

CASE REPORTS

Supraventricular tachycardia induced by central venous catheter in a newborn

Taquicardia supraventricular induzida por cateter venoso central num recém-nascido

Mariana Portela¹ , Lídia Leite¹ , Sofia Granja² , Filipa Raposo^{1,3} , Almerinda Barroso^{1,3} , Clara Machado^{1,3} 

ABSTRACT

Introduction: Central venous catheter (CVC) is an important tool in newborn care in the Neonatal Intensive Care Unit. Complications related to CVC placement, such as tachyarrhythmia, are most often due to malposition.

Case report: Herein is reported the case of a preterm neonate who developed supraventricular tachycardia after insertion of an umbilical venous catheter (UVC). The UVC was pulled out, but reestablishment of the sinus rhythm required adenosine administration.

Discussion: Despite being rare in preterm newborns, tachyarrhythmia is a well-known complication of catheter malposition, mostly caused by low anatomic accuracy associated with the small size of the heart.

Conclusion: In cases of tachyarrhythmia in newborns, it is mandatory not only to review the CVC position within the heart but also to rapidly diagnose the type of arrhythmia, avoiding more severe complications.

Keywords: central venous catheter; newborn; supraventricular tachycardia; tachyarrhythmia

RESUMO

Introdução: O cateter venoso central (CVC) é uma ferramenta importante no cuidado do recém-nascido na Unidade de Cuidados Intensivos Neonatais. As complicações associadas ao CVC, como taquiarritmia, ocorrem mais frequentemente devido ao seu mau posicionamento.

Relato do caso: É reportado o caso de um recém-nascido pré-termo que desenvolveu taquicardia supraventricular (TSV) após inserção de um cateter venoso umbilical (CVU). Embora o CVU tenha sido retirado, o restabelecimento do ritmo sinusal requereu administração de adenosina.

Discussão: Embora rara em recém-nascidos prematuros, a taquiarritmia é uma complicação bem conhecida do mau posicionamento do cateter, atribuída principalmente à dificuldade de precisão anatómica devido à reduzida dimensão do coração neste grupo etário.

Conclusão: Perante um caso de taquiarritmia num recém-nascido, é fundamental não só confirmar a posição do CVC no coração, como também diagnosticar rapidamente o tipo de arritmia, evitando complicações mais graves.

Palavras-chave: cateter venoso central; recém-nascido; taquiarritmia, taquicardia supraventricular

1. Department of Pediatrics, Hospital de Braga. 4710-243 Braga, Portugal.
mariana.fpo@hotmail.com; lidialeitemarques@gmail.com; filipa_raposo@hotmail.com; almerindabarrosopereira@gmail.com
2. Department of Pediatric Cardiology, Centro Hospitalar Universitário de São João. 4200-319 Porto, Portugal.
sofiagranja@hotmail.com
3. Neonatal Intensive Care Unit, Hospital de Braga. 4710-243 Braga, Portugal.
filipa_raposo@hotmail.com; almerindabarrosopereira@gmail.com; clara.machado@gmail.com

INTRODUCTION

Umbilical venous catheter (UVC) is commonly used in the Neonatal Intensive Care Unit (NICU) as a tool for the administration of fluids, nutrition, and medications.⁽¹⁻⁴⁾ Ideally, UVC should be located just outside the heart, at the junction of the inferior vena cava and right atrium.² Chest and abdomen radiography is the most common method to confirm the position of the catheter, but ultrasound has also been used, with favorable outcomes.⁽¹⁻²⁾ UVC complications usually result from catheter malposition and include pericardial effusion and cardiac tamponade, pleural effusion, thrombosis, endocarditis, infections, and cardiac arrhythmia, among others.⁽²⁻⁴⁾

Tachyarrhythmia is a well-known potential complication of central venous catheter (CVC) placement in adults. However, only a few cases have been reported in neonates.⁽¹⁾

CLINICAL CASE

A boy with 1250 g (90th percentile) and 27+5 weeks of gestational age was born by vaginal delivery after a spontaneous preterm birth, with incomplete lung maturation. Apgar score was 5/8/10 (at 1, 5, and 10 minutes, respectively). After birth, he required resuscitation measures with positive pressure ventilation and endotracheal

ventilation. At NICU, surfactant was administered, and the patient started to receive caffeine citrate and empiric antibiotics. Since the mean arterial blood pressure (MABP) was low (19 mmHg), peripheric dopamine infusion was administered, with favorable outcome. An umbilical arterial catheter (UAC) and UVC were inserted to the length of 12.8 cm and 7.4 cm, respectively. Easy bleeding was noted during the procedure, and the newborn suddenly developed tachycardia immediately after UVC insertion, with a heart rate of 300-320 beats/minute. Since chest radiography was not an immediate option at the moment, UVC and UAC were pulled back, but tachycardia persisted. The patient maintained hemodynamic and respiratory stability and good peripheral perfusion. An echocardiogram and electrocardiogram (ECG; **Figure 1**) were performed, excluding cardiac tamponade. MABP remained stable. After consulting with the Pediatric Cardiology, supraventricular tachycardia was confirmed. Because the patient was a premature neonate on the first day of life, vagal maneuvers with crushed ice were not initiated to avoid thermal instability. Alternatively, adenosine was administered at the dose of 50 mcg/kg, with a resulting heart rate of 200 beats/minute and reestablishment of the sinus rhythm. Both central lines were pulled out. After the event, the patient remained in NICU, with no additional cardiovascular complications or sequelae. Since no accessory pathway was found, the exact cause of this event remained unknown.

