Pain in the Neck: A Rare Complication of Transradial Cardiac Catheterization

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ABSTRACT: Vascular and bleeding complications are a known risk of cardiac catheterization. In this article, we report a neck hematoma after left-sided transradial cardiac catheterization, which is a known but rarely reported complication of this procedure.

Key words: neck hematoma, transradial cardiac catheterization, transradial catheterization complications

Case Report
An 84-year-old male presented with progressive chest pain and was admitted from the emergency room with a non-ST elevation myocardial infarction with a peak troponin value of 2.5 ng/mL. He had a history of atrial fibrillation and was on dabigatran for anticoagulation, and had hypertension, hyperlipidemia, coronary artery bypass surgery (CABG) 19 years prior to presentation, and an implantable cardiac defibrillator for ischemic cardiomyopathy. He was referred for coronary angiography and possible percutaneous coronary intervention (PCI). His dabigatran was held for 72 hours prior to the procedure, and he was on dual antiplatelet therapy with aspirin and clopidogrel.

In order to access the patient’s left internal mammary arterial (LIMA) graft, cardiac catheterization was performed via the left radial artery. Diagnostic angiography was performed via a short 5 Fr sheath inserted into the left radial artery. Initially, a 5 Fr internal mammary (IM) catheter was used to engage the LIMA, which showed a patent bypass graft to an obtuse marginal artery. With the IM catheter in the left subclavian artery, a 0.035” x 260 cm Cook Fixed Core Guidewire (Cook Medical) was advanced through the IM catheter, but there was difficulty advancing to the ascending aorta. This wire was exchanged to a 0.035” x 150 cm Terumo Angled Glide-wire (Terumo). Initially, the wire seemed to take a course to the ascending aorta but would not advance, and was withdrawn. Angiography was then performed in the left subclavian artery (Figure 1), showing a patent, tortuous subclavian. The Terumo angled Glidewire was then easily advanced to the ascending aorta. All subsequent catheter exchanges were performed over the Cook Fixed Core Guidewire (260 cm). Coronary angiography showed a critical proximal lesion in the saphenous vein graft (SVG) to the left anterior descending (LAD) artery (Figure 2). Subsequently, uneventful PCI was performed to the SVG to LAD bypass graft. Bivalirudin was administered during the procedure for anticoagulation with an activated clotting time (ACT) of 318 seconds, and was stopped at the end of the procedure.

Four hours after the procedure, the patient complained of left-sided neck pain. On physical exam, there was no evidence of stridor or respiratory distress and the oxygen saturation was 100% on room air. The left side of the neck was firm and tender to the midline, with swelling and ecchymosis consistent with a hematoma. Immediate computed tomography (CT) scan of the neck and chest was performed without intravenous contrast. The CT scan (Figure 3) showed high-density attenuation within the soft tissues of the neck extending from the left hypopharynx tracking down to the upper mediastinum consistent with a large hematoma. The hematoma was causing...
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the trachea to be deviated to the right. His initial hemoglobin (Hgb) before the case was 11.9 g/dL, and a repeat Hgb at the time of the CT was 10.0 g/dL. The patient was managed conservatively with close monitoring and analgesic medication. A light pressure dressing was also applied to the left side of the neck for 4 hours.

CT scan was repeated after 6 hours and showed a stable large hematoma, with resolution of tracheal deviation. The hemoglobin nadir was 9.0 g/dL and stabilized at 9.8 g/dL without requirement of blood transfusion. Figure 4 shows the patient after 24 hours with a large area of ecchymosis. The patient remained tender in the left neck and complained of dysphagia, but never had any signs of respiratory compromise. Retrospective review of subclavian angiography (Figure 1) after the finding of the neck hematoma suggested possible perforation with faint contrast blush from a small branch coming off the subclavian artery, but the angiography was not definitive. His dual antiplatelet therapy with aspirin and clopidogrel was continued throughout his course, but his dabigatran was held. The patient was discharged after 72 hours to rehabilitation. After a 5-day course of rehabilitation, he was discharged home. His dysphagia improved and he was tolerating a full solid diet, and had marked improvement in his pain.

