

EPS FOR RESIDENT PHYSICIANS

A case of unstable occult arterial bleeding post pacemaker implantation

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1 | CASE DESCRIPTION

A frail 93-year old woman with a history of hypertension, diabetes mellitus, and ischemic heart disease on aspirin, presented to our institution with marked bradycardia of 30 bpm and congestive cardiac failure. Twelve lead ECG showed complete heart block with a narrow complex escape rhythm. Chest radiograph demonstrated pulmonary congestion. Laboratory studies including blood counts, renal, liver, and thyroid function were normal. Transthoracic echocardiogram showed normal biventricular function without significant valvular abnormalities. She underwent implantation of a dual chamber permanent pacemaker. Pacing leads were implanted by extra-thoracic puncture subclavian vein approach at the level of the first rib under fluoroscopy. A postimplantation fluoroscopic image showed well-positioned atrial and ventricular leads with good sensing parameters and pacing thresholds. A compression bandage was applied postprocedure.

The patient deteriorated 5 hours later with clinical evidence of hypovolemic shock. Laboratory studies showed a significant decrease in hemoglobin from 10.2 to 8.6 g/dL and an elevated lactate level with significant metabolic acidosis. Repeated thoracic echocardiogram showed no postprocedural pericardial effusion. Removal of the compression bandage revealed increased swelling over the generator pocket. Immediate resuscitation measures were instituted with fluid boluses, red blood cell transfusions, and mechanical ventilation for severe metabolic acidosis. A computed tomography scan of the thorax was performed to exclude occult vascular injury. A large hematoma below the pectoralis major muscle was seen extending into the left axilla region, with lobulated contrast extravasation into

the hematoma in the venous, delayed and arterial phases, suggesting active arterial bleeding from a branch of the left subclavian artery (Figure 1). She underwent a left upper limb angiogram to localize the bleeding source. Initial angiogram of the left subclavian artery showed no evidence of bleeding from the main subclavian, axillary and subscapular arteries, but subselective cannulation of the thoracoacromial branch of the axillary artery showed active extravasation from the pectoral branch (Figure 2). This was successfully embolized with histoacryl lipiodol glue.

The patient's hemodynamic parameters stabilized after successful hemostasis and the rest of her recovery remained uneventful. Repeated computed tomography performed 2 weeks after the acute event showed a resolving hematoma with no evidence of fluid or abscess formation. Subsequent outpatient visits showed complete resolution of the pocket swelling with no change in pacemaker function and lead thresholds.

2 | DISCUSSION

Arterial injuries from pacemaker implantation are uncommon and usually arise from the cannulation of the subclavian artery during attempts at subclavian venous access. This case illustrates a rare occurrence of arterial bleeding from the pectoral branch of the thoracoacromial artery, likely from inadvertent laceration injury during attempts at cannulating the subclavian vein using a fluoroscopic-guided, first rib approach, even though there was no suspicion of any arterial injury during venous access.

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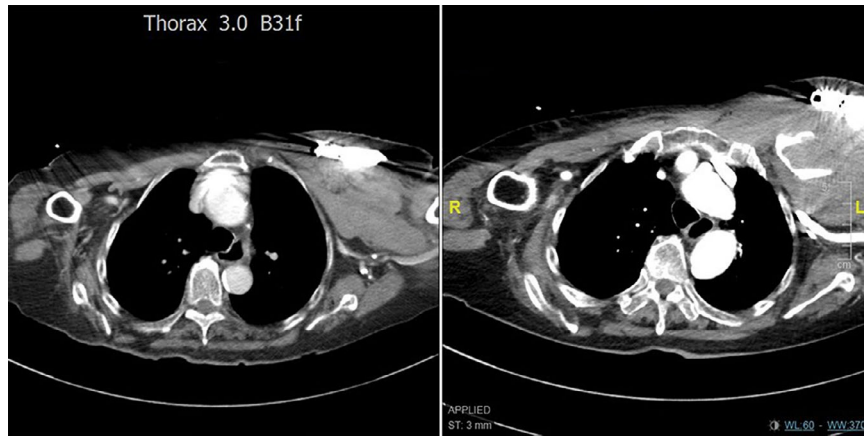


FIGURE 1 Computed tomography scan of the thorax with intravenous contrast. Urgent CT thorax showing large upper anterior chest wall hematoma below pectoralis muscle with extension into the left axilla (left). Subsequent arterial phase CT angiogram showed contrast extravasation suggestive of active arterial bleed likely from small branch of subclavian artery (right)



FIGURE 2 Invasive left upper limb angiogram and angioembolization. Initial angiogram of the left subclavian artery did not show any contrast extravasation (left). Subselective cannulation of the thoracoacromial branch showed contrast extravasation and active bleed from the pectoral branch with pseudoaneurysm formation (middle). Angioembolization with hemostatic glue was performed with amorphous enhancement showing successful embolism of bleeding pseudoaneurysm (right)

Axillary and subclavian arterial injury from inadvertent cannulation during device implants is well described in literature.¹ However, reports of direct injury or bleeding from the thoracoacromial branch are rare. Pak et al² described a case of iatrogenic aneurysm formation 9 months post pacemaker implantation arising from the thoracoacromial artery. Adeosun et al³ described a case of left subclavian artery injury presenting with hemopneumothorax and hemodynamic compromise shortly after implant. Angiogram showed bleeding from a small vessel near the subclavian artery that required angioembolization. To the best of our knowledge, bleeding arising from laceration injury to the thoracoacromial artery manifesting as hemorrhagic shock post pacemaker insertion has not previously been described.

The thoracoacromial artery is a short branch arising from the second part of the axillary artery, under the pectoralis minor muscle. It winds around the upper border of this muscle and pierces the clavipectoral fascia and divides into the pectoral, acromial, clavicular,

and deltoid branches. The pectoral branches descend between the pectoral muscles, giving rise to a branch to pectoralis minor and continue on the deep surface of pectoralis major.⁴ We postulate that the proximity of thoracoacromial artery to the axillary vein and its course superficial to the axillary vein at its inflection point around the pectoralis minor muscle renders it vulnerable to iatrogenic or traumatic injury.

This case highlights the importance of considering the differential of arterial bleeding when faced with an enlarging pocket hematoma or hemorrhagic shock post device implantation, even in the absence of suspected subclavian or axillary arterial cannulation. A good knowledge of the vascular anatomy of axillary and subclavian arterial and venous anatomy and the branches is essential. Early diagnosis and prompt initiation of resuscitation measures, followed by computed tomography, angiography and angioembolization are life-saving. The availability of surgical and radiological expertise is often crucial in such

cases. A venogram prior to venous puncture would be helpful in preventing a catastrophic arterial injury especially in high-risk population, for example patients on antiplatelet or anticoagulant therapy.

CONFLICT OF INTEREST

Authors declare no conflict of interest for this article.

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