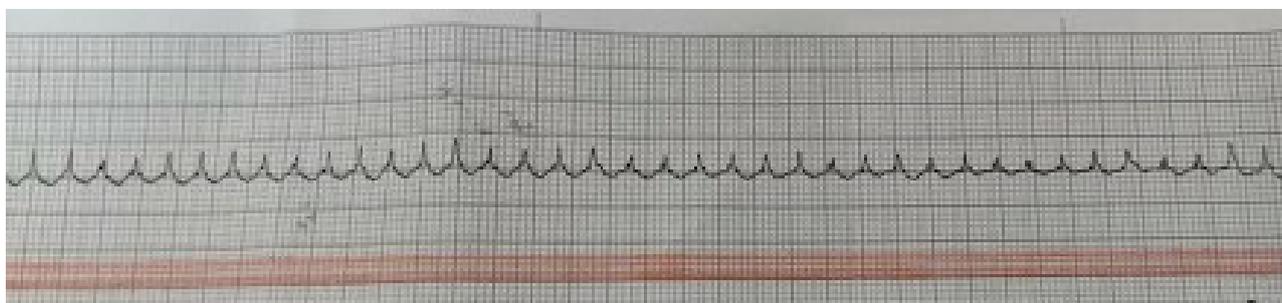


Figure 1 - ECG showing tachycardia with narrow QRS; rate of 300 beats/min

DISCUSSION/CONCLUSIONS

Atrial flutter and supraventricular tachycardia (SVT) are the most common arrhythmias found. However, atrial flutter is not frequent in the neonatal period.^(1,2,4) Since the therapeutic attitude comprises synchronized cardioversion in atrial flutter and adenosine in SVT, prompt distinction of these conditions is of great relevance.^(1,4) Atrial flutter consists of regular rapid atrial rate of 240-360 beats/min and regular rhythm with sawtooth pattern of P waves and narrow QRS in ECG (in the absence of aberrant pathways). SVT also has a narrow QRS but is characterized by regular R-R interval, rates of 260-300 beats/min, and absence of P waves.⁽³⁾

Reasons for CVC migration include contraction of the umbilical stump and changes in the size of the abdomen, recurrent movement of the affected limb or head, and routine flushing or handling of the catheters by medical or nursing staff.^(1,2) In most cases, arrhythmia occurs at the time of catheter insertion but may also happen hours or even days later.⁽¹⁾ Therefore, imaging assessment to confirm the position of the catheter should not be delayed.⁽¹⁾ Proposed mechanisms for the development of arrhythmia associated with central lines include premature atrial beat, induced when the catheter tip touches the endocardium and triggers SVT in the presence of an accessory pathway, and mechanical distortion of the atria, predisposing for a reentry pathway.^(1,2)

The most effective treatment for SVT depends on the overall cardiovascular status and may include cardiovascular resuscitation in severe cases, and synchronized cardioversion in hemodynamically unstable patients.^(3,5) Vagal maneuvers and intravenous adenosine may be used in hemodynamically stable patients.^(1,3,5) Vagal maneuvers, such as placing crushed ice over the face for a few minutes or oropharyngeal suction, may buy some time while adenosine is being prepared, but their use in neonates is controversial.⁽³⁾ Adenosine starting dose should be 0.05-0.1 mg/kg, until a maximum of 0.3 mg/kg.⁽⁶⁾ Although withdrawal of the catheter tip is important, most cases also require medical therapy to induce reversion to sinus rhythm.⁽¹⁾

With this case, the authors aimed to raise awareness of tachyarrhythmia as a potential and serious complication of CVC in neonates and for the importance of checking the position of the catheter. Prompt diagnosis of the type of arrhythmia is also crucial to define an early and adequate therapeutic strategy.

AUTHORSHIP

Mariana Portela - conceptualization; Writing – original draft; Writing – review & editing

Lidia Leite – Conceptualization; Writing – review & editing

Sofia Granja – Conceptualization; Writing – review & editing; Supervision

Filipa Raposo – Conceptualization; Writing – review & editing; Supervision

Almerinda Barroso – Conceptualization; Writing – review & editing; Supervision

Clara Machado – Conceptualization; Writing – review & editing; Supervision

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CORRESPONDENCE TO

Mariana Portela
Department of Pediatrics
Lugar das Sete Fontes
Hospital de Braga
4710-243 Braga
Email: mariana.fpo@hotmail.com

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