



## Review

## Lower extremity ischemia following umbilical artery catheterization: A case study and clinical update

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### ABSTRACT

In the neonatal intensive care unit, the use of umbilical artery catheters (UAC) is established. Methods to perform uninterrupted arterial blood gas and pressure monitoring, access for the delivery of fluids and medication, exchange transfusion, cardiac catheterization, and angiography using umbilical artery catheters are used in the care of critically ill neonatal patients. One complication that can develop with the use of UAC's is lower limb ischemia, which can result in catastrophic effects, including limb amputation. In selected cases, conservative management may be an option in patients for limb salvage in the setting of lower limb ischemia.

In this paper, we present a case study of a patient who developed lower limb ischemia during UAC who was treated conservatively. This approach resulted in limb salvage and avoidance of lower extremity amputation. The literature was reviewed for relevant risk factors and treatment options for lower limb ischemia following umbilical artery catheterization.

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## 1. Background

Umbilical artery catheters (UAC) are a useful intervention in facilitating care for neonates with cardiopulmonary disease. The most common usages for UAC are blood sampling and infusion of fluids and medications. With an increased use of umbilical artery catheters, there have been notable clinical complications of its use in the literature.<sup>1,2</sup> These complications include thrombotic or embolic events, hemorrhage, arterial spasm resulting in ischemia of the lower extremities, sepsis, necrotizing enterocolitis, hypertension, congestive heart failure, visceral gangrene, aortic aneurysm, peritoneal perforation with bleeding, spinal cord infarct and paraplegia, foot drop, osteomyelitis, refractory hypoglycemia, vesicumbilical fistula, visceral herniation through the umbilical ring, urinary ascites, vascular perforations, and death.<sup>3</sup> Wigger suggests that, at one time, catheter associated complications may have been the cause of death in up to 12% of infants with umbilical artery catheters.<sup>4</sup> Clinicians may recognize that the visible complications include blanching and/or cyanosis of the distal extremity or buttock area due to vasospasm or thrombosis.

### 1.1. Risk factors associated with complications from UAC

Both patient and catheter induced factors exist which favor the development of thrombotic complications. Variables relating to the patient include low flow states,<sup>5</sup> hypoxia, hyperviscous or hypercoagulable states, and sepsis.<sup>4</sup> Critically ill neonates often have these clinical conditions favoring these developments. Complications that are associated with the catheter itself may be explained by the method of placement and subsequent manipulation or replacement of the catheter, catheter size, configuration, and composition, placement level in the aorta, use of heparin in the infusate, tonicity and pH of infusates, and the duration of catheter use.<sup>5</sup>

## 2. Case study

A neonate was transferred to our NICU following the placement of an umbilical artery catheter who developed a subsequent ischemic limb episode. We review the hospital course of this patient and pertinent literature.

This case review was IRB approved for review and no conflicts of interest were identified. The patient was a 2 day old neonate transferred to Children's Memorial Hospital for further management following the insertion of a UAC for monitoring. Within hours following the insertion of the catheter, the patient's right lower

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