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Case Report

Surgical Management of Infectious Pseudoaneurysm of the Ascending Aorta Post Coronary Artery Bypass Grafting: A Rare Clinical Condition

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ABSTRACT

Background: Although an extremely rare clinical condition, the pseudoaneurysm of a saphenous vein graft from the ascending aorta may occur several months following coronary artery bypass graft surgery.

Methods: This paper describes a 48-year-old male patient with a history of addiction, who underwent coronary artery bypass graft surgery. The patient was referred to the emergency department 20 days after his surgery with a number of symptoms such as fever, weakness, tachycardia, tachypnea, zero Richmond Agitation Sedation Scale)RASS(, and low hemoglobin level. He was then admitted for a sepsis workup. A combined regimen of ciprofloxacin, vancomycin, and meropenem was prescribed after a positive *Pseudomonas aeruginosa* blood culture.

Results: Computed tomography angiography showed a pseudoaneurysm in the upper and anterior mediastinum. Reoperation was planned for surgical removal, followed by right femoral arterial, venous cannulation and deep hypothermic circulatory arrest (18–20 °C), all of which yielded a favorable outcome.

Conclusions: Rapid and accurate diagnosis and surgical correction are life-saving for pseudoaneurysms of the ascending aorta post coronary artery bypass graft surgery. ***(Iranian Heart Journal 2017; 18(2):53-57)***

Keywords: Coronary artery bypass graft surgery, Pseudoaneurysm of aorta, Saphenous vein graft, Reoperation

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The infectious pseudoaneurysm of a saphenous vein graft after coronary artery bypass graft surgery (CABG) is an extremely rare complication. Nonetheless, it has been reported in a number of isolated cases in the literature. [1, 2] The infectious pseudoaneurysm of the ascending aorta is an uncommon fatal complication following CABG. [3, 4] There have also been rare reports on mycotic aneurysms. [5, 6] Albeit an extremely rare clinical condition, the pseudoaneurysm of the ascending aorta may occur within several months after CABG. We herein describe a patient with infectious pseudoaneurysm of the aorta after CABG and present a review of the pertinent literature.

PATIENT AND OBSERVATION

A 48-year-old man was referred to our emergency department with symptoms such as fever, weakness, tachycardia, tachypnea, zero Richmond Agitation Sedation Scale (RASS,) and low hemoglobin level. He was then admitted for further diagnosis and treatment of sepsis. Upon admission, he had a pulse rate of 140 beats per minute, blood pressure of 130/56 mm Hg, body temperature of 38.5 °C, and respiration rate of 25 breaths per minute.

Laboratory tests yielded a WBC of 28600/mL with a neutrophils rate of 90.2%, hemoglobin of 7.7 g/dL, hematocrit of 25.9%, platelets of 293,000/mL, troponin of 0.53 ng/mL, creatinine of 1 mg/dL, BUN of 40 mg/dL, BS of 119 mg/dL, total bilirubin of 0.8 mg/dL, D. bilirubin of 0.5 mg/dL, SGOT of 74 U/L, SGPT of 81 U/L, ALP of 522 U/L, sodium of 135 Meq/L, potassium of 5.4 Meq/L, calcium of 8.2 mg/dL, PT of 15.6, INR of 1.35, PTT of 28.7, and albumin of 3 g/dL with a normal thyroid function. The platelet and WBC counts gradually reached 84000 and 8000 per milliliter, respectively. Moreover, *Pseudomonas aeruginosa* (*P. aeruginosa*) was identified in the blood cultures using combination disks containing clavulanic acid.

Transthoracic echocardiography revealed a large mass occupying the posterior right atrium, ejection fraction of 40%, mild mitral regurgitation, and mild pleural effusion. The results of high-resolution computed tomography indicated collapse consolidation at the hill of the right lung in addition to linear opacities in the left lung base. Additionally, there was a large anterior mass in the superior mediastinum and a great anterior vessel to the right of the supradiaphragmatic site, which contained a small calcified mass above the heart and shifted the mediastinum to the left.

Thoracic aortic computed tomographic angiography demonstrated an ascending aorta pseudoaneurysm in the upper and anterior mediastinum, which appeared as a wide filling defect in the right atrium. The pressure effects were observed in the left ventricle, inferior vena cava, and pulmonary veins. Moreover, the presence of a 80×123×160 mm hematoma was corroborated in the anterior pericardial sac (Fig. 1 and Fig. 2). Contrast material extravasations, arising from the ascending aorta and the center of the hematoma, conferred further evidence of the postoperative ascending aorta pseudo-aneurysm. There were also reports on multiple mediastinum lymphadenopathies and bilateral pleural effusions. Chest X-ray showed mediastinum widening (Fig.1).

Therefore, the treatment plan involved ciprofloxacin, vancomycin, and meropenem IV. We decided to perform resternotomy. The patient was prepared for the right femoral (both artery and vein) cannulation and then put on cardiopulmonary bypass prior to a deep hypothermic circulatory arrest (18–20 °C). On cardiopulmonary bypass and following sternum reentry, the pseudo-aneurysmal wall, which packed with clots, was incised toward the sternum. After the

removal of the clots and soft tissues, the aneurysms were repaired using a Dacron patch, followed by a balloon pump insertion through the left femoral artery. The patient was thereafter transfused with equal ratios of platelet, fresh frozen plasma, and packed cells. The circulatory arrest time was 20 minutes.

