Rare Bleeding Complication of the Radial Artery Conduit after Coronary Artery Bypass Grafting with Endoscopic Harvesting

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A 79-year-old man with unstable angina developed localized left atrial tamponade after conventional coronary artery bypass grafting (CABG) with endoscopic radial artery harvesting (ERAH). Hemodynamic instability developed several hours after the systemic heparinization. Transthoracic and later intraoperative transesophageal echocardiography revealed a large, isolated hematoma compressing the left atrium. The radial artery for the circumflex artery bled during an emergent re-sternotomy. Incomplete hemostasis of the radial artery by ERAH was the likely cause of this serious complication. Surgeons, especially those who are new to ERAH, should examine the harvested radial arterial conduit carefully and confirm complete hemostasis before performing the procedure.

Key words: left atrial tamponade, endoscopic radial artery harvesting

Introduction

It is widely accepted that the radial artery is the second arterial conduit for coronary artery bypass grafting (CABG).1–3 Endoscopic radial artery harvesting (ERAH) facilitates the use of the radial artery with less morbidity.4–7 However, the procedure of ERAH certainly has a learning curve.4)

We present a rare case of localized left atrial tamponade after CABG with ERAH.
bypass (CPB) and the aortic cross clamp times were 146 and 100 minutes, respectively. Weaning from CPB on dopamine (3 μg/kg/min) and dobutamine (3 μg/kg/min) was uneventful.

During the first 10 hours after surgery, a total of 600 mL of blood was drained from the left pleural and pericardial chest tubes. Hemodynamics during this period was stable on a small dose of dopamine (2 μg/kg/min). After complete hemostasis, continuous infusion of heparin sodium (10,000 U/day) was started to prevent graft occlusion and cerebral complications. Then, the patient developed hemodynamic instability within the next few hours. His cardiac output decreased to 1.7 L/min/m² despite the administration of dopamine (5 μg/kg/min), dobutamine (5 μg/kg/min), and milrinone (0.75 μg/kg/min). Right-sided pressure, obtained by Swan-Ganz catheterization (Baxter Healthcare Corp, Irvine, CA, USA), revealed elevated right atrial pressure (23 mmHg), elevated pulmonary arterial pressure (46/26 mmHg), and elevated pulmonary capillary wedge pressure (20 mmHg). Transthoracic echocardiography (TTE) at the bedside demonstrated a large, localized hematoma posterior to the left atrium with hyperkinetic left ventricular wall motion. The patient was immediately transferred to the operating room. Intraoperative transesophageal echocardiography (TEE) showed a large hematoma causing almost complete obliteration of the left atrium (Fig. 1).

When the hematoma located in the oblique sinus was removed, the patient's clinical status improved dramatically. Bleeding from the radial arterial conduit near the left atrial appendage was found. Avulsion injury of the radial artery was repaired with 7/0 monofilament. Then, hemostasis was ensured. The remainder of the patient's hospital course was uncomplicated. All of the bypass conduits were found to be open on postoperative coronary angiography.

**Discussion**

The radial artery is being used more often as a second or third arterial conduit for internal thoracic arteries in CABG. The superior patency rate of the radial artery has an advantage over that of the saphenous vein in midterm and long-term results. Traditional open radial artery harvesting creates a full forearm longitudinal scar with some neuralgic complications. Recently, ERAH is widely used because it offers superior cosmetic results and avoids neuralgic complications. However, procedures of ERAH, such as exposure of the radial artery under minimum skin incision, dissection and manipulation of the conduit using dissector and credor in a narrow space, requires practice. While one is learning the technique, management of the branches is not easy to perform. Injury of radial arterial branches can occur by
blunt dissection with a dissector, and hemostasis of theranches using bipolar electronic cautery may be done incompletely to avoid thermal injury in proximity to the conduit.4) Such problems of branches may go unnoticed because of exsanguination of the upper extremity with Esmark bandage and inflated tourniquet. Hence, the harvested radial artery conduit should be examined closely after harvesting.5–7) Skeletonization of the conduit is ideal for the identification of branches and to avoid bleeding, although this procedure is a little time-consuming. To our regret, because this was our first ERAH, we missed an avulsion injury that was subsequently found during another operation. We learned from this, and after performing more than 50 consecutive ERAH procedures, we never experienced these problems again.

Cardiac tamponade after cardiac surgery can be a life-threatening complication; its incidence is 2%.8, 9) Left atrial tamponade is uncommon although it has been reported in the literature.9) The sequence of events was related to bleeding after systemic heparinization. The radial artery conduit running near the left atrial appendage is commonly used for revascularization of circumflex arteries.3, 7) Hence, bleeding from it may easily cause left atrial tamponade if the drainage of blood from the oblique sinus does not work effectively.

Early diagnosis of tamponade and rapid re-intervention play a crucial role in saving patients. Localized tamponade is at times difficult to diagnose since, in the vast majority of patients, most classical clinical signs, such as pulsus paradoxus, are not present. Fortunately, TTE gave us sufficient information to diagnose left atrial tamponade. However, TTE is often difficult to carry out immediately after surgery due to the presence of chest tubes and positive-pressure ventilation. TEE can provide critical information and allows more accurate diagnosis after cardiac surgery.8,9)

A patient developed localized left atrial tamponade after CABG with ERAH, a first for us. From this experience, we learned that surgeons, especially those who are new to ERAH, should closely examine the radial artery and confirm complete hemostasis before performing the procedure.

References