GROUP B STREPTOCOCCUS MYCOTIC ANEURYSM OF THE THORACIC AORTA: A CASE REPORT AND LITERATURE REVIEW

Darat Ruangkriengsin, Methee Chayakulkeeree and Pakpoom Phoompoung

Division of Infectious Diseases and Tropical Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Abstract. Group B streptococci are an uncommon cause of mycotic aneurysm. We report here the case of a mycotic aneurysm caused by *Streptococcus agalactiae*. A 67-year-old male presented to our hospital with a 2-week history of progressive hoarseness, weight loss, odynophagia. He denied fever or dysphagia. On examination he was afebrile with a normal pulse rate and blood pressure. He had a white plaque in the mouth. He had left vocal cord paralysis. His heart and lung sounds were normal. His white blood cell count in the blood was 10,330 WBC/mm^3 with 82% neutrophils. Computed tomography of his chest showed a saccular thoracic aortic aneurysm 4.9 cm in diameter that extended from the distal aortic arch to the proximal part of the descending aorta. The patient was presumed to have a mycotic aortic aneurysm. He was started on ceftriaxone empirically. A total aortic arch replacement was performed 3 days after starting antimicrobial treatment. Amplification and sequencing of the bacterial 16SrRNA gene from the resected aortic wall revealed *S. agalactiae*. Blood cultures were negative and tissue biopsy of the aortic wall revealed no organisms on Gram stain or bacterial culture. After surgery the patient was continued on 6 weeks of intravenous antimicrobial therapy. The patient improved and he went home in good condition. *Streptococcus agalactiae* can cause mycotic aortic aneurysm.

Keywords: group B Streptococcus, *Streptococcus agalactiae*, mycotic aneurysm, infected aortic aneurysm

INTRODUCTION

Mycotic aortic aneurysms are rare. The causative agents of infected aortic aneurysms vary by country; *Staphylococcus aureus* is the most common pathogen in western countries (Oderich *et al*, 2001) and non-typhoid *Salmonella* is the most common pathogen in Asia (Hsu *et al*, 2004). In Thailand, 70% of mycotic aneurysms are due to *Burkholderia pseudomallei* or non-typhoid *Salmonella* species (Anunnatsiri *et al*, 2008). The incidence of invasive infections caused by group B *Streptococcus* (GBS) among non-pregnant adults is increasing (Chaiwarith *et al*, 2011), and several cases of mycotic aneurysm due to GBS have been reported (Ledochowski

Correspondence: Dr Pakpoom Phoompoung, Division of Infectious Diseases and Tropical Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, 2 Wanglang Road, Bangkok Noi, Bangkok 10700, Thailand.
Tel/Fax: +66 (0) 2419 7783
E-mail: benefat@hotmail.com

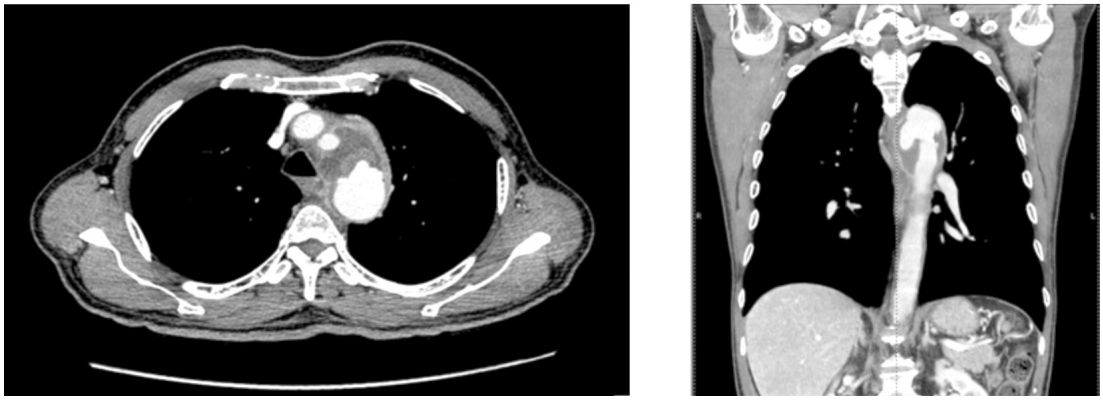

Fig 1–Computerized tomography of chest and aorta, axial and coronal views.

et al, 2014). We report here a case of mycotic aortic aneurysm caused by GBS in Thailand that was resolved with surgical and antibiotic therapy.

