CASE REPORT

Endocarditis caused by unusual Streptococcus species *(Streptococcus pluranimalium)*

Fotoglidis A, Pagourelias E, Kyriakou P, Vassilikos V

3rd Cardiology Department, Aristotle University of Thessaloniki, Thessaloniki, Greece

Abstract

Background: Infective endocarditis in intravenous drug abusers is caused mainly by Staphylococcus species and usually affects the right heart valves.

Case Description: We report the case of a 37-years-old intravenous drug abuser, who was diagnosed with infective endocarditis of the mitral and aortic valve. An unusual Streptococcus species (*Streptococcus pluranimalium*) was isolated from surgical specimens (peripheral arterial emboli, valves' vegetations) which, according to the literature, is related to animals' diseases such as infective endocarditis in adult broiler parents, with no references existing regarding causing such disease in humans. This unusual coccus infection caused specific clinical features (sizable vegetation on mitral valve >2cm, smaller vegetations on aortic valve, systemic emboli), resistance to antimicrobial therapy, rapid progression of the disease (despite of medical therapy and surgical replacement of both valves), and finally the death of the patient two months after the initial presentation of infective endocarditis.

Conclusion: Unusual cases of infective endocarditis in intravenous drug abusers are emerging and are characterized by changing microbiological profile and varying clinical characteristics. Clinical doctors must be aware of these cases, especially when their patients present an atypical clinical course, and reappraise their medical management.

Hippokratia 2015; 19 (2):182-185.

Keywords: *Streptococcus pluranimalium*, infective endocarditis, drug abuser

Corresponding Author: Fotoglidis Athanasios, MD, Hippokratio General Hospital of Thessaloniki, 49 Konstantinoupoleos Str., 54642 Thessaloniki, Greece, tel: +302310892076, e-mail: fotogli@yahoo.gr

Introduction

Infective endocarditis (IE), despite contemporary advances in diagnostic modalities, remains a usual cause of hospitalization, which is associated with high morbidity and mortality[1,2]. Its prevalence, among intravenous drug abusers (IVDAs), is reported to be 2-5% per year[3,4]. IVDA endocarditis is even more frequent in human immunodeficiency virus (HIV) positive IVDAs, notably those with severe immunosupression[5,6].

Staphylococcus aureus had been considered the most common culprit in IVDA endocarditis[2] but the etiology of the disease is progressively changing, including other staphylococci, beta-hemolytic streptococci, and pathogenic fungi[4,7]. Non-pathogenic microbes (such as oral flora bacteria) are also part of the IE causative spectrum. Polymicrobial infections occur in 2-5% of cases.

IVDA endocarditis affects mainly the right-sided valves, with tricuspid being the most frequent site of the infection[8]. High frequency of relapses, severe sepsis, congestive heart failure, embolic events (into the lungs) and multiple organ failure, leading to intensive care unit admission and/or surgery, are common features of the disease. Nevertheless, the involvement of left-sided valves in IVDA endocarditis is gradually increasing[9]; being also characterized by severe clinical course and major complications. Endocarditis of left-sided valves, in comparison to the right-sided valves and polymicrobial infections, constitute risk factors for high morbidity and mortality among the IVDAs.

We present the case of a 37-years-old IVDA, who was admitted to the cardiology department due to endocarditis. The main characteristics of this case, highlighting its uniqueness, are: i) its atypical presentation of multiple recurrent systemic embolic events and low fever, ii) unusual Streptococcus species isolated and iii) the severe course.

Case presentation

A 37-years-old male IVDA, with clear past medical history, presented at the emergency department complaining of having tingling pain in his left leg for at least 15 days, which deteriorated 6 hours before his admission, and low-grade fever for about 10 days. On admission, he was afebrile, while clinical examination revealed acute left lower limb ischemia signs (painful, pale, cold and pulseless leg) and a loud pansystolic murmur, best heard at the mitral valve area, radiating to the left axilla. Arterial embolism was diagnosed, using emergency Doppler ultrasonography of the left lower limb vasculature, which revealed emboli in the left common femoral artery. The patient underwent emergency Fogarty catheter (Edwards Lifesciences, Irvine, USA) embolectomy of the left com-

