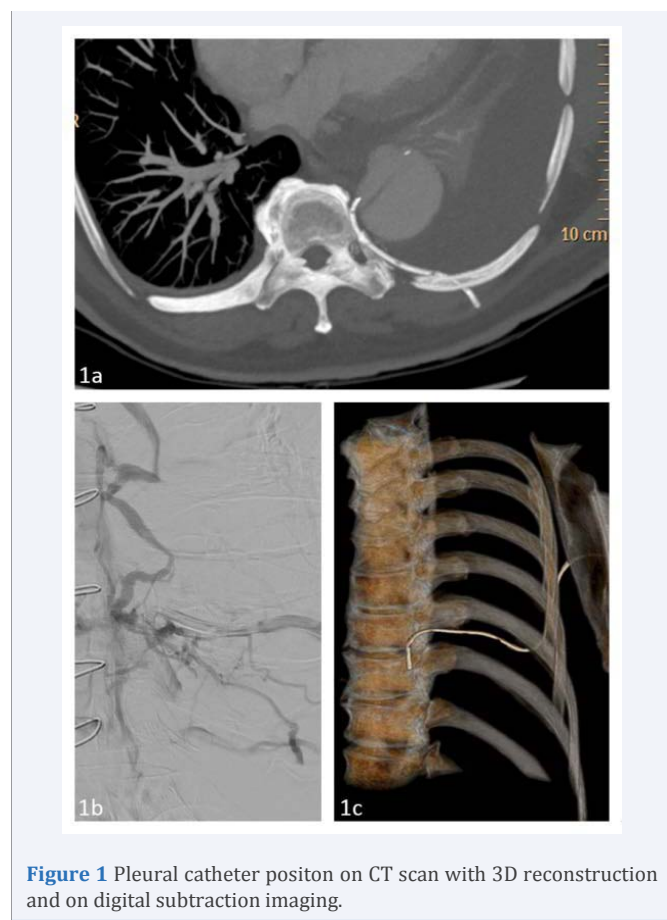


Figure 1 Pleural catheter position on CT scan with 3D reconstruction and on digital subtraction imaging.

National guidelines advise to insert the needle above the superior aspect of the rib in the ICS to avoid damaging the neurovascular bundle ('triangle of safety') [3]. Although, the neurovascular bundle is lying relatively protected by the overlying rib, insertion of the needle over the superior border of the inferior rib is not always reliable, due to patient habitus or posture or erroneous insertion of the needle which could result in vessel laceration.

US guidance with color Doppler allows the physician to determine a more accurate needle insertion and thus reduces the incidence of a complication and increases efficacy [4,5].

Imaging of intercostal vessels with US is not incorporated in current thoracic guidelines. Therefore, knowledge about the anatomic variations of the intercostal neurovascular branch remains important. The intercostal vessel begins its course exposed posteriorly, within the middle of the ICS, and

progressively moves towards the safety of the overlying rib as it travels laterally. The vessels decrease in size from posterior to anterior and after the mid axillary line it increases again to the parasternal region [6]. Interventions conducted within six cm lateral to the spinous process are potentially risky given the increased possibility of non shielding of the intercostal artery by the superior rib. Furthermore, the risk may be increased when accessing higher rib spaces [7]. Although the above described course is reliable there are individual outliers within patients [5,8]. Especially in the older patients the tortuosity of the intercostal vessels increases and the amount of safe space decreases [7,9].

In conclusion, to our knowledge we are the first to report the rare complication of puncturing an intercostal vein during thoracentesis which can be reduced by the use of US. We emphasize that in case either a vessel laceration or a hemothorax is suspected, additional imaging is needed.

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Cite this article

de Boer SW, Kastelij EA, Smith T, Schramel FMNH (2016) An Unusual Location of a Pleural Catheter: Small is the Gate and Narrow the Road that Leads to it, and only a Very Few Find it *Clin Res Pulmonol* 4(1): 1036.