



Case Report

# Neonatal Ventricular Tachycardia after Insertion of an Umbilical Venous Catheter

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Citation: Sanchez A, Mansour S, Borrhomee S. (2022) Neonatal Ventricular Tachycardia after Insertion of an Umbilical Venous Catheter. Ann Case Report 7: 825. DOI: 10.29011/2574-7754.100825

Received: 07 April 2022; Accepted: 12 April 2022; Published: 14 April 2022

## Abstract

We report the case of a full term newborn, presenting at birth with respiratory distress and clinical signs of hypoxic-ischemic brain injury. To provide sedative drugs and fluids, an umbilical venous access was inserted. After the insertion of the umbilical venous catheter, the patient presented a supra ventricular tachycardia, followed by a transitory ventricular tachycardia, that stopped after the catheter was removed. To our knowledge, several case reports have described the association between umbilical venous catheter and arrhythmias but, no case of ventricular tachycardia was observed

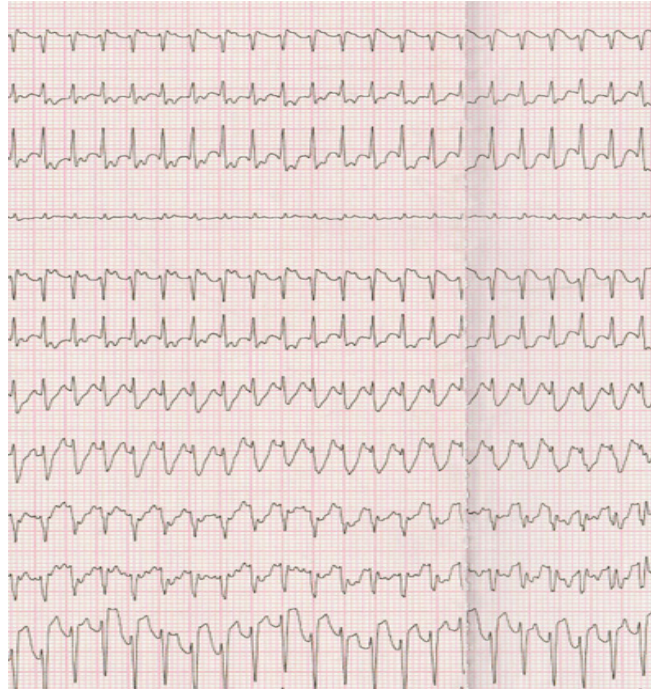
## Introduction

The umbilical venous catheter (UVC) is a common technique in neonatology in order to provide parental nutrition and drugs. Some risks are well-known including infection, thrombosis and arrhythmias [1,2]. Due to catheter misplacement, the arrhythmia usually affects the heart's upper chambers when it occurs. Though several case reports have described the association between umbilical venous catheter and arrhythmias [3,4], no case of ventricular tachycardia was observed. The aim of this article is to report a case of a full term newborn who developed a ventricular tachycardia after the insertion of an umbilical venous catheter.