mon femoral artery under local anesthesia in the vascular surgery department. Laboratory investigations showed increased neutrophils (white blood count: 16.4 x 10^9/L, with neutrophils: 87%) and inflammatory marker [C-reactive protein (CRP): 146 mg/L] while serological testing for hepatitis viruses (HBsAg, anti-HCV) and HIV (HIV Ag-Ab) were negative. Transthoracic echocardiography (Figure 1) revealed a sizable, oscillating, echodense mass with vegetation features (max diameter 2 cm), located on the anterior leaflet of the mitral valve and smaller vegetations located on the posterior leaflet of the mitral valve and the aortic valve cusps, setting the diagnosis of infective endocarditis.

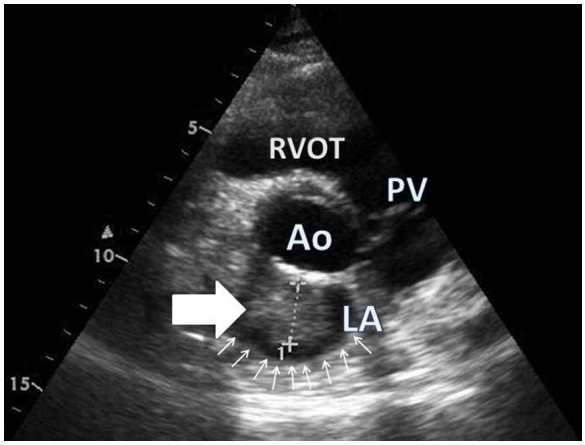

Figure 1: Parasternal short axis transthoracic echocardiography image at the lever of the aortic valve. The left atrium is delineated by the small white arrows, while the big slide arrow points an echogenic mass (vegetation) with a maximum diameter (line with crosses) of 2 cm, almost filling the left atrium. Vegetation is originated from the mitral valve, not displayed in this cross section. Ao: aortic valve, RVOT: right ventricular outflow tract, LA: left atrium, PV: pulmonic valve.

Microscopic examination of the excised, during arterial embolectomy, emboli showed a fibrin network and colonies of cocci, while Periodic acid-Schiff (PAS) and methamine silver stain were negative for fungi. The culture of the surgical specimen in common culture media (chocolate agar, blood agar, MacConkey agar, mannitol salt agar, and Schaedler anaerobic agar) and use of the automated analyzer Vitek 2 (bioMérieux Inc., Durham, USA) identified an unusual Streptococcus species (*Streptococcus pluranimalium*). The isolated bacterium was sensitive to vancomycin [30mgr/kgr/day intravenous (iv) in 2 doses] and gentamycin (3mgr/kgr/day iv in 3 doses) which had been initiated as soon as the diagnosis of IE was made.

The third day after the admission, the patient complained of pain in the right arm and right leg. Emergency Doppler ultrasonography revealed emboli in the right brachial artery and the right common femoral artery. The patient underwent Fogarty catheter embolectomy of the right brachial artery and the right common femoral artery under local anesthesia. Despite the embolectomy of the right common femoral artery, dry gangrene developed gradually on the right foot (Figure 2). Microbiological culture of the surgical specimen from the right brachial embolectomy confirmed the presence of *Streptococcus pluraminalium*, while the microbiological culture of the surgical specimen from the right common femoral artery was negative. During the initial diagnostic evaluation of the patient, computed tomography revealed incidental splenic infarcts (Figure 3). Due to vegetation size (2 cm), revealed by echocardiography and the recurrent embolic episodes (left common femoral artery, right brachial artery, right common femoral artery, splenic infarcts), the patient was referred for cardiovascular surgery, in order to resect the infected valves and replace them with prosthetics.

