

Complications from brachial arterial pressure monitoring are rare in patients having cardiac surgery

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We would like to thank the Journal for their interest in our recent article about the use of intra-arterial brachial pressure monitoring during cardiac surgery (1).

Brachial arterial lines are considered standard of care for patients having cardiac surgery at the Cleveland Clinic. We began using brachial intra-arterial pressure monitoring nearly 30 years ago because arterial pressure measured from the radial artery was often inaccurate and radial-to-aortic pressure gradients frequently developed during and after separation from cardiopulmonary bypass. Inaccurate radial arterial pressures were especially common in complex cases involving prolonged duration of cardiopulmonary bypass, systemic cooling, or hypothermic circulatory arrest, where accurate blood pressure monitoring is essential (2,3). Certainly, intra-arterial monitoring of brachial arterial pressure is more accurate and reliable than radial arterial pressure and is more closely correlated with central aortic pressure (4).

Our technique for catheter placement involves direct palpation of the brachial arterial pulse. A 20-gauge angiocatheter and wire are then used to place a 20-gauge 5-inch arterial catheter using the Seldinger technique. Although our use of ultrasound is increasing, this technology is usually reserved for difficult catheter placement or in patients with non-pulsatile blood flow. Considering first attempt success is increased and hematoma formation is reduced when ultrasound is used for radial arterial cannulation, greater use of ultrasound in the future may further improve the success and safety

of brachial arterial cannulation (5). Despite a low rate of complications at our institution, most brachial arterial lines are placed by trainees under direct staff supervision. Our postoperative intensive care unit staffs are well-trained in caring for patients with brachial arterial lines and vigilant about recognizing associated complications.

Our report evaluated the safety of brachial intra-arterial catheters in 21,597 patients undergoing cardiac surgery (1). We explored vascular, infectious, and neurologic complications and reported a low overall complication rate of 0.19%.

Brachial vascular complications occurred in 33 (0.15%) of patients, and consequent ischemia of the hand or forearm was managed medically or surgically with resolution of the ischemia in all cases. The use of a small 20 g catheter likely contributes to the low rate of vascular complications, because larger cannula use, as in percutaneous coronary interventions, increases vascular complications (6).

Eight (0.04%) patients developed infectious complications that were definitely-or possibly-related to brachial arterial line placement. Nonetheless, only three patients had documented insertion site infection; five other patients had blood stream infections which were considered only possibly-related to the brachial arterial line. Certainly, these blood stream infections were more likely related to a coexisting central venous catheter (7).

The median nerve lies medial to the brachial artery and median nerve paresthesias are common during brachial arterial cannulation. Yet we found no median nerve injuries

in our study of more than 21,000 patients (1). Many of our brachial artery catheters are placed in awake patients prior to anesthetic induction and if a median nerve paresthesia occurs, the needle is withdrawn and redirected which may reduce risk of injury to the median nerve.

Although complications were rare in our patient population, it is unclear whether our results can be extrapolated to other settings since important differences exist between cardiac surgical patients and other patient populations. For example, perioperative anticoagulation is common in patients having cardiac surgery which likely reduces risk of *in situ* thrombosis. Certainly, for vascular surgery patients who have a higher incidence of peripheral arterial disease, we prefer radial arterial cannulation.

Our brachial catheters are typically removed at the time of discharge from intensive care unit, which is usually within 24–48 hours of admission. These few complications from brachial arterial catheterization occurred between the day of surgery and the 30th postoperative day with a median [IQR] of 4 [2, 8] days after surgery. Patients who suffered complications had a more challenging postoperative course demonstrated by a much higher incidence of cardiac arrest, dialysis, prolonged ventilation, multisystem organ failure, and need for extracorporeal membrane oxygenation. These patients likely developed low flow states and required high dose vasopressors, which increased risk of brachial arterial thrombosis.

Our report provides evidence that brachial intra-arterial pressure monitoring in patients having cardiac surgery is safe and complications are rare.

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Footnote

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