

Amputation of Dominant Limb After End Artery Arterial Line Placement

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Introduction

- End-artery arterial line placement is often essential for critically ill patients who require continuous hemodynamic monitoring, particularly when standard access points are unavailable.
- Despite its widespread use, arterial line placement carries risks, particularly in patients with septic shock when hypotension, low vascular flow, and hyperinflammatory states are present.
- This presentation explores a case in which a brachial arterial line contributed to severe vascular complications.
- Preoperative risk versus benefit assessments should be made to determine the need for procedures, such as an arterial line.

Case Description

- A 29-year-old male who presented with peritonitis and pneumoperitoneum and underwent an emergency exploratory laparotomy.
- A brachial arterial line was placed due to septic shock and inability to access the radial artery; the patient subsequently had a total colectomy for CMV colitis.
- Postoperatively, the patient's limb showed mottling and significant clot formation at the arterial line site, confirmed by ultrasound.



- Initial treatment included a heparin drip followed by thrombectomy; however, multiple thrombectomies and a hematoma cut-down were required, ultimately resulting in an above-the-elbow amputation.
- Workup revealed no underlying hypercoagulable disorder; the arterial thrombus was likely due to low venous flow and stasis from hypotension related to septic shock.

Discussion

- Although rare, amputation and other severe vascular complications can occur as a result of end-artery arterial line placement. A study in the American Society of Anesthesiologists journal reports the rate of vascular complications or nerve injuries from arterial line placement as 3.4 per 10,000.
- In patients with septic shock, the risk of vascular complication increases due to hypotension and resultant low flow states, which can promote thrombus formation around the line.
- Septic conditions also create an inflammatory response, leading to vascular changes that further increase the risk of clot formation, particularly in limbs with compromised blood flow.
- Continuous hemodynamic monitoring is crucial in critical care, but the risks associated with arterial lines should prompt careful consideration, especially in patients with additional risk factors for thrombosis.
- Non-invasive blood pressure monitoring devices may offer safer alternatives in high-risk cases, although they can sometimes be unreliable in patients with movement or comorbidities like peripheral vascular disease or arthritis.
- This case serves as a reminder of the delicate balance in choosing invasive versus non-invasive monitoring in critically ill patients, where the benefits of accurate data must be weighed against the potential for severe complications.

Conclusion

- This case highlights the importance of assessing each patient's unique risks and considering alternative monitoring methods for those at higher risk of complications.
- Clinicians must balance the need for accurate hemodynamic monitoring with the potential for vascular complications, especially in patients prone to low flow states and inflammation.
- In high-risk patients, non-invasive monitoring options may reduce the likelihood of complications, though they have limitations in certain populations.
- Ongoing development of more reliable non-invasive monitoring technologies could help improve patient safety in the future by reducing the reliance on invasive arterial lines in vulnerable populations.

References

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