

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

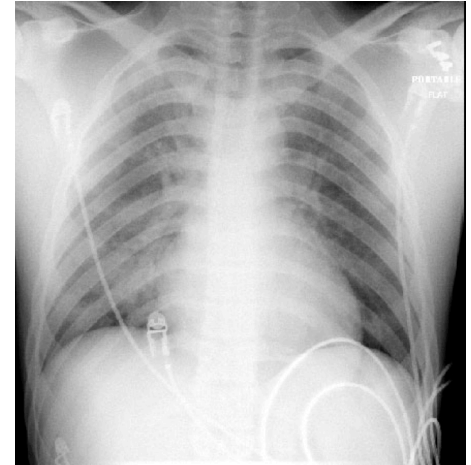
Author: Kristina T. Gemayel | Editor: Samir Hussain, M.D.

December 2017 | Vol 4 | Issue 28

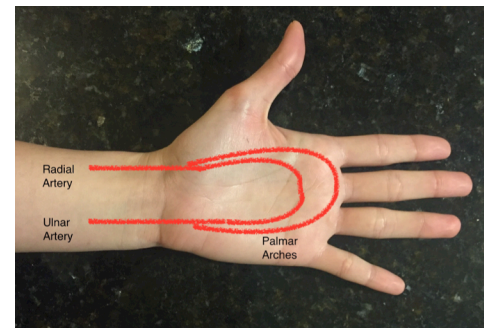
Arterial Line

A 36-year-old male is brought to the Emergency Department for a near drowning episode. EMS states the patient was unresponsive on their arrival and was found with his face submerged in a hot tub. Per the patient's friend on scene, he has no significant past medical history, but is unsure if drug or alcohol use have been involved with the incident. On arrival to the ER, patient is apneic with an initial temperature of 97°F. EKG shows sinus rhythm with non-specific ST changes and chest x-ray is shown to the right. After intubation and central line placement, the physician decides to place a radial arterial line. Which of the following would NOT be a relative contraindication for arterial line placement in this patient?

- A. Traumatic injury proximal to the proposed site of insertion.
- B. Infection of the site where catheter is to be placed.
- C. Allen's test depicting arterial blush in 4 seconds.
- D. Presence of Raynaud's phenomenon in patient's hands.
- E. History of Buerger's disease.



©2013 University of Virginia
Chest xray depicting pulmonary edema in a near drowning patient.



Arterial Supply of the Hand

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

BROWARD HEALTH MEDICAL CENTER

Department of Emergency Medicine
1625 SE 3rd Avenue
Fort Lauderdale, FL 33316

The correct answer is: **(C)**

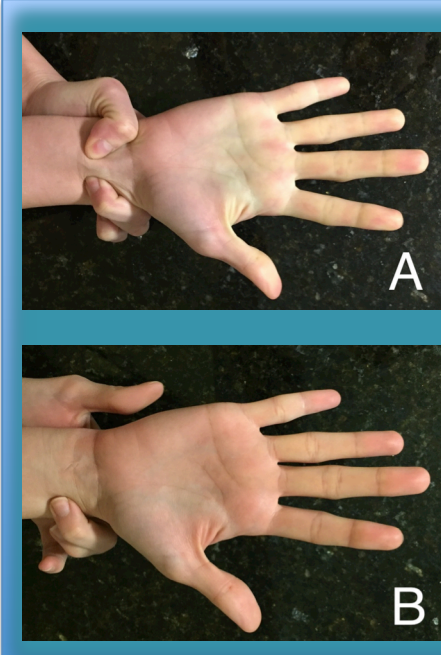
Allen's test (depicted on the right) is used to assess the arterial blood flow to the hand by confirming patency of the radial and ulnar arteries. Allen's test can be performed at the bedside prior to percutaneous arterial puncture of the radial artery. Due to the potential for formation of obstructing thrombus in the radial artery after puncture, demonstration of adequate collateral flow through the ulnar artery is recommended. Failure of arterial blush after 5-10 seconds of performing the Allen's test suggests an abnormality of arterial flow.¹

Discussion

Radial arterial lines can serve as a useful tool when treating critically ill patients. Placement of an arterial line is indicated for the continuous monitoring of blood pressure in patients with hemodynamic instability who require inotropic or vasopressor medication. An arterial line allows for consistent and continuous monitoring of blood pressure, which help to facilitate clinical judgments when titrating supportive medications. In addition, arterial lines provide reliable access to obtain frequent blood sampling, allowing clinicians the ability to track gas exchange and arterial oxygenation.²

Placement of an arterial line should not compromise the circulation distal to the placement site. Therefore, the few contraindications to arterial line placement should be mentioned. Areas with known deficiencies in the collateral circulation, such as patients with Raynaud's phenomenon or thromboangiitis obliterans (Buerger's disease), should be avoided. Other contraindications include inadequate collateral circulation the hand, infection at the site of catheter insertion, or traumatic injury proximal to the proposed insertion site.³

Due to the usefulness of radial arterial line placement in the management and treatment of critically ill patients, proper placement techniques and arterial line pressure transducer setup will be illustrated in detail.



