

A Retained Arterial Catheter Fragment Migrates to Base of Thumb and Requires Two Subsequent Surgeries for Removal

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Introduction

-Placement of a radial arterial (RA) line for hemodynamic monitoring or serial lab draws is frequently performed during the perioperative period. -Major complications from arterial line placement are rare (<1% of cases) but do occur (1). -Potential complications of arterial cannulation include distal ischemia, hematoma formation, infection, thrombosis, embolism, and permanent arterial injury (1, 4), and a damaged catheter likely increases the risk of these complications. -Causes of catheter damage include shearing by stylets or needles during placement, mechanical stress due to repeated movement, and accidental damage while suturing or cutting with scissors during removal (3, 4). -Methods and equipment used for arterial cannulation varies, without clear guidelines for acceptable standards in the literature. -We present an unusual but serious complication of a retained catheter fragment in the radial artery requiring two subsequent surgical interventions for removal.

Overview of potential complications associated with arterial cannulation (1,4):

- Thrombosis
- Hematoma
- Claudication
- Compartment syndrome
- Distal ischemia
- Accidental dislodgement of catheter
- Inadequate padding of pressure points resulting in skin damage
- Catheter contamination and infection
- Retention of catheter fragment
- Permanent arterial damage

Case Report

-A 10 year old female with PMH significant for heterotaxy syndrome, atrioventricular septal defect status post repair, and complete heart block presented for removal and replacement of pacemaker. Induction, intubation, and PIV placement went smoothly. An arterial line was placed due to repeat thoracotomy. The left RA was cannulated on first attempt using a 22-gauge PIV catheter. The surgery was uneventful, and the pt was extubated and admitted to the PICU. -On post-operative day 1, the arterial line was removed and it was noted that ~2 cm of catheter was missing. The catheter fragment was easily palpated in the wrist and visualized on bedside ultrasound by the pediatric intensive care fellow.



Figure 2. Arterial catheter fragment compared to intact catheter demonstrates approximately 2 cm of missing catheter

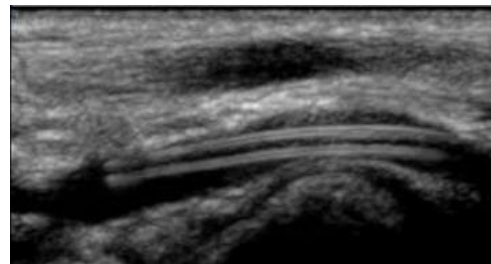


Figure 1. Ultrasound image showing patient's retained arterial catheter fragment

-The pt was taken to the OR later that day by vascular surgery for catheter retrieval under GA; however, the surgical team was unable to locate the fragment after dissection down to the RA. Angiography showed no filling defect, and the procedure was aborted. -Formal vascular studies obtained on POD2 demonstrated migration of the fragment distally to the base of the thumb. Orthopedic surgery was consulted, and the pt underwent hand exploration under GA on POD3. The fragment was found to have migrated further to the common digital artery (CDA) of the index finger. After difficult dissection, the fragment was removed intact and repair of the CDA and RA was performed. -Post-operatively, the pt had mild paresthesias of the left index finger and abnormal two-point discrimination. This was thought to represent a neuropraxia injury that would resolve with time.

Discussion

-There are many ways that an arterial catheter can be damaged during placement and removal, and care should be taken to avoid this complication. In particular, although not performed in this case, re-inserting a needle into the catheter after placement into the patient should be avoided due to increased potential for catheter damage (4), and scissors or other sharp tools should not be used for removal (2). -In this case, there was no obvious external cause for damage to the catheter. Notably, a 22-gauge PIV catheter meant for low-pressure venous access was used in place of a prepackaged arterial cannula meant for higher pressures. This, plus mechanical stress, may have been enough to cause breakage. -All arterial catheters should be checked for integrity upon placement and removal. If the integrity of the catheter is in doubt, or if a patient complains of continued pain after removal, examination with ultrasound should be considered (1, 3, 4). -In this case, the patient underwent a 2nd procedure for removal which could potentially have been avoided, highlighting the importance of explicit communication among care teams. -This case highlights a potentially serious risk of the practice of using venous catheters as arterial lines in children. This topic requires further investigation.

References

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