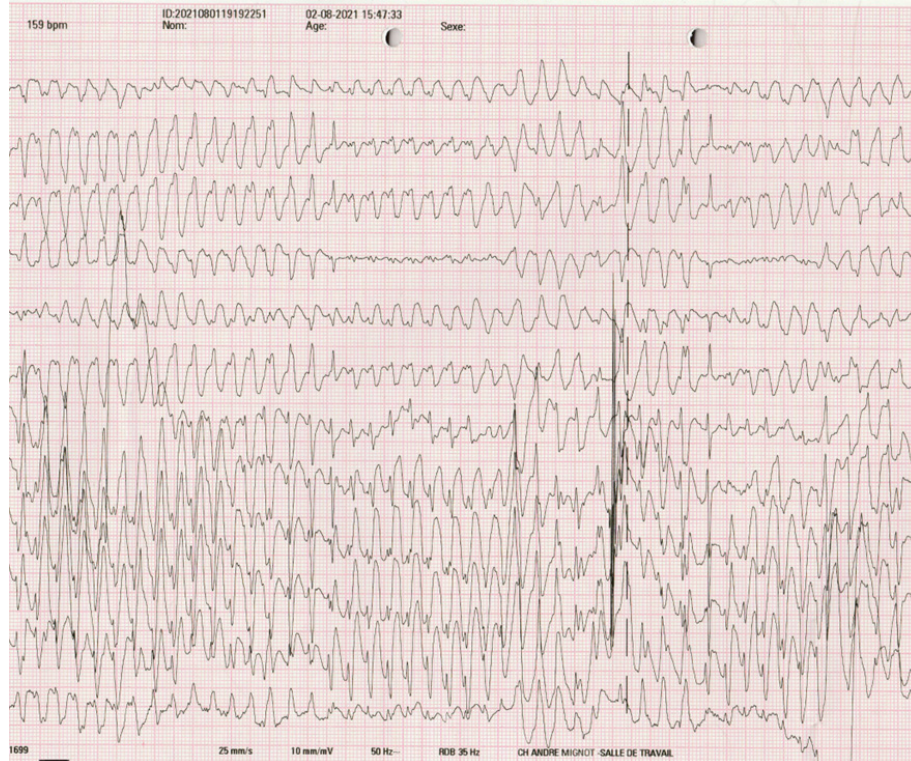
## Case description

The patient was a 2890g female infant born at 39 weeks of a twin pregnancy. She was born by cesarean section for fetal bradycardia. Apgar scores was 2, 2, 3 at 1, 5, 10 minutes, with a pH of 7.16 and lactates at 5.1mmol/L in the umbilical cord blood. She presented with immediate respiratory distress and received non invasive ventilation support with CPAP, allowing progressive stabilization. Medical assessment found a pathological neurological examination with hypotonia and lack of responsiveness. The biological control at M30 showed pH at 6.82 and lactates 17 mmol/L and blood pH remained low at H1 (pH 6.8, lactates 13.3 mmol/L) despite respiratory and circulatory stabilization. Neurological exam was still abnormal. Due to difficulty in establishing a peripheral venous access, UVC was

inserted to 9 cm to allow administration of medication and nutrition. Soon after the procedure, the patient showed a tachycardia at 280 bpm. Electrocardiogram was performed and confirmed a supra ventricular tachycardia (Figure 1) with ventricular extrasystoles, followed by a transitory passage in ventricular tachycardia (Figure 2) during 47 seconds, resulting in clinical circulatory failure. Several reduction attempts were performed: vagal maneuvers, followed by 2 doses of adenosine drug (0.3mg/kg), without success. The catheter position was checked with chest X ray and showed malposition of UVC, too deep inside the right atrium. Echocardiography was performed, finding the catheter in the right atrium in front of the oval foramen. The catheter was therefore withdrawn and pulled back one centimeter which allowed immediate amendment of tachycardia. Troponin level were elevated at 11958 ng/L. Despite the return to a normal heart rhythm, neurological examination remained concerning and further explorations found a type B discontinuous electroencephalogram. The patient was put in therapeutic hypothermia in this context of perinatal anoxic ischemic encephalopathy. No recurrence of arrhythmias occurred during the rest of the patient's care and the kinetics of troponin were favorable with a control at 4000 ng/L at day 1 and normal heart function before discharge. After 72h of therapeutic hypothermia, neurological exam was reassuring, and brain MRI found bilateral peri-rolandic and occipital cortical lesions, without involvement of white matter or basal ganglia. Follow up will carry on with our team until the age of seven years old to assess proper neurodevelopment.



**Figure 1:** Supra ventricular tachycardia.



**Figure 2:** Ventricular tachycardia.

## Discussion

Supraventricular tachycardia (SVT) is a common arrhythmia during the neonatal period and its evolution is usually favorable. It has been associated to umbilical catheter misplacement in several case reports. Ventricular tachycardia (VT), however, has been studied in the pediatrics population [5] and it's not proved that a mechanical etiology like UVC misplacement can be responsible. This case report seems to show a correlation between VT and UVC since VT occurred following 3 minutes of SVT after UVC misplacement. Moreover, only the pullback of 1cm of the catheter stopped the arrhythmia, without any recurrence during the hospitalisation. Mechanically induced VT were described in adults [6] but the mechanical stimulation must be in the ventricle itself. In our case, the catheter was only slightly too deep in the atrium and was never seen past the tricuspid valve. We think there is a possibility that the catheter wasn't secured tightly enough and it might have moved during the resuscitation. Fixation system consisted in suturing with 3.0 strand, starting with a first stitch across the umbilical skin and jelly, to ensure stability. No tape is added on the infant's skin. We might need to consider systematic use of a tape and bridge tape, on top of our actual fixation in the future, to ensure maximum stability during resuscitation. In children populations, VT commonly has a favorable prognosis when infants have a normal heart [5]. It was the case in our situation. Usual treatment [5] is based on antiarrhythmic medications (lidocaine, amiodarone, Beta blockers). Depending on the etiology, other interventions included cardioversion, radiofrequency catheter ablation or surgery can be discussed. In our case, etiologic treatment consisted in removing the catheter and was enough to ensure durable sinus rhythm. Since she had no other risk factor for recurrence, no further explorations or treatments were needed. The umbilical venous catheter is a mainstay in neonatology. There are methods to determine the correct insertion and localization of the catheter. The most commonly used method is the one used in our center, based on the newborn's weight described by Shukla [1]. There are other methods but all are limited by interpersonal variations. In practice, the localization of the umbilical venous catheter is verified by chest Xray [7,8], the ideal position is located around T8 thoracic vertebrae. This verification is systematic. In our case, correct position was only verified after arrhythmia occurred

but it's a matter of circumstances, because the neonatologist was actually dealing with the baby's instability. The management of newborns with cardiac arrhythmias secondary to UVC has not been studied. The investigation of its position is essential in order to clarify the different steps of the handling, in particular with regard to the necessity or not of a pullback of the catheter. Every necessary symptomatic treatments should be added, depending on the patient's clinical state, such as vasoactive drugs if circulatory failure occurs. Differential diagnosis for arrhythmia must also not be overlooked and infection must always be considered, along with metabolic disorder or iatrogenic arrhythmia through maternal treatments/intoxication. Other studies are necessary to describe this event and analyze its cause, in order to improve treatment and prevent sequels of this iatrogenic effect.

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