

## *Klebsiella pneumoniae* Pseudoaneurysm of the Ascending Aorta after Coronary Artery Bypass Graft

Seyed Khalil Forouzannia\*, Mohammad Hasan Abdollahi, Seyed Jalid Mirhosseini, Seyed Hossein Moshtagion, Habibollah Hosseini, and Mohammad Hossein Mirshamsi

Cardiovascular Research Center, Afshar Hospital, Shahid Sadooghi University of Medical Sciences, Yazd, Iran

Received: 3 Jul. 2009; Received in revised form: 29 Aug. 2009; Accepted: 9 Oct. 2009

**Abstract-** Mycotic pseudoaneurysm of the ascending aorta is rare in patients undergoing coronary artery bypass graft (CABG) and usually caused by staphylococcus aureus. We describe a patient with a mycotic pseudoaneurysm of the ascending aorta at the proximal vein graft anastomosis site after CABG. Culture from the sinus tract of the sternum and from the aneurysm sac was *Klebsiella pneumoniae*. Surgical technique was patch repair of aorta under hypothermic circulatory arrest. He is asymptomatic at 24 months follow-up.

© 2010 Tehran University of Medical Sciences. All rights reserved.

Acta Medica Iranica 2010; 48(3): 200-202.

**Key words:** Aneurysm, false; aneurysm, infected; coronary artery bypass; klebsiella pneumoniae

### Introduction

Osler first coined the term "mycotic aneurysm" in 1885 to describe a mushroom-shaped aneurysm in a patient with endocarditis (1). Mycotic pseudoaneurysms of the ascending aorta are complications after cardiac surgery and are caused by growth of bacteria or fungi in the vessel wall.

Such aneurysms are more likely to occur in immunosuppressed patients after heart or heart-lung transplantation than after coronary artery bypass grafting (CABG). Whereas *Candida* species and gram-negative bacteria more common after heart or heart-lung transplantation, *Staphylococcus aureus* is the organism most frequently found after CABG (2,3). Rarely has *klebsiella pneumoniae* been reported in an ascending aorta mycotic pseudoaneurysm (4). We describe the case of the ascending aorta, which developed at the proximal vein graft anastomosis site after CABG surgery, was attributable to growth of *klebsiella pneumoniae*.

### Case Report

A 56-year-old man underwent CABG with Left Internal Mammary Artery (LIMA) to Left Anterior Descending (LAD) and Saphenous Vein Graft (SVG) to the Right Coronary Artery (RCA). Early postoperative course was uneventful, and he was discharged from the hospital on the 6th postoperative day. Four weeks later, he had

purulent drainage from the upper portion of the sternal incision. Culture specimens from the sternal wound grew *klebsiella pneumoniae*. He was treated with antibiotic, removing one sternal wire, and dressing changes. The sternal wound was healed completely in approximately one month.

One month later, he developed sudden chest pain and was admitted to CCU and discharged from hospital two days after without specific diagnosis.

Six months later he had recurrent purulent drainage of the sternal wound at the previous site. A chest radiograph showed mediastinal widening (Figure 1).



**Figure 1.** Chest radiograph show mediastinal widening

\* **Corresponding Author:** Seyed Khalil Forouzannia

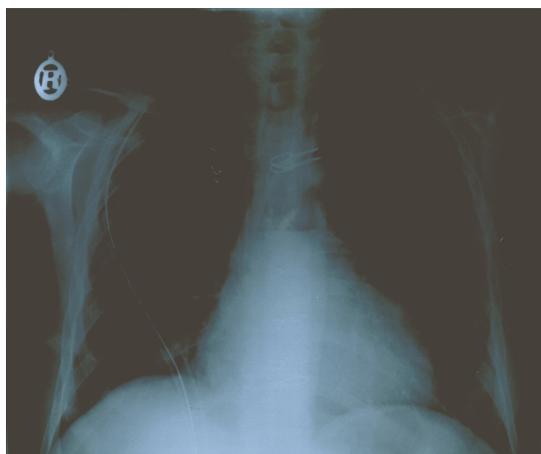
Department of Cardiovascular Surgery, Afshar Hospital, School of Medicine, Shahid Sadooghi University of Medical Sciences, Yazd, Iran  
Tel: +98 351 5254067, Fax: +98 351 5253335, E-mail: drforouzan\_nia@yahoo.com



**Figure 2.** CT scan show mediastinal pseudoaneurysm

Computed tomographic (CT) scan of the chest revealed a 2×3 cm pseudoaneurysm in the anterior mediastinum immediately anterior to the ascending aorta with sternal erosion (Figure 2). The patient was candidate for angiography but due to sudden bleeding from the sternal wound he was candidate for emergency operation. Cardiopulmonary bypass (CPB) was initiated via femorofemoral bypass while during direct compression of sternal wound for control of bleeding. After deep hypothermia at 18°C and circulatory arrest sternum was and opened the sac of the pseudoaneurysm was identified and opened in a vertical fashion. Sternal portion that was adjacent to the sac was eroded completely.