CASE REPORT

A 67-year-old Thai man with a history of poorly controlled diabetes mellitus type 2 was admitted to Siriraj Hospital, Bangkok, Thailand with a 2-week history of progressive hoarseness and odynophagia. The odynophagia was rated as 4 out of 10 in severity and occurred even with swallowing water. He had lost 10 kg of body weight in the month prior to presentation. He denied having fever, epistaxis, dysphagia, trismus, neck or ear pain, cough, hemoptysis, orthopnea, paroxysmal nocturnal dyspnea or edema. His symptoms were not associated with any specific position or movement. He is a retired government officer with a history of multiple sexual partners without condom use over a 40-year period. He had a 30 pack-year smoking history and drank alcohol daily for the past 30 years. His medications at presentation were metformin 1,700 mg/day and glipizide 10 mg/day.

On physical examination his temperature was 36.5ºC, his pulse rate was 90/min, his blood pressure was 119/69 mmHg, his respiratory rate was 16/min, and his oxygen saturation was 96% on room air. He had white oral plaque in the mouth but no masses or ulcers. The heart and lung sounds were normal. He had no hepatosplenomegaly or lymphadenopathy and his neurological examination was unremarkable.

On laboratory investigation, his complete blood count revealed a hemoglobin of 11.5 g/dl, a leukocyte count of 10,330/mm^3 with 81.8% neutrophils and 10.6% lymphocytes and a platelet count of 454,000/mm^3. His HbA1C was 11.2%. His creatinine level was 0.73 mg/dl; his AST and ALT were 17 and 13 U/l, respectively; and his albumin level was 2.9 g/dl. His anti-HIV test was non-reactive. His chest radiograph was unremarkable. Laryngoscopy revealed left vocal cord paralysis. Esophagogastroduodenoscopy also revealed left true vocal cord paralysis without evidence of esophageal abnormalities.

Computed tomography of his chest with contrast (Fig 1) revealed large outpouching of contrast into a pseudoaneurysm surrounding the proximal descending thoracic aorta with a thick enhancing wall, suggestive of a mycotic aneurysm.

The aneurysm diameter was 4.9 cm.

His blood culture were negative. Transthoracic echocardiography revealed no evidence of infective endocarditis. He was started on intravenous ceftriaxone and surgery was performed three days later. The aneurysm was excised and a Gelweave™ graft was used to reconstruct and re-establish continuity of the aorta. Tissue biopsy of the aortic wall revealed no polymorphonuclear cells or bacteria on Gram stain or culture. Amplification and sequencing of the bacterial 16S rRNA gene revealed *S. agalactiae* in the tissue of the aortic wall. Based on the PCR results, intravenous ceftriaxone was given for 6 weeks. At the 2-month follow-up visit post-hospitalization, the patient had improved significantly and was clinically in good condition.

DISCUSSION

Streptococcus agalactiae is a gram-positive bacterium belonging to Lancefield group B (Edward and Baker, 2015). Group B streptococci (GBS), colonizes the vagina, gastrointestinal tract, and/or upper respiratory tract (Edward and Baker, 2015). GBS can cause postpartum infection and neonatal sepsis (Edward and Baker, 2015). *S. agalactiae* is an emerging pathogen in young adults, the elderly, and patients with comorbidities such as diabetes mellitus, malignancies, and cardiovascular diseases (Edward and Baker, 2015). Common clinical manifestations of GBS infection include bacteremia, arthritis, cellulitis, and meningitis (Chaiwarith *et al*, 2011; Edward and Baker, 2015). Although GBS is associated with a variety of infections, including endocarditis, mycotic aneurysm due to GBS is rare (Burnet *et al*, 1990).

The term mycotic aneurysm was first used by Willium Osler in 1885 to describe vegetation on the internal surface of the aorta that looked like "fresh fungus", and hence he coined the term "mycotic" (Edward and Baker, 2015). This term is now used to describe all types of infected aneurysms, except syphilitic aortitis. Causes of mycotic aneurysms include trauma, infection from a contiguous site, hematogenous seeding secondary to bacteremia, and embolization into the vasa vasorum, generally secondary to endocarditis (Chan *et al*, 1989). In our case, bacterial endocarditis was ruled out, there was no evidence of skin or soft tissue infection, arthritis, or history of trauma. Therefore, hematogenous seeding from primary bacteremia is the most likely route of infection in the reported case. Impaired immunity caused by diabetes mellitus was the only significant risk factor identified in this patient.

