

EDITORIAL VIEW

Arterial blood evaluation: from the old Allen test to the new technologies

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ABSTRACT

Arterial blood evaluation allows us to acquire a great amount of results and helps in clinical decision making. Allen test is an old, but not always performed test, before the radial artery puncture although there has been a significant increase in the number of arterial punctures performed due to the application of new technologies that are no longer limited to simple blood gas analysis

Key words: Allen test; Radial artery; Perfusion Index; Arterial catheterisation

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A paper was published recently by Cikman et al, entitled “A questionnaire based study evaluating the knowledge and approach by physicians about arterial blood gases”. They observed that most of the doctors (participating in the study) had sufficient knowledge regarding the evaluation of arterial blood gases and that most of the participating specialist physicians did perform Allen test before radial access.¹ It is also routinely used for selecting patients for radial artery harvesting, radiocephalic arteriovenous fistula formation for hemodialysis and invasive hemodynamic monitoring. If not performed correctly, it can lead to serious complications. Allen test; yes or not? Edgar V. Allen, for the first time in 1929, described a non-invasive evaluation test of the patency of the arterial blood supply to the hand in patients with thromboangiitis obliterans.² The original test was modified in the early 50’s to fit as an evaluation of the collateral circulation before arterial cannulation.³ The medicolegal issues must be kept in mind while planning any type of invasive procedures which may have the potential to cause harm to the patient. Now-a-days, the anesthesiologists can perform semi-invasive and invasive procedures in complete safety. With the advent of technology, many systems (particularly ultrasonography) are becoming more specific, more sensitive, and above all low cost. In addition, the learning curve for residents and physicians is easy and quick. It’s crucial, as proposed by *Position paper of the European Association of Percutaneous Cardiovascular Interventions and the Working Group on Thrombosis and Acute Cardiac Care of the European Society of Cardiology for catheterization procedures*, in case of myocardial revascularization, where the radial approach has been shown benefits for patients and a re-

duction in mortality, myocardial infarction and stroke in patients undergoing the procedure for radial artery. For the selection of patients to be treated with aradial approach it is appropriate to use oximetry plethysmography (more objective than the Allen test), demonstrating the presence of a valid collateral circulation which can compensate the radial occlusion.⁴

The risk of permanent ischemia following procedures involving catheterization of the radial artery appears to be small. In subjects which are anatomically devoid of double arterial circulation of the hand, there is a greater risk of ischemia and necrotic loss of parts of one or more fingers. Among the causes we can mention repeated attempts at cannulation, prolonged stay of the introducer, arterial spasm, the use of oversized sheaths for the caliber of the artery of the subject, or the presence of peripheral vascular disease. Even the frequent use of vasopressors to counteract hemodynamic instability during the procedure, occlusive hemostasis and the repetition of the procedure are risk factors for subsequent occlusion of the radial artery. The risk can be greatly reduced simply by performing tests at our disposal.

Many studies have been proposed to identify a gold-standard. In 2009, ZHU Zhi-rung showed a positive linear correlation analyzed photoplethysmography and modified Allen test where the recovery time of hand circulation in a senior group (more than 60 years) was longer than that of the younger group (below 40 years) and middle aged group (between 40-60 years).⁵ In 2011, Ruengsakulrach P et al demonstrated the validity of the modified Allen test

Arterial blood evaluation

for primary screening.⁶ Some manufacturers of scientific equipment have proposed monitors to obtain a new digital parameter: the Perfusion Index (P) an easy and practical parameter to assess collateral flow prior to arterial catheterization.

A practical vision about modern technology is to be able

to have a comfortable, practical and effective way to obtain information in order not to harm the patient and to ensure an effective instrument for beneficial impact for anesthetists. All means at our disposal may be acceptable and the combination of multiple tests may increase the sensitivity and the specificity.

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Anesthetic aphorisms MONITORING AND EQUIPMENT

- Never use a ventilator, anesthetic machine or any equipment with which you are not familiar. This is an absolute rule during afterhours.
- If you have a problem with the ventilator/breathing system that you cannot instantly identify and correct, change to a simple circuit and ventilate the patient by hand. The best and the most reliable device for ventilation remains Ambu resuscitation self-inflating bag.
- Know where the defibrillator is kept in theatre and how it works.
- If a monitor gives an abnormal value, such as low oxygen saturation, check first the patient and then the equipment.
- Make sure that you are not the only sucker in the anesthetic room/theatre.