Discussion

Access-site vascular complications such as hematoma, pseudoaneurysm, arteriovenous fistula, radial artery evulsion, and thromboembolism are known, but uncommon complications of cardiac catheterization by the radial approach.1,2 Vascular injury and subsequent bleeding complications can also occur away from the access site, anywhere along the tract of wire or catheter manipulation. This can include perforation or dissection of the aorta itself or of major or minor side branches from the aorta. Injury to smaller vessels near the aortic arch can be difficult to immediately recognize, but can still lead to significant bleeding complications such as neck or mediastinal hematomas depending on the location of injury. Very few cases of neck or mediastinal hematomas after cardiac catheterization by the radial approach have been reported.3-5 This complication is also possible from the femoral approach, but not as likely given that the ascending aorta is not accessed from the right or left subclavian artery as it is during radial catheterization.

In the case we present here, the neck hematoma was recognized only after the patient complained of neck pain a few hours after the case was over. In looking back at the initial angiogram of the subclavian artery (Figure 1), there was suggestion of contrast blush perhaps emanating from the inferior thyroid artery. Well-known branches of the left subclavian artery include the vertebral branch and internal mammary artery. The thyrocervical trunk arises distal to the vertebral artery, and quickly divides into the inferior thyroid artery, suprascapular artery, and transverse cervical artery.6 The white arrow on Figure 1 suggests blush and possible perforation of the inferior thyroid artery, a smaller subbranch from the left subclavian artery. This was likely the result of advancing the 0.035˝ hydrophilic angled Terumo Glidewire into a small vessel and causing perforation.

This case reinforces the importance of taking caution when advancing a hydrophilic wire, which can end up in smaller arterial branches leading to hemorrhagic complications. In our case, the hydrophilic wire was followed under fluoroscopy. The initial course it took seemed to go into the ascending aorta, but was instead in a small branch and resistance was met. At this point, angiography was performed to guidewire advancement. In addition to being a hydrophilic wire, this was also an angled wire, which has a greater tendency than a standard J-type wire to traverse into smaller side branches. Use of a J-wire can help prevent entering smaller

![Figure 2](image2.png)

**Figure 3.** Computed tomography of the neck showing large area of high-density attenuation (white arrow) within the soft tissues of the neck consistent with a large hematoma. Asterisk (*) marks trachea, which is deviated to the right from mass effect.
side branches and vessel perforation. Closer attention to angiography also may have identified a possible bleeding complication sooner than when the patient complained of neck pain. Our patient was successfully managed with conservative observation and analgesic medication. Other invasive options that can be considered for uncontrolled hemorrhage include coil embolization and open surgical repair.

Another risk factor for bleeding in this case was that the patient presented in atrial fibrillation and was on the anticoagulation agent dabigatran. Optimal periprocedural management of the novel oral anticoagulation agents, such as dabigatran, is still being established. Dabigatran has a half-life of approximately 14 hours, and any alteration in creatinine clearance can increase this half-time. Our patient had a normal creatinine of 0.9 mg/dL and normal creatinine clearance as well. For minor procedures, it is suggested that 1-2 doses of dabigatran be held (3-4 doses if there is abnormal renal function). In our case, dabigatran was held for 5 doses, which should not have increased peri-procedural bleeding given the half-life kinetics of the drug. However, as postmarketing surveillance continues for dabigatran reports are emerging that the drug may be involved in increased bleeding events, especially in elderly patients. Other safety risks of dabigatran may even include increased risk of myocardial infarction. The periprocedural management of the novel anticoagulation agents and their interaction with other anticoagulation agents used in the cardiac catheterization lab, such as bivalirudin, certainly require careful attention and further investigation.

In conclusion, vascular injury can occur at any point where there was wire or catheter manipulation. Subsequent bleeding from a small branch can lead to bleeding complications including neck and mediastinal hematomas, which are rare but possible complications from cardiac catheterization via the transradial approach.

References