

Allen's Test

Purpose: To determine if the ulnar arterial collateral circulation to the hand is sufficient to provide adequate collateral circulation (or blood flow) to the hand and to decrease the risk of hand ischemia following interventions being performed on the radial artery. Such interventions include puncturing the radial artery for arterial blood gas (ABG) assessment, obtaining blood samples for laboratory assessment, and/or invasive blood pressure monitoring.

Technique

Using Change in Skin Color (Awake & Cooperative Patient):

1. Position and stabilize the hand with the palm facing upwards.
2. Locate radial and ulnar pulses of hand with palpation
 - a. Radial artery is located below the thumb at the proximal skin crease of the wrist
 - b. Ulnar artery is located below the 5th digit at the proximal skin crease of the wrist
3. Compress both radial and ulnar arteries firmly using three fingers or thumb
4. Ask the patient to clench and unclench their fist 10 times, then open the hand into a relaxed, slightly flexed position.
 - a. The palm should be pale.
 - b. Hyperextension of the hand and wide separation of the fingers can lead to a false positive result.
 - c. In the uncooperative or sedated patient, use alternative methods to further assess circulation (finger-pulse plethysmography or doppler flow measurements)
5. Release the ulnar artery
6. Count the seconds it takes for the palm and thumb to flush (or turn back to appearing pink)

Using Pulse Oximeter (Sedated Patient or Unable to Cooperate):

Note: This is not a validate method but serves as an alternative since the patient cannot participate in the assessment by clenching and relaxing their hands in appropriate position.

1. Position and stabilize the hand with the palm facing upwards.
2. Place a pulse oximeter probe on any finger of the hand being assessed.
 - a. You can also use a Doppler to assess blood flow to the hand
3. Locate radial and ulnar pulses of hand with palpation
 - a. Radial artery is located below the thumb at the proximal skin crease of the wrist
 - b. Ulnar artery is located below the 5th digit at the proximal skin crease of the wrist
4. Compress both radial and ulnar arteries firmly using three fingers or thumb until there is no more wave form noted on the pulse oximetry monitor
5. Release the ulnar artery
6. Count the seconds it takes for pulse oximetry wave form to come back on the pulse oximetry monitor

How to Interpret the Exam:

Positive result:

- Using Change in Skin Color: Within 3-5 sec the palm becomes flush and ulnar artery is considered patent.
- Using pulse oximeter: Within 3-5 sec the pulse oximetry wave forms return fully and ulnar artery is considered patent.

Negative result:

- Using Change in Skin Color Technique: The palm remains blanched or it takes >6 seconds to flush indicating ulnar artery circulation is insufficient or the artery is occluded.
- Using Pulse Oximeter Technique: The wave forms remain absent or diminished or it takes >6 seconds for them to return indicating ulnar artery circulation is insufficient or the artery is occluded.

Notes:

- Predictive value of a negative test is 0.8%. Predictive value of a positive test is 53%
- There are discrepancies among sources as to what a "positive" and "negative" Allen's test means.
- In the uncooperative or sedated patient, other methods can be used (finger-pulse plethysmography, Doppler flow measurements, and measurement of the systolic arterial pressure in the thumb)

References:

- Asif M, Sarkar PK. Three Digit Allen's Test. Ann Thorac Surg. 2007;84(2):686-7.
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