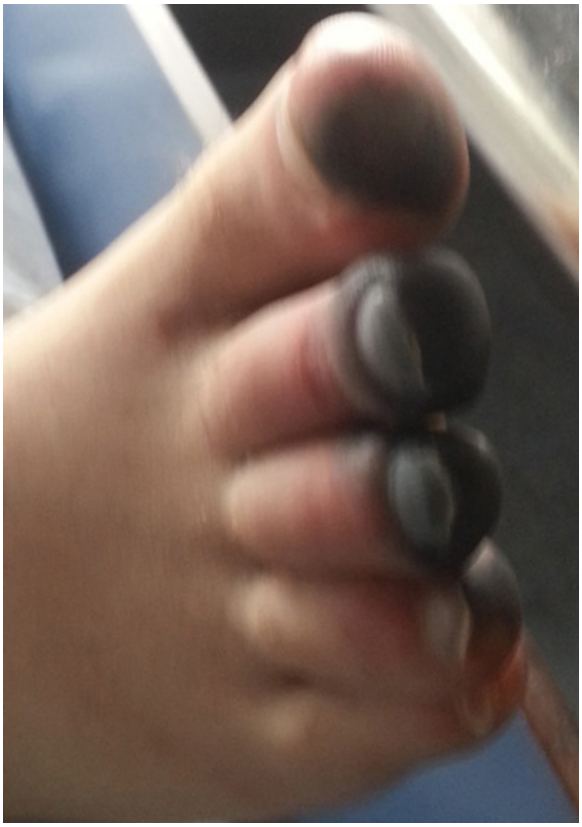

Figure 2: Patient's right foot showing dry gangrene on the distal phalanges of the toes, due to peripheral arterial embolism, evidence of rapid progression of the infective endocarditis.

On the 5th day after admission, cardiac surgery was performed under general anesthesia. During the operation, a sizable vegetation (>2cm) was found on mitral valve and smaller vegetations on the aortic valve cusps. Surgical replacement of mitral and aortic valves was performed (Medtronic Open Pivot bileaflet mechanical heart valves 27mm and 19mm respectively; Medronic, Inc., Minneapolis, USA). Microbiological culture of the surgical specimen confirmed the known presence of *Streptococcus pluraminalium.*

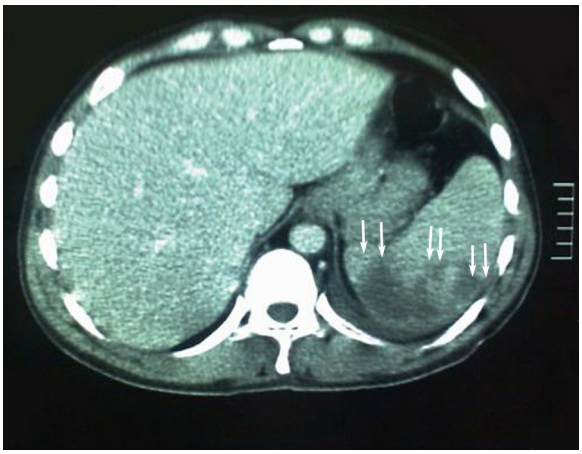

Figure 3: Computed tomography of the patient demonstrating splenic infarcts (white arrows), due to arterial emboli, which constituted a major complication of the infective endocarditis in this patient.

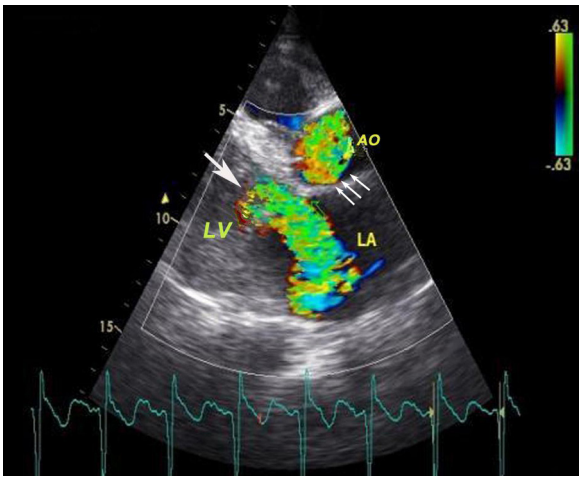

Figure 4: Parasternal long axis transthoracic echocardiography image at end systole, revealing two different turbulent jets, coming from mitral (big solid arrow) and aortic (small arrows) paravalvular leaks, due to prosthetic valves' dehiscence, with a fatal outcome despite of emergency repeated valve surgery. LV: left ventricle, LA: left atrium, AO: ascending aorta.

