



Arm Pain after Transradial Coronary Procedures



The number of coronary angiographic and interventional procedures performed via transradial access is increasing in the United States and worldwide [1,2] and, while transradial procedures are generally associated with fewer bleeding complications compared to transfemoral procedures, they are not free of complications. In this issue of the journal, Dharma and colleagues [3] report on the incidence of arm pain in a post-hoc analysis of a randomized clinical study analyzing the utility of intraarterial nitroglycerin for preventing radial artery occlusion after transradial procedures [4] in 1706 patients. The presence of pain was recorded in approximately 5% of patients one day after the procedure at the time of the ultrasound which was done to ascertain whether the radial artery was patent. Arm pain was associated with radial artery occlusion, multiple puncture attempts, small radial artery diameter, and prolonged compression to obtain hemostasis over 4 h. All the above variables (with the exception of prolonged compression) can also be associated with radial artery spasm and are associated with radial artery occlusion [5]. The fact that arm pain was not statistically associated with severe spasm is somewhat surprising but may be related to the low incidence of severe spasm in the population studied.

The authors are to be congratulated on their study, which brings home a few important points related to arm pain in patients who have undergone transradial coronary angiography and/or interventions. The first point is that arm pain in these patients is not that rare and despite this, staff physicians, trainees and nurses sometimes seem to be unsure how to approach these patients. Arm pain can occur during the case, immediately after the case and late after the case. In the original study [4] the authors did not report the incidence of arm pain during the case, but they reported an incidence of severe radial artery spasm (defined as “as severe local pain and discomfort during catheter movement compelling the operator to stop the procedure and cross-over to the other route” [6]) during the procedure of 0.8%. The incidence of moderate/severe arm pain at 24 h based on an assessment using the visual analogue scale (VAS) with a score of greater than 4 was 4.5%. Of note, this number does not include mild pain, so the incidence of mild pain in this cohort is unknown. One of the limitations that the authors recognize was the fact that they cannot make statements about the total incidence of post-procedure arm pain because they did not have longitudinal follow up. But, Leeuwen and colleagues have previously reported a 30-day incidence of arm pain of 4.5% after transradial procedures [7].

The second point is that arm pain can be associated with serious complications and the association between arm pain 24 h after the procedure and radial artery occlusion found by the authors is perhaps one of the most pertinent findings of the study. In studies analyzing the factors associated with radial artery occlusion, pain is one of the factors significantly associated with this undesirable outcome [8]. Consequently, until proven otherwise, arm pain at the access site after a transradial procedure should be encountered with a high level of suspicion for radial artery occlusion, and there should be a low threshold for ordering an ultrasound to ascertain radial artery patency. Obtaining an ultrasound is important because the palpation of a radial pulse can be misleading as the radial artery can occlude proximally and recanalize distally [9]. Moreover, the performance of ulnar compression [10] and the short-term (e.g. one month) prescription of anticoagulation can increase the long-term patency of the radial artery [11]. Other serious complications of transradial coronary angiography and intervention that can be heralded by pain are bleeding/hematoma, pseudoaneurysm, perforation and the possibility of compartment syndrome. While bleeding and hematoma are lower with transradial access than with transfemoral access, they can still occur and usually manifest as (fore) arm pain. The same is true of pseudoaneurysm formation although in the radial space pseudoaneurysms tend to be small and to resolve spontaneously. Perforation is a very rare complication, occurring in less than 1% of all procedures [9]. Early recognition of perforation, however, is very important because the patient is at risk of limb loss if compartment syndrome develops.

Since the increase in frequency in coronary procedures done via radial access has been accompanied by an increase in number of procedures performed via ulnar access, it is perhaps reasonable to mention that the frequency of ulnar artery perforation was similar to the frequency of radial artery perforation in a recently published meta-analysis [12] and that arm pain would be the presentation symptom for ulnar artery thrombosis too, although there is a lot less published data on this subject. Also, although the paper by Dharma and colleagues [3] only studied patients who had diagnostic coronary angiography and percutaneous coronary intervention, their findings apply to peripheral procedures done via radial or ulnar access [13,14] and, potentially, to structural procedures done via access from the forearm too.

The finding that arm pain was associated with prolonged hemostasis compression (greater than 4 h) is interesting, but the explanation is not clear. The arm pain may be caused by the compression itself, by low grade ischemia in the setting of prolonged compression, or by endothelial dysfunction [15]. The association between arm pain and prolonged compression is the strongest of all analyzed factors, but the authors do not provide a good explanation for this. Most of the time, prolonged

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compression results when there is bleeding during deflating of the TR band and the pressure must be increased again in order to stop the bleeding. This can either be a sign that the patient is prone to bleeding or can result from less than optimal hemostasis. Since the centers were highly experienced centers, it is safe to assume that the former was the main cause for the prolonged compression time. Whatever the cause, the paper by Dharma et al. confirms the adage that the need for prolonged compression is never a good sign.

In summary, the paper by Dharma and colleagues reminds us that arm pain after a coronary procedure performed via radial access is not a rare occurrence and that the clinician has to recognize that the symptom of pain can be the herald of more serious occurrences.

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