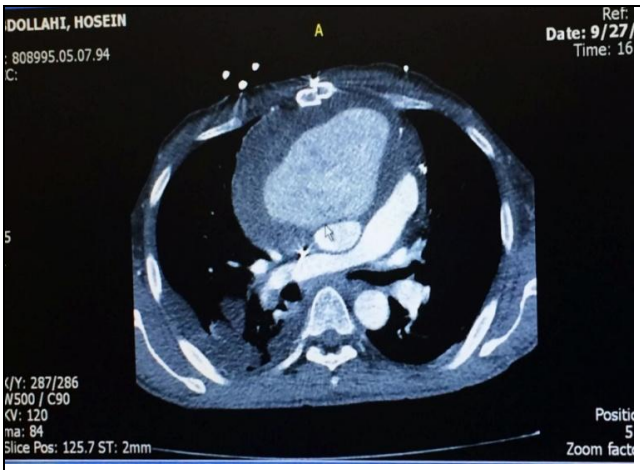

Figure 1. Lung and mediastinal computed tomography scan

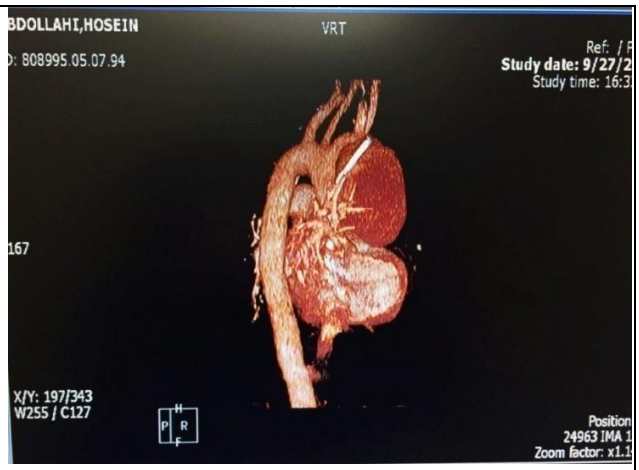

Figure 2. 3D imaging by mediastinal computed tomography scan.

Following the stitching of the sternum, the patient was normothermic and hemodynamically stable with a low dose of inotropic support. Subsequently, he was taken to the intensive care unit and extubated after 24 hours. The balloon pump was removed 2 days after the surgery. The patient was subsequently transferred to the cardiovascular ward and discharged on day 7 with satisfactory general health.

DISCUSSION

The site of pseudoaneurysms is caused by endothelial damage and the subsequent infection at the cannulation site during surgery [7, 8] or the proximal suture line of the proximal saphenous vein graft to the ascending aorta graft. [9]

Osler was the 1st investigator to use the term "infectious aneurysm" in 1885 in order to describe a mushroom-shaped aneurysm in a patient with endocarditis. [10] The infected pseudoaneurysm was allegedly developed by Candida species and Gram-negative bacteria called "*Staphylococcus aureus*". [11, 12] The relevant mechanisms have been previously described thoroughly in the literature. [13]

In our patient, sepsis was diagnosed based on clinical manifestations and laboratory findings. Blood cultures, collected from separate sites and analyzed in triplicate, corroborated the presence of *P. aeruginosa*. The antibiotic therapy was modified based on the results of the culture. Also, computed tomographic angiography of the thoracic aorta was conducted to provide further insight about the prediction of the ascending aorta pseudoaneurysm.

The surgical procedure was adapted from a study by Lillehei et al. [14] Femoral bypass was initially performed prior to the opening of the sternum due to the high risk of aneurysm rupture in the setting of resternotomy. [15] In such patients, deep hypothermic circulatory arrest is recommended. [16] Thus, we subjected our patient to this technique for 20 minutes during surgery.

The standard treatment of the infected aortic graft poses a number of therapeutic challenges. Some scholars have suggested autologous materials, which are widely

known to fail in practice. As a result, we turned to non-reactive patches. [17, 18] However; it has been claimed that a patient's pericardium or its xenogeny resources, especially bovine, may substitute synthetic products. [17] Therefore, lifelong antibiotic therapy is frequently prescribed to prevent re-infection after prosthetic heart valve replacement. [18]

There are various methods for the surgical repair of pseudoaneurysms such as the use of the omentum, [19] autograft patches from the fascia lata and the saphenous vein, [20] or graft from autologous, homologous, or xenon pericardial materials followed by short-term antibiotic therapy. [21] Alternatively, the Amplatzer device can be prescribed in patients with smaller dehiscence lengths. [22]

In our study, the pericardial biopsy during surgery revealed a leukocyte infiltration between fibrin materials, which can be attributed to the preoperative antibiotic therapy.

CONCLUSIONS

Infectious pseudoaneurysms of the ascending aorta (at the origin of the saphenous vein graft) post CABG are a very rare clinical condition. However, early diagnosis by computed tomographic angiography and planning re-sternotomy by total circulatory arrest and cardiopulmonary bypass via femoral cannulation are life-saving in these patients.

Conflict of Interest: The authors declare that there is no conflict of interest.

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