A 3cm×2cm defect was found at the base of the aneurysm in the ascending aorta. Defect was closed with a collagen-sealed Dacron patch.



**Figure 3.** Chest x ray 24 months after operation

No sign of active infection was noted at the site of operation. The resected aneurysmal sac was sent to the laboratory for histologic examination and culture that was positive for *klebsiella pneumoniae* and was sensitive to ciprofloxacin and amikacin.

Intravenous antibiotic including ciprofloxacin 400mg (BID) and amikacin 300mg (TDS) was continued for 6 weeks and ciprofloxacin orally (500mg daily) for chronic suppression. At the most recent follow-up (24 months, after operation he was asymptomatic and chest x-ray was normal (Figure 3).

## Discussion

The mechanisms of mycotic pseudoaneurysm development after CABG have been well described in the medical literature (5). An inflammatory process around the aorta, such as deep sternal wound infection or mediastinitis, can spread inside and invade aorta wall, and start pseudoaneurysm formation. Endothelial damage and infection at the site of proximal anastomosis, or cannulation site, or proximal graft suture line can also initiate an infectious process. The finding of *klebsiella pneumoniae* as a probable cause of this process is unusual. In this patient, either a primary infection developed at the proximal vein graft anastomosis at the time of CABG or bacteremia developed as a result of the infection at the site of the sternal sinus tract. Subsequent infection and aortitis resulted in aortic repair and pseudoaneurysm formation.

Diagnosis of this complication is difficult and sudden death is the most presentation.

The basic surgical principles described by Lillehei and colleagues remain valid (6). Because of the high risk aneurysmal of rupture during sternotomy, femorofemoral bypass must be initiated before opening the sternum (7). Total circulatory arrest, as we used in this patient, provides the best exposure with a dry field.

An infected aorta can be difficult to manage standard treatment of vascular graft or anastomotic infections include extra anatomic bypass and use of autologous material. Because the ascending aorta is not readily amenable to this approach, in situ patch repair or replacement has been advocated (8, 9). Ideally, the patch material used to repair a mycotic aneurysm should be as nonreactive as possible. Either the patient's own pericardium or bovine pericardium is preferable to artificial material for repair of mycotic aneurysms (8). In our patient, non-artificial material was not accessible, and a synthetic patch was used. However, such a patch might be susceptible to persistent or recurrent infection.

## **Klebsiella pneumoniae pseudoaneurysm of the ascending aorta after CABG**

Life long treatment with antibiotics has been recommended for patients who are receiving synthetic graft material to prevent serious, potentially lethal, recurrence of infection (9). In addition, repair with use of autologous, homologous, or xenopericardial material and administration of short-term antibiotics has been suggested as an alternative to the use of synthetic patch material (10).

### **References**

1. Osler W. The Gulstonian Lectures on malignant endocarditis. *Br Med J* 1885;1(1262):467-70.
2. Follis FM, Paone RF, Wernly JA. Mycotic aneurysm of the ascending aorta after coronary revascularization. *Ann Thorac Surg* 1994;58(1):236-8.
3. Schmitt TM, Finck SJ, Brumble LM, Lane GE. *Pseudomonas aeruginosa* pseudoaneurysm of the ascending aorta after coronary artery bypass graft surgery. *Tex Heart Inst J* 2003;30(2):137-9.
4. Chen YF, Lin PY, Yen HW, Lin CC. Double mycotic aneurysms of the ascending aorta. *Ann Thorac Surg* 1997;63(2):529-31.
5. Berkmen YM. Medical aspects of infectious aortitis. In: Lande A, Berkmen YM, McAllister HA Jr, editors. *Aortitis: clinical, pathologic, and radiographic aspects*. New York: Raven Press; 1986. p. 161-72.
6. Lillehei CW, Todd DB Jr, Levy MJ, Ellis RJ. Partial cardiopulmonary bypass, hypothermia, and total circulatory arrest. A lifesaving technique for ruptured mycotic aortic aneurysms, ruptured left ventricle, and other complicated cardiac pathology. *J Thorac Cardiovasc Surg* 1969;58(4):530-44.
7. Ueda Y, Miki S, Kusuhara K, Okita Y, Tahata T, Yamanaka K. Surgical treatment of aneurysm or dissection involving the ascending aorta and aortic arch, utilizing circulatory arrest and retrograde cerebral perfusion. *J Cardiovasc Surg (Torino)* 1990;31(5):553-8.
8. Pasic M, Carrel T, von Segesser L, Turina M. In situ repair of mycotic aneurysm of the ascending aorta. *J Thorac Cardiovasc Surg* 1993;105(2):321-6.
9. Chan FY, Crawford ES, Coselli JS, Safi HJ, Williams TW Jr. In situ prosthetic graft replacement for mycotic aneurysm of the aorta. *Ann Thorac Surg* 1989;47(2):193-203.
10. Pasic M. Mycotic aneurysm of the aorta: evolving surgical concept. *Ann Thorac Surg* 1996;61(4):1053-4.