

**Brachial artery occlusion with transient finger paralysis related to blood pressure measurements**

To the Editor:

A 93-yr-old woman with hypertension (126/54 mmHg treated with amlodipine 2.5 mg·day$^{-1}$), mitral regurgitation (third degree), and dementia (14 points by the mini-mental state examination treated with donepezil 3 mg·day$^{-1}$) was scheduled for surgical reduction and internal fixation of a fractured femur. Preoperatively, the Allen’s test was inconclusive because of the patient’s dementia, although the preoperative motor function of her upper extremities appeared normal. Under local anesthesia, we inserted a 22-G catheter into the patient’s right radial artery without difficulty. To allow cardiac output estimation using the Vigileo$^{TM}$ monitor (Edwards LifeScience LLC, Irvine, CA, USA), the catheter was connected to the Flotrac$^{TM}$ sensor. Spinal anesthesia was performed uneventfully using 0.5% bupivacaine. Throughout anesthesia, non-invasive blood pressure was measured at the patient’s right upper arm using a standard adult cuff (width 13 cm) every five minutes. Acetate Ringer’s solution was intravenously administered at 5–10 mL·kg$^{-1}$·hr$^{-1}$. In the operating room, her hemodynamics, including blood pressure (100–130 / 40–55 mmHg), heart rate (50–62 beats·min$^{-1}$), and cardiac index (1.8–2.1 L·min$^{-1}$·m$^{-2}$), were stable. The duration of the arterial catheter insertion was 85 min, and the procedure time was 90 min. Postoperatively, the radial arterial catheter was removed, and a pressure dressing was applied at the insertion site for 120 min.

After the operation, non-invasive blood pressure measurements were obtained from the patient’s right upper arm every 15 min for the first two hours, and every 30 min thereafter. Postoperative blood pressure values remained within normal range (140–160 / 50–70 mmHg), though the patient complained of right upper arm pain at each blood pressure cycling interval. Five hours after the operation, a physician on the ward could not obtain blood pressure measurements from the patient’s right upper arm and, subsequently, the pulses of the right brachial and radial arteries became impalpable, accompanied by incomplete paralysis of her right fingers. In view of the possibility of right brachial artery occlusion, subcutaneous heparin (5000 U every 12 hr) was commenced. The temperature of her hands measured by Coretemp$^{TM}$ (Terumo Co, Tokyo, Japan) was similar (35.0°C [left] or 34.7°C [right], respectively); angiography was not performed.

Twenty-four hours after the operation, her right brachial and radial arteries remained non-palpable, whereas the motion of her fingers gradually improved, and her right upper arm pain disappeared. We referred the patient to a radiologist to perform magnetic resonance angiography of her right arm, and the evaluation documented complete obstruction of her right brachial artery (Figure, Panel A). The peripheral arteries appeared to have adequate blood flow, probably due to collateral circulation. Thirty-six hours after the operation, the second magnetic resonance angiography revealed re-flow of this artery (refer to white arrow [b]).

**FIGURE** (Panel A) Twenty-four hr after the operation, magnetic resonance angiography of the patient’s right arm documented complete obstruction of the right brachial artery (refer to black arrow [a]), whereas the peripheral arteries appeared to have enough blood flow, probably due to collateral circulation. (Panel B) Thirty-six hr after the operation, the second magnetic resonance angiography revealed re-flow of this artery (refer to white arrow [b]).
After the event, the clinical course of this patient was uneventful, although it was nine days after the operation before normal pulsation of her right radial artery was noted.

In patients undergoing anesthesia, persistent arterial occlusion related to non-invasive blood pressure cycling is very rare, but the incidence is unknown. In patients with underlying arteriosclerotic disease, repeated cycling of non-invasive blood pressure devices could be a factor in causing acute brachial artery occlusion. Notably, the aforementioned patient demonstrated finger paralysis which coincided with upper arm pain. In unique circumstances, repeated, transient occlusion of the brachial artery may be a factor in inducing ulnar nerve dysfunction causing temporary paralysis of fingers as a result of arterial obstruction. However, the role of radial artery occlusion in the symptoms of this patient remain uncertain, because her upper arm pain and finger paralysis resolved gradually over the duration of recovery period.

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References

Well leg compartment syndrome following prolonged surgery in the supine position

To the Editor:
We report a case of well leg compartment syndrome (WLCS) in a 43-yr-old woman who underwent anesthesia for a Whipple’s pancreatoduodenectomy. Intraoperatively, pressure areas were checked, and thrombo-embolic deterrent anti-embolism stockings and latex covered heel pads containing foam were applied (Figure). During the nine-hour procedure, the lowest systolic blood pressure recorded was 70 mmHg, which was transient. Otherwise, her systolic pressure remained between 80 mmHg and 110 mmHg.

Postoperatively, the patient was transferred to the intensive care unit and her trachea was extubated uneventfully five hours later. The patient immediately complained of left lower limb discomfort, and a tender erythematous band-like area, 8 cm by 5 cm, was visible on the posterior aspect of her calf. The left anti-embolism stocking was removed, and the limb was elevated. On the fourth postoperative day she described severe bilateral calf pain. On examination, there was a clear line of demarcation over both lower calves consistent with the heel pads used intraoperatively. The skin remained intact, and both feet and calves were swollen. There was normal sensation over the dorsum of both feet, but reduced sensation over the plantar aspects. There was pain in the distal calves on passive stretching of her toes, which increased on ankle dorsi-flexion. Dorsalis pedis pulses were palpable bilaterally.

Intra-compartmental pressures were as follows: left lateral 17 mmHg, left posterior 17 mmHg, right lateral 17 mmHg, and right posterior 40 mmHg. Her blood pressure was 110/65 mmHg. The patient subsequently underwent an exploration and fasciotomy of the right posterior compartment of the leg. There was no necrosis or ischemic muscle and the swelling had resolved one week later. She had full range of movement, but an area of hypersensitivity remained in the right medial and lateral plantar nerve distributions. Subsequently, the patient continued to suffer from