The initial postoperative days were uncomplicated. On the fifteenth postoperative day, gentamycin was replaced, due to impaired renal function [creatinine clearance (CrCl): 37 ml/min, Cockcroft-Gault equation], to meropenem (1gr iv every 12 hours), to which was also sensitive the Streptococcus species. In the following days, the patient remained afebrile and hemodynamically stable with a progressive improvement of his renal function. Inflammatory marker levels were improved but remained above the upper normal limit (CRP: 85 mg/L), a fact that denoted continuing infection[10]. The patient remained hospitalized, receiving intravenous antibiotic treatment. During the postoperative period, repeated blood cultures were all negative, while serial echocardiography studies (last on the 26th postoperative day) showed normal functioning prosthetic valves.

One month after the cardiac surgery, while the patient was stable, afebrile, receiving intravenous antibiotics, he developed rapid deterioration of his clinical condition and signs of acute pulmonary edema. Emergency echocardiography study revealed severe mitral and aortic paravalvular leaks (Figure 4). Emergency repeated valve surgery was undertaken, which revealed dehiscence of both aortic and mitral valve and sizable vegetations (<2cm) on both prosthetic valves. During the operation both prosthetic valves were replaced with new ones, but the patient remained hemodynamically unstable with continuing signs of acute pulmonary edema. Asystole occurred postoperatively causing patient's death, one hour after surgery, despite advanced cardiopulmonary resuscitation.

Discussion

Although the right-sided valvular infections are the usual localization of IE in IVDA patients, left-sided valve involvement is gradually increasing. The reason for this epidemiological change is rather unclear[11].

IVDAs have a poor quality of life and poor personal hygiene. Besides direct pathogenic mechanisms of infection (microorganisms, injectable material-drugs causing inflammation of endothelium) there are also indirect mechanisms (skin, urinary, and oral cavity infections) which predispose IVDAs to IE. The more frequent pathogen is *Staphylococcus aureus*, originating from patient's skin [several drug abusers are carriers of *methicillin-resistant Staphylococcus aureus* (MRSA)], followed by *streptococci*, *enterococci*, gram negative cocci (*Pseudomonas* mainly) and fungi. Poor prognostic factors are advanced age, left-sided endocarditis, multiple valve infection, MRSA, large (>2cm) vegetations[12] and HIV seropositive[13] with severe immunosuppression (CD4 cell count <200ml/microl or AIDS criteria). There are few data[3,14] regarding the results of surgical treatment and long-term outcomes for these patients. It is broadly accepted that preoperative clinical status influences the perioperative mortality. Although IVDAs present a high-risk profile on admission, their in-hospital mortality is similar (5.1%) to that of the non-IVDAs[3]. IVDAs have a significantly higher recurrence rate in comparison to non-IVDA patients, primarily because of early postoperative outcomes. Moreover, it is believed that drug abuse doesn't affect postoperative prognosis when aggressive surgical management is combined with prolonged postoperative antimicrobial therapy[3]. Further studies in IVDA patients, regarding the optimal timing of surgery and the proper perioperative antimicrobial therapy, are required.

To the best of our knowledge, *Streptococcus pluranimalium* is classified as an unusual streptococcus for provoking infections in humans. *Streptococcus pluranimalium* was identified in 1999 and is confused phenotypically with other unusual streptococcus species[15] (*S.acidominimis*) and *Streptococcus bovis* group[16]. It was

isolated from variant species (bovine's genetic system and breast glands, lungs and excreta of canaries, calf brain, giant panda's anus[17]), causing, among others, infective endocarditis in adult broiler parents[16]. There are clinical references[7] of infective endocarditis related to contact with contaminated milk or infected farm animals (*Brucella sp*, *Coxiella burnetii*, *Erysipelothrix sp*) and exposure to domestic (dog, cat) animals (*Bartonella sp*, *Pasteurella sp*, *Capnocytophaga sp*). The use of non-sterilized needles in outdoor areas is possibly the provoking factor of infection in the present case.

