

Previous Radial Artery Catheterization Complicates Invasive Monitoring During Cardiac Surgery[☆]



El cateterismo radial previo dificulta la monitorización invasiva durante la cirugía cardíaca

Invasive systemic blood pressure monitoring is a standardized routine practice in cardiac surgery. It is generally performed inserting an 18–20F Teflon catheter by right radial artery puncture, which is maintained in situ for 24–72 h, as necessary.¹ The new trend to perform coronary angiographies through right radial catheterization instead of the traditional femoral artery access seems to improve patient comfort, decrease the rate of local complications and shorten hospital stay and recovery after the procedure.^{2,3} However, we have observed in daily practice that radial artery catheterization may obstruct the reuse of the radial artery access for invasive monitoring. Therefore, the aim of the present work was to demonstrate whether prior radial artery catheterization complicated the use of the same access route for invasive monitoring during cardiac surgery. One hundred and thirty-two consecutive patients undergoing cardiac surgery, with prior catheterization via either right radial or femoral artery access, according to the operator's decision, were prospectively studied between September and December 2014. At the moment of surgery, the degree of difficulty to reuse the right radial artery access for invasive monitoring was evaluated using a Likert-type scale, and the rate of necessary contralateral radial or alternative femoral artery access (endpoints) due to the impossibility of using the right radial artery was calculated. A 5-point ordinal scale of difficulty ranging from “easy” to “impossibility of cannulating the radial artery” was built. Patients with catheterization by femoral artery puncture acted as control group. All puncture attempts in the operating room were performed by the same operator using an 18F Teflon catheter. The time between catheterization and surgery and the degree of puncture difficulty were expressed as median and quartiles ($Q_{25\%-75\%}$). Comparisons were performed with relative risk (RR) confidence interval (CI), χ^2 and two-tailed Mann-Whitney tests, using SPSS Statistics 17.0 software package. The protocol was approved by the Institutional Review Board and informed consent was obtained from all patients together with the surgical consent. Patient mean age was 68.2 ± 11.1 years and 73% were men. Among the total number of patients, 49% ($n=64$) had had right radial artery and the rest femoral artery catheterization. A local complication at the access site (ecchymosis or hematoma) was reported by 2% ($n=3$) of patients. Median time between catheterization and surgery was 13 days ($Q_{25\%-75\%}$, 6–33 days). Semiology in the operating room, prior to attempting radial puncture for invasive monitoring, revealed the following alterations in patients who had undergone prior radial catheterization: pulse decrease or absence in 48% of patients ($n=31$),

ecchymosis or hematoma in 31% ($n=20$), pain on palpation in 13% ($n=18$) and a pseudoaneurysm. Fig. 1 shows two cases of extensive ecchymosis and hematomas following radial artery catheterization of 7 and 10 days evolution, respectively. Contralateral radial or femoral artery access to monitor patients during surgery with previous radial artery catheterization was necessary in 41% (26/64) of patients, whereas in those without radial artery catheterization it dropped to 21% (14/68) (RR 1.97 CI_{95%} 1.13–3.43, $P=.012$). The median degree of difficulty with right radial access when a previous catheterization had been performed through this access route was 3 ($Q_{25\%-75\%}$, 2–5), while in those patients where femoral access was used, median difficulty was 1 ($Q_{25\%-75\%}$, 1–3) ($P=.0005$, Mann-Whitney test). The radial artery could not be used in the operating room in 30% (10/33) of patients with prior radial access and presence of normal pulse; this represents twice



Fig. 1 – Two images of ecchymosis and hematomas after radial catheterization.

[☆] Please cite this article as: Borracci RA, Ochoa G. El cateterismo radial previo dificulta la monitorización invasiva durante la cirugía cardíaca. Cir Esp. 2016;94:491–492.

the failure resulting in patients with femoral catheterization and normal radial pulse (15%, 9/52) (RR 2.05 CI_{95%} 0.93-4.55, $P=.073$). When radial catheterizations were divided according to the time elapsed between catheterization and surgery, below and above the median value (15 days), success rates were 63% (20/32) and 59% (19/32), respectively (RR 1.05 CI_{95%} 0.71-1.56, $P=.798$).

Radial pulse preservation after catheterization did not necessarily imply that the artery could be adequately reused, as the arterial walls could be thickened by a hematoma or periarterial fibrosis, or the intima damaged by catheter insertion.⁴ The incidence of radial artery occlusion assessed a short time after catheterization averages 5%-12%, but if the control is performed at 30 days the rate of occlusion decreases, possibly due to spontaneous recanalization.^{5,6} This observation might explain a probable greater success rate of radial artery puncture as this is performed farther away from catheterization, something that did not occur in our series. Same arm cubital artery access following radial puncture failure was postulated in the SWITCH registry of cardiac catheterization.⁷ The homolateral cubital artery puncture after the impossibility of radial artery cannulation was not performed in our work, as this maneuver was considered to increase the risk of hand ischemia. Finally, the anatomical and functional injury of the radial artery might encumber its usefulness as potential coronary graft or arteriovenous fistula for dialysis in the future.⁸ In conclusion, diagnostic catheterization via the radial artery prior to cardiac surgery may complicate the reuse of the same access site for invasive blood pressure monitoring during a surgical procedure. Although the radial artery access to perform catheterization seems to represent an important improvement, some of these inconveniences should be taken into account when the patient must undergo cardiac surgery in the short-term.

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2173-5077/

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