The first case of mycotic aneurysm caused by *S. agalactiae* was described by Blackett *et al* (1989) in a patient without endocarditis. Our review of the English language literature for reports on mycotic aneurysm caused by *S. agalactiae* revealed 12 case reports in the PubMed database (Table 1). The mean age of these 12 cases was 64 years and the most common complaints were pain (75%) and fever (67%). Some cases presented with symptoms of the aneurysm compressing an adjacent organ. The most common location involved by the mycotic aneurysm was the abdominal aorta. Blood cultures were positive in only half of patients, but tissue cultures were positive in all patients. A noteworthy point is the absence of endocarditis in all patients. Half the cases occurred in Asia.

Antibiotic therapy and surgical debridement (aneurysm excision) have been recommended to treat mycotic aneurysms (Valentine and Chung, 2012). Aneurysm

Table 1
Review of 12 previous cases reported in the literature.

Reference	Age in years, gender	Clinical presentation	Location	Hemoculture result	Tissue culture result	Infective endocarditis present	Type of surgery	Outcome
Blackett *et al*, 1989	61, male	Fever, lumbar pain	Abdominal aorta	Negative	Positive	No	Excision and grafting	Cured
Burnet *et al*, 1990	N/A	Hemorrhagic shock, acute limb ischemia	Femoral artery	Negative	Positive	No	Femoral clipping and amputation of limb	Cured
Akashi *et al*, 2000	61, female	Fever with dyspnea, pericarditis	Ascending thoracic aorta	Positive	Positive	No	Excision and grafting	Cured
Andreasen *et al*, 2001	40, male	Fever, abdominal pain	Abdominal aorta	Negative	Positive	No	Bypass surgery	Cured
Iwaki *et al*, 2006	59, male	Chest pain,dyspnea	Aortic arch	Positive	N/A	N/A	Excision and grafting	Cured
Chandrikakumari *et al*, 2008	69, male	Abdominal pain	Abdominal aorta	N/A	Positive	No	Excision and grafting	Cured
Yamamoto *et al*, 2009	50, male	Fever, low back pain	Abdominal aorta	Positive	N/A	N/A	Excision and grafting	Cured
Masuhara *et al*, 2010	59, female	Hemoptysis	Descending aorta	N/A	Positive	N/A	Excision and patchplasty	Cured
Thawait *et al*, 2012	74, male	Fever, lumbar pain	Abdominal aorta	Negative	Positive	No	Excision and grafting	Cured
Cozijnzen *et al*, 2013	66, male	Abdominal pain	Thoracoabdominal aorta	Positive	N/A	No	Excision and grafting	Cured
Ledochowski *et al*, 2014	86, male	Fever, abdominal pain	Abdominal aorta	Positive	N/A	No	Stent graft and bypass surgery	Cured
Matsuda *et al*, 2014	78, male	Dyspnea, pericarditis	Aortic arch,femoral artery	Positive	N/A	No	No surgery due to high risk	Dead
Present case	67, male	Hoarseness, weight loss	Descending aorta	Negative	Negative (Positive PCR)	No	Excision and grafting	Cured

N/A, not available; PCR, polymerase chain reaction.

excision and ligation, with or without arterial reconstruction, should be performed in low-risk patients. For high-risk patients in whom excision and ligation surgery cannot be performed, endovascular aneurysm repair (EVAR) should be considered for palliative treatment (Chan *et al*, 1989). Antibiotics are recommended for at least 6 weeks after surgery, and antibiotics should be given for 2-4 weeks prior to surgery (Valentine and Chung, 2012). If aneurysm excision and ligation surgery cannot be performed and EVAR is considered for palliative treatment during active infection, suppressive lifelong oral antibiotics should be given (Chan *et al*, 1989). In the 12 previous cases reported in the literature, surgery was performed in all but one. The most common antibiotic used was penicillin; the disease prognosis was satisfactory for all patients, except the patient that was too high-risk to undergo surgery.

In conclusion, we report here a case of infected aortic aneurysm caused by GBS, in which the patient responded satisfactorily to surgery and antibiotic therapy.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the patient reported in this study for permitting us to disclose the details of his case.

