Rocha SM, et al., J Neonatol Clin Pediatr 2018, 5: 026
DOI: 10.24966/NCP-878X/100026

HSOA Journal of Neonatology and Clinical Pediatrics

Case Report

Pleural Effusion as a Complication of Umbilical Venous Catheter

Sara Machado Rocha[1]*, Catarina M Lacerda[2], Margarida Rosal[3], Carla David[3] and Teresa Tomé[3]

[1]*Department of Pediatrics, Hospital de Santarém, Santarém, Portugal*

[2]*Department of Pediatrics, Centro Hospitalar Barreiro-Montijo, Santarém, Portugal*

[3]*Department of Pediatrics, Centro Hospitalar de Lisboa Central, Santarém, Portugal*

Abstract

Umbilical Venous Catheterization (UVC) is a common practice in neonatal units, though not without risks. Complications may occur in over 20% of patients; however pleural effusion is extremely rare. We report a case of an extreme preterm male neonate weighing 810 g, who developed pleural effusion due to malpositioned UVC. Pleural fluid was biochemically similar to parenteral nutrition solution. This alongside with the absence of recurrence of pleural effusion after UVC removal, support the causality between the UVC and pleural effusion. This case emphasizes the need to confirm the correct positioning of UVC. When in doubtful position, it should be withdrawn as early as possible, ensuring an alternative central access. If the clinical situation does not allow it, it is important to consider the osmolarity of the perfused solution, due to the risk of endothelial damage.

Keywords: Neonate; Parenteral nutrition; Pleural effusion; Umbilical venous catheter

***Corresponding author:** Sara Machado Rocha, Department of Pediatrics, Hospital de Santarém, Santarém, Portugal, Tel: +351 918178259; E-mail: sararocha.smr@gmail.com

Citation: Rocha SM, Lacerda CM, Rosal M, David C, Tomé T (2018) Pleural Effusion as a Complication of Umbilical Venous Catheter. J Neonatol Clin Pediatr 5: 026.

Received: November 15, 2018; **Accepted:** December 06, 2018; **Published:** December 20, 2018

Introduction

Umbilical Venous Catheterization (UVC), first described in 1947 by Diamond [1], is a common practice in most neonatal units. It provides a quick and easy access to the systemic circulation, allowing a wide variety of purposes and preventing multiple painful venipunctures. However, this procedure is associated with significant complications [2,3]. Mechanical complications may occur in over 20% of patients, especially if malpositioned [4]. Pleural effusion is rarely reported as a complication of UVC [5].

Clinical Case Report

We report a case of an extreme low birth weight preterm male neonate (810 g, 25 weeks of gestation), delivered by spontaneous vaginal delivery due to cervical incompetence. The APGAR score at first, fifth and tenth minute was 3, 5 and 7, respectively. He was intubated and ventilated at delivery room and initial physical assessment was unremarkable. Upon admission to the Neonatal Intensive Care Unit (NICU), the neonate was accidentally extubated and reintubated, then starting progressive worsening respiratory distress. Right pneumothorax was diagnosed and chest tube placed. Its correct position was confirmed by chest radiograph. The newborn was placed on high frequency oscillatory ventilation and chest drainage active suction, according to the NICU protocol. The umbilical catheters were introduced and the location of catheters tip was verified by anteroposterior chest radiograph. Umbilical Arterial Catheter (UAC) was placed at a low position and was removed after a few hours, due to vasospasm of the left lower limb. UVC tip was malpositioned at the left upper abdominal quadrant and therefore was withdrawn 1.5 cm. Parenteral nutrition was then initiated, on the first hour of life. Ampicilin and gentamycin were started as empirical treatment. During the first day, blood gases were appropriate (pH 7.35, pCO_2 35.5 mmHg) and the minimum blood glucose level was 85 mg/dL. At 24 h of life, the neonate became hypotensive and oligoanuric refractory to therapy (saline bolus, inotropic drugs and hydrocortisone) in association with worsening respiratory function, persistent hypoxemia, metabolic acidosis and blood glucose level of 47 mg/dL.

The chest radiograph showed recurrence of the right pneumothorax, due to chest tube malposition (Figure 1). The chest tube was replaced, with an initial drainage of air and serohematic fluid that turned into milky/yellowish (Figure 2), in a total of 164 ml. Cytochemical examination of pleural fluid revealed a predominance of polymorphonuclear cells and a high glucose concentration (1173 mg/dL) that is compatible with parenteral nutrition solution. Peripherally inserted central catheter was placed and UVC removed. After catheter removal, mean arterial pressure, urine output and blood glucose normalized and there was no recurrence of pleural effusion. Chest tube was removed on the fourth day and post-procedure chest radiograph showed clear parenchymal lung fields. Blood culture was sterile, therefore antibiotics were stopped at day 5. The infant remained intubated for 40 days and received parenteral nutrition for 42 days. He was discharged without oxygen at 77th day of life. Brain ultrasound at discharge was normal.