Allen's Test

(A) Hand is exsanguinated by digital pressure of both arteries and the patient making a strong fist.

(B) Pressure is released from the ulnar artery, and hand is assessed for return of color and capillary refill to the entire hand.

(C) Normal filling time < 5 seconds.

(D) Repeat Steps A-C with release of radial artery.

Technique

The technique discussed can be applied to two of the more common methods of radial arterial line placement ("over the wire" and "over the needle"). After risk is assessed and appropriate patient consent is obtained, the site should be cleaned with a sterile preparation and draped. With sterile gloves, palpate the radial artery 1-2 cm from the wrist. To help minimize pain, 1 percent lidocaine solution (without epinephrine) can be injected at the area of insertion. Using the supplies in the arterial line kit, insert your needle at a 30-45 degree angle directly over the palpated pulse, advancing slowly until obtaining a flash of blood visible in your syringe. For the "over the wire" technique, disconnect the syringe and slowly thread your wire through the hub. The wire should thread without resistance. Once the wire is in the vessel, withdraw the needle and advance the catheter over the wire. Finally, remove the wire while observing for pulsatile blood flow and attach the catheter to an arterial line transduction system.

For a list of educational lectures, grand rounds, workshops, and didactics please visit BrowardER.com and **click** on the **"Conference"** link.

All are welcome to attend!



ABOUT THE AUTHOR

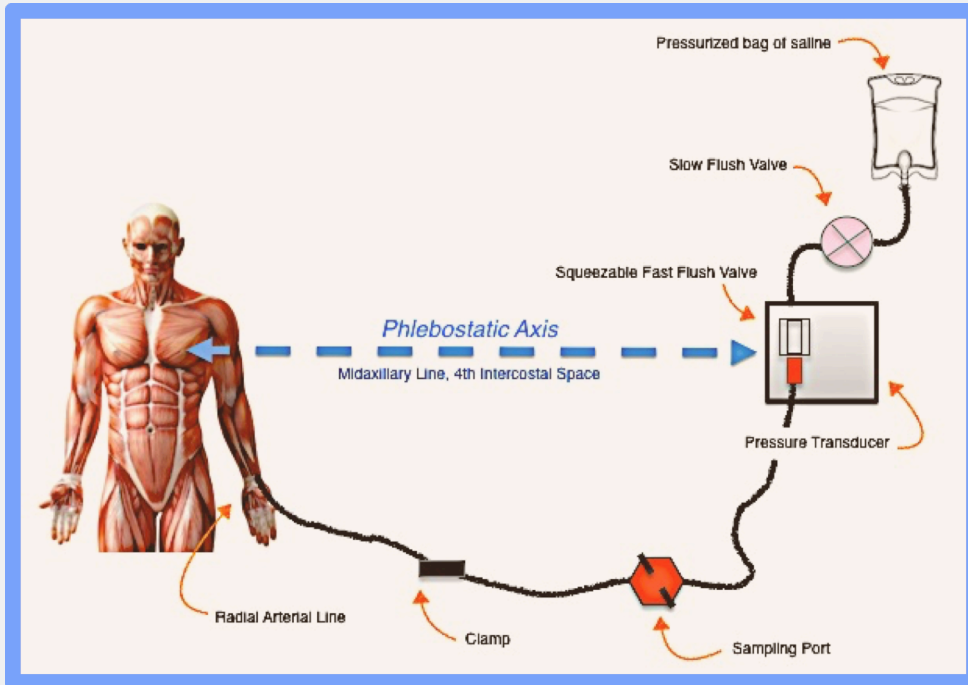
This month's case was written by Kristina Gemayel. Kristina is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in December, 2017.

REFERENCES

- [1] Shah, A.H., et al. (2015). Allen's test: Does it have any significance in current practice?. *J Invasive Cardiol.*
- [2] Tegtmeier, K, et al. (2006). Placement of an arterial line. *N Engl J Med.*
- [3] Nuttall, G, et al. (2016). Surgical and patient risk factors for severe arterial line complications in adults. *ANESTHESIOLOGY.*
- [4] McCann, U, et al. (2001) Invasive arterial bp monitoring in trauma and critical care. *CHEST Journal.*

Warriors

Arterial Line Transducer Setup



Five things required in this setup are: a 500cc bag of normal saline, pressure bag, transducer set (contains syringes), transducer holder which attaches to the IV pole, and a transducer pressure cable which will connect to your monitor.

A 500cc bag of saline should be pressurized to 300 mmHg, and transducer holder should be mounted with syringe facing upwards. Remove all the air bubbles from the IV tubing allowing normal saline to run throughout the IV tube. Connect the transducer pressure cable to the monitor and zero the arterial transducer at the level of the phlebostatic axis of the patient. Attach setup to patient and you should see waveform on the monitor.

Take Home Points

- Know the indications and contraindications of arterial line placement.
- Properly assess patency of the arterial supply to the hand, and remember key steps involved in arterial line placement to minimize procedural risk to the patient.
- Understand that proper knowledge of both the arterial line placement and transducer setup is crucial for physicians, especially in the emergency setting.