REFERENCES

Akashi Y, Ikehara Y, Yamamoto A, *et al*. Purulent pericarditis due to Group B *Streptococcus* and mycotic aneurysm of the ascending aorta, case report. *Jpn Circ J* 2000; 64: 83-6.

Andreasen D, Dimcecski G, Nielsen H. Mycotic aneurysm of the aorta caused by group B *Streptococcus*. *Scand J Infect Dis* 2001; 34: 208-9.

Anunnatsiri S, Chetchotisakd P, Kularbkaew C. Mycotic aneurysm in northeast Thailand: the importance of *Burkholderia pseudomallei* as a causative pathogen. *Clin Infect dis* 2008; 47: 1436-9.

Blackett RL, Hill SF, Bowler I, *et al*. Mycotic aneurysm of the aorta due to group B *Streptococcus* (*Streptococcus agalactiae*). *Eur J Vasc Surg* 1989; 3: 177-9.

Burnet NG, Wilkinson RC, Evans DS. Mycotic aneurysm caused by group B *Streptococcus*: a cautionary tale of management problems and a rare organism. *Br J Clin Pract* 1990; 44: 372-4.

Chaiwarith R, Jullaket W, Bunchoo M, *et al*. *Streptococcus agalactiae* in adults at chiang mai university hospital: a retrospective study. *BMC Infect Dis* 2011; 11: 149.

Chandrikakumari K, Giot JB, de Leval L, *et al*. Report of a case of *Streptococcus agalactiae* mycotic aneurysm and review of the literature. *Int J Surg Pathol* 2008; 16: 314-9.

Chan FY, Crawford ES, Coselli JS, *et al*. In situ prosthetic graft replacement for mycotic aneurysm of the aorta. *Ann Thorac Surg* 1989; 47: 193-203.

Cozijnsen L, Marsaoui B, Braam R, *et al*. Infectious aortitis with multiple mycotic aneurysms caused by *Streptococcus agalactiae*. *Ann Vasc Surg* 2013; 27: 975.e7-975.e13.

Edwards MS, Baker CJ. *Streptococcus agalactiae* (Group B Streptococcus). In: Bennett JE, Dolin R, eds. Mandell, Douglas, and Bennett's principles and practice of infectious diseases. 8th ed. Philadelphia: Elsevier Saunders, 2015.

Hsu RB, Chen RJ, Wang SS, Chu SH. Infected aortic aneurysms: clinical outcome and risk factor analysis. *J Vasc Surg* 2004; 40: 30-5.

Iwaki H, Suzuki S, Yajima T, *et al*. Use of open stent grafting for a mycotic aortic arch aneurysm. *J Thorac Cardiovasc Surg* 2006; 132: 1462-3.

Ledochowski S, Jacob X, Friggeri A. A rare case of *Streptococcus agalactiae* mycotic aneurysm and review of the literature. *Infection* 2014; 42: 569-73.

Masuhara H, Watanabe Y, Fujii T, *et al*. Successful surgical repair of an infectious thoracic

aortic pseudoaneurysm accompanied by aortobronchopulmonary fistula and advanced hepatic dysfunction without assisted circulation. *Ann Thorac Cardiovasc Surg* 2010; 16: 35-9.

Matsuda B, Hoo A, Teerasukjinda O, *et al*. Group B streptococcal (GBS) bacteremia with mycotic thoracic aortic aneurysm and suppurative pericardial effusion. *Hawaii J Med Public Health* 2014; 73: 25-8.

Oderich GS, Jean M, Thomas C, *et al*. Infected aortic aneurysms: aggressive presentation, complicated early outcome, but durable results. *J Vasc Surg* 2001; 34: 900-8.

Thawait, Akay A, Jhirad R, El-Daher N. Group B *Streptococcus* mycotic aneurysm of abdominal aorta: report of a case and review of the literature. *Yale J Biol Med* 2012; 85: 97-104.

Valentine RJ, Chung J. Primary vascular infection. *Curr Probl Surg* 2012; 49: 128-82.

Yamamoto H, Yamamoto F, Ishibashi K, *et al*. In situ replacement with equine pericardial roll grafts for ruptured infected aneurysms of the abdominal aorta. *J Vasc Surg* 2009; 49: 1041-5.