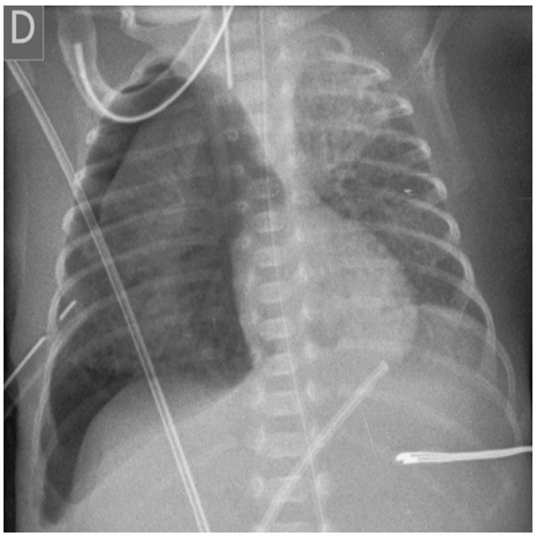

Figure 1: Recurrence of right pneumothorax due to chest tube malposition; UVC tip malpositioned at the left upper abdominal quadrant.

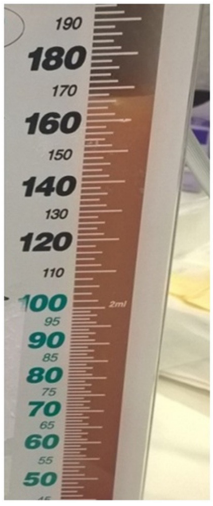

Figure 2: Milky yellowish pleural liquid, corresponding to parenteral nutrition solution.

Discussion

The high glucose concentration in the pleural fluid as well as the absence of recurrence of pleural effusion after catheter removal, support a causal relationship between the UVC and the pleural effusion. A possible mechanism could have been endothelial damage of a small vessel due to hyperosmolarity of parenteral nutrition solution (around 900 mOsm/L), as previously suggested by Traen et al., [5]. The fluid have leaked into the abdominal cavity and crossed the diaphragm openings to the thoracic cavity due to active suction of chest drainage. This explanation supports the late presentation of symptoms.

Correct positioning of the UVC is critical in order to prevent life-threatening complications [2]. The optimal position of the UVC tip is considered to be just above the diaphragm in the thoracic inferior vena cava or at the cavoatrial junction. The current standard technique used worldwide to localize the catheter tip is Anteroposterior (AP) chest radiography, since it was introduced by Peck and Lowman in 1967 [6]. However, cases have been reported suggesting that complications could occur even when AP chest radiographs revealed a proper position of catheter's tip [7,8]. Lateral views increase the accuracy of chest radiograph in predicting the location of UVC tip, but it results on greater exposure of neonate to radiation [9]. Recently, studies have demonstrated that echocardiography is superior to AP chest radiographs for UVC tip localization [2,10].

We should not forget to check the catheter's tip location after any repositioning, and re-evaluate it regularly is mandatory. When malpositioned or in doubtful position, catheters should be withdrawn as early as possible, ensuring an alternative access. If the clinical situation does not allow it, it is important to consider the osmolarity of the perfused solutions, due to the risk of endothelial damage.

Financial Disclosure

The authors have no financial relationships relevant to this article to disclose.

Conflict of Interest

The authors have no conflicts of interest to disclose.

Contributor's Statement Page

Sara Machado Rocha: Concepted, designed, drafted and revised the manuscript.

Catarina M Lacerda: Reviewed and revised the manuscript.

Margarida Rosal, Carla David and Teresa Tomé: Served as scientific advisors and critically reviewed the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

References

1. Diamond LK (1947) Erythroblastosis foetalis or haemolytic disease of the newborn. Proc R Soc Med 40: 546-550.

2. Pulickal AS, Charlagorla PK, Tume SC, Chhabra M, Narula P, et al. (2013) Superiority of targeted neonatal echocardiography for umbilical venous catheter tip localization: Accuracy of a clinician performance model. J Perinatol 33: 950-953.

3. Hoellering AB, Koorts PJ, Cartwright DW, Davies MW (2014) Determination of umbilical venous catheter tip position with radiograph. Pediatr Crit Care Med 15: 56-61.

4. Lloreda-García JM, Lorente-Nicolás A, Bermejo-Costa F, Fernández-Fructuoso JR (2016) Complicaciones mecánicas asociadas a la localización de la punta de catéteres centrales en una unidad neonatal. Anales de Pediatría 85: 77-85.

5. Traen M, Schepens E, Laroche S, van Overmeire B (2005) Cardiac tamponade and pericardial effusion due to venous umbilical catheterization. Acta Paediatr 94: 626-628.

