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Right heart catheterization from the arm: back to first principles

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Non-invasive imaging advocates may have foretold the demise of invasive right heart catheterization (RHC), but it retains a clear role in the diagnosis and management of disorders such as pulmonary arterial hypertension, intracardiac shunts and chronic thromboembolic disease. Indeed as more drugs and interventional therapies targeting these diseases reach the market, we predict a resurgence of RHC. This is supported by current guidelines, which mandate RHC for confirmation of diagnosis and vasoreactivity testing in all patients with pulmonary hypertension prior to initiation of therapy[1].

In this issue of the journal, Shah et al. present their single center experience comparing RHC performed via antecubital vein with proximal (i.e. internal jugular, femoral or subclavian) vein access[2]. In this retrospective analysis of 272 diagnostic RHC procedures performed over a 5-year period, the authors documented a swift uptake of antecubital vein access amongst operators, with comparable success rates (91% vs. 96% for antecubital and proximal venous access respectively) and low crossover from antecubital to proximal venous access. After 5 years, 85% of all cases were performed from the arm. This high take up almost certainly reflects an institutional propensity towards trans-radial access, but interestingly there was no evidence of a learning curve with similar success rates in the first and last quartiles. There was a significant reduction in fluoroscopy time compared with proximal vein access. This may reflect the relative ease of navigating through the cardiac chambers when approached from above compared with from below via femoral access, although a breakdown by choice of proximal venous access route was not included.

Though lagging behind Europe, adoption of trans-radial access for left heart catheterization (LHC) has risen steadily in the US[3]. While debate continues regarding relative bleeding and mortality benefits compared with trans-femoral access, advantages such as early patient mobilization post-procedure, facilitation of same-day discharge and uninterrupted anticoagulation are clear. These same advantages apply to RHC performed from the arm. Certainly from a logistical perspective, if the operator selects trans-radial access for LHC then it makes little sense to perform simultaneous RHC from the groin. Freeing up the groin also enables lower limb exercise hemodynamic assessment in the cath lab, which may unmask findings not apparent at rest[4].

RHC from the arm is a simple technique and is achievable through most forearm or antecubital veins. Indeed the first cardiac catheterization was performed from the arm in 1929. Veins on the medial (ulnar) side of the forearm are preferred because the route to the heart is more direct through the basilic, axillary and subclavian veins. Access via veins on the lateral (radial) side of the forearm can be more challenging because the cephalic vein typically enters the axillary vein at a sharp angle which can be difficult to navigate. Initial access can be obtained using aseptic technique outside the catheterization laboratory using a tourniquet on the upper arm and a standard peripheral IV cannula. The cannula should be covered with a dressing to maintain sterility. In the lab the field is cleaned again, local anesthesia is given and the cannula exchanged over a 0.018" guidewire for a larger (preferably hydrophilic-coated radial) sheath. Antispasmodics are not usually needed, but if so then nitroglycerine is the agent of choice. In most cases, balloon-tipped catheters can be advanced even without a guidewire. The balloon is inflated once the catheter enters the subclavian vein. It is important not to push if resistance is felt. The most common challenge is venous occlusion from previous trauma or prior instrumentation, which may not be apparent on physical examination because of the rich collateral circulation. A careful history can be a more useful indicator that the contralateral side or alternative access may be preferred. An optional venogram helps to determine the optimal path and a hydrophilic guidewire can be used to navigate tortuosity in case of difficulty advancing the catheter. Once the subclavian vein is reached then RHC is performed using the same maneuvers as for direct subclavian or internal jugular access. After the procedure, hemostasis is achieved with brief manual compression. No adjunctive closure or compression device is needed.

The present study by Shah et al. demonstrates that returning to first principles with RHC performed from the arm is practicable in the modern catheterization laboratory and may encourage trans-radial enthusiasts to forgo the groin altogether!

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