6. Peck DR, Lowman RM (1967) Roentgen aspects of umbilical vascular catheterization in the newborn. The problem of catheter placement. Radiology 89: 874-877

7. Unal S, Arifoglu I, Celik IH, Yilmaz O, Bas AY, et al. (2017) Pleural and pericardiac effusion as a complication of properly placed umbilical venous catheter. J Neonatal Surg 6: 34.

8. Pabalan M, Wynn RJ, Reynolds AM, Ryan RM, Youssfi M, et al. (2007) Pleural effusion with parenteral nutrition solution: An unusual complication of an "appropriately" placed umbilical venous catheter. Am J Perinatol 24: 581-586.

9. Guimarães AF, Souza AA, Bouzada MC, Meira ZM (2017) Accuracy of chest radiography for positioning of the umbilical venous catheter. J Pediatr (Rio J) 93: 172-178.

10. Fleming SE, Kim JH (2011) Ultrasound-guided umbilical catheter insertion in neonates. J Perinatol 31: 344-349.

Journal of Anesthesia & Clinical Care

Journal of Addiction & Addictive Disorders

Advances in Microbiology Research

Advances in Industrial Biotechnology

Journal of Agronomy & Agricultural Science

Journal of AIDS Clinical Research & STDs

Journal of Alcoholism, Drug Abuse & Substance Dependence

Journal of Allergy Disorders & Therapy

Journal of Alternative, Complementary & Integrative Medicine

Journal of Alzheimer's & Neurodegenerative Diseases

Journal of Angiology & Vascular Surgery

Journal of Animal Research & Veterinary Science

Archives of Zoological Studies

Archives of Urology

Journal of Atmospheric & Earth-Sciences

Journal of Aquaculture & Fisheries

Journal of Biotech Research & Biochemistry

Journal of Brain & Neuroscience Research

Journal of Cancer Biology & Treatment

Journal of Cardiology: Study & Research

Journal of Cell Biology & Cell Metabolism

Journal of Clinical Dermatology & Therapy

Journal of Clinical Immunology & Immunotherapy

Journal of Clinical Studies & Medical Case Reports

Journal of Community Medicine & Public Health Care

Current Trends: Medical & Biological Engineering

Journal of Cytology & Tissue Biology

Journal of Dentistry: Oral Health & Cosmesis

Journal of Diabetes & Metabolic Disorders

Journal of Dairy Research & Technology

Journal of Emergency Medicine Trauma & Surgical Care

Journal of Environmental Science: Current Research

Journal of Food Science & Nutrition

Journal of Forensic, Legal & Investigative Sciences

Journal of Gastroenterology & Hepatology Research

Journal of Gerontology & Geriatric Medicine

Journal of Genetics & Genomic Sciences

Journal of Hematology, Blood Transfusion & Disorders

Journal of Human Endocrinology

Journal of Hospice & Palliative Medical Care

Journal of Internal Medicine & Primary Healthcare

Journal of Infectious & Non Infectious Diseases

Journal of Light & Laser: Current Trends

Journal of Modern Chemical Sciences

Journal of Medicine: Study & Research

Journal of Nanotechnology: Nanomedicine & Nanobiotechnology

Journal of Neonatology & Clinical Pediatrics

Journal of Nephrology & Renal Therapy

Journal of Non Invasive Vascular Investigation

Journal of Nuclear Medicine, Radiology & Radiation Therapy

Journal of Obesity & Weight Loss

Journal of Orthopedic Research & Physiotherapy

Journal of Otolaryngology, Head & Neck Surgery

Journal of Protein Research & Bioinformatics

Journal of Pathology Clinical & Medical Research

Journal of Pharmacology, Pharmaceutics & Pharmacovigilance

Journal of Physical Medicine, Rehabilitation & Disabilities

Journal of Plant Science: Current Research

Journal of Psychiatry, Depression & Anxiety

Journal of Pulmonary Medicine & Respiratory Research

Journal of Practical & Professional Nursing

Journal of Reproductive Medicine, Gynaecology & Obstetrics

Journal of Stem Cells Research, Development & Therapy

Journal of Surgery: Current Trends & Innovations

Journal of Toxicology: Current Research

Journal of Translational Science and Research

Trends in Anatomy & Physiology

Journal of Vaccines Research & Vaccination

Journal of Virology & Antivirals

Archives of Surgery and Surgical Education

Sports Medicine and Injury Care Journal

International Journal of Case Reports and Therapeutic Studies

Submit Your Manuscript: http://www.heraldopenaccess.us/Online-Submission.php

Herald Scholarly Open Access, 2561 Cornelia Rd, #205, Herndon, VA 20171, USA.
Tel: +1-646-661-6626; E-mail: info@heraldsopenaccess.us
http://www.heraldopenaccess.us/