The contamination with this unusual streptococcus caused specific clinical characteristics: i) infection of left-sided valves (mitral, aortic), ii) sizable vegetation (2cm) on mitral valve and smaller vegetations (3-4mm) on aortic valve, iii) multiple peripheral arterial emboli (right arm, left leg, right leg, splenic infarcts), iv) antimicrobial therapy (selected on the basis of antibiogram and European guidelines) resistance, v) rapid evolution of the disease on the prosthetic valves, with development of vegetations on both valves, mainly on mitral valve, during the first month after surgical replacement of the infected valves, and vi) as final outcome the death of the patient, two months after the initial emergence of the IE.

In conclusion, unusual cases of infective endocarditis in intravenous drug abusers are revealing, characterized by unusual microbiological findings and altered clinical characteristics. Clinical doctors must be aware of these cases, especially when their patients display an atypical clinical course and modulate their medical management accordingly.

Conflict of interest

Authors declare no conflict of interest.

References

1. Tornos P, Gonzalez-Alujas T, Thuny F, Habib G. Infective endocarditis: the European viewpoint. Curr Probl Cardiol. 2011; 36: 175-222.
2. Murdoch DR, Corey GR, Hoen B, Miró JM, Fowler VG Jr, Bayer AS, et al; International Collaboration on Endocarditis-Prospective Cohort Study (ICE-PCS) Investigators. Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century: the International Collaboration on Endocarditis-Prospective Cohort Study. Arch Intern Med. 2009; 169: 463-473.
3. Carozza A, De Santo LS, Romano G, Della Corte A, Ursomando F, Scardone M, et al. Infective endocarditis in intravenous drug abusers: patterns of presentation and long-term outcomes of surgical treatment. J Heart Valve Dis. 2006; 15: 125-131.
4. Sousa C, Botelho C, Rodrigues D, Azeredo J, Oliveira R. Infective endocarditis in intravenous drug abusers: an update. Eur J Clin Microbiol Infect Dis. 2012; 31: 2905-2910.
5. Gebo KA, Burkey MD, Lucas GM, Moore RD, Wilson LE. Incidence of, risk factors for, clinical presentation, and 1-year outcomes of infective endocarditis in an urban HIV cohort. J Acquir Immune Defic Syndr. 2006; 43: 426-432.
6. Wilson LE, Thomas DL, Astemborski J, Freedman TL, Vlahov D. Prospective study of infective endocarditis among injection drug users. J Infect Dis. 2002; 185: 1761-1766.
7. Baddour LM, Wilson WR, Bayer AS, Fowler VG Jr, Bolger AF, Levison ME, et al; Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease; Council on Cardiovascular Disease in the Young; Councils on Clinical Cardiology, Stroke, and Cardiovascular Surgery and Anesthesia; American Heart Association; Infectious Diseases Society of America. Infective endocarditis: diagnosis, antimicrobial therapy, and management of complications: a statement for healthcare professionals from the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, Council on Cardiovascular Disease in the Young, and the Councils on Clinical Cardiology, Stroke, and Cardiovascular Surgery and Anesthesia, American Heart Association: endorsed by the Infectious Diseases Society of America. Circulation. 2005; 111: 394-434.
8. San Román JA, Vilacosta I, Sarriá C, Garcimartín I, Rollán MJ, Fernández-Avilés F. Eustachian valve endocarditis: Is it worth searching for? Am Heart J. 2001; 142: 1037-1040.
9. Faber M, Frimodt-Moller N, Espersen F, Skinhoj P, Rosdahl V. Staphylococcus aureus endocarditis in Danish intravenous drug users: high proportion of left-sided endocarditis. Scand J Infect Dis. 1995;27:483-487.
10. Ghoneim AT, McGoldrick J, Ionescu MI. Serial C-reactive protein measurements in infective complications following cardiac operation: evaluation and use in monitoring response to therapy. Ann Thorac Surg. 1982; 34: 166-175.
11. Starakis I, Mazokopakis EE. Injecting illicit substances epidemic and infective endocarditis. Infect Disord Drug Targets. 2010; 10: 22-26.
12. Martin-Davila P, Navas E, Fortun J, Moya JL, Cobo J, Pintado V, et al. Analysis of mortality and risk factors associated with native valve endocarditis in drug users: the importance of vegetation size. Am Heart J. 2005; 150: 1099-1106.
13. Miro JM, del Rio A, Mestres CA. Infective endocarditis in intravenous drug abusers and HIV-1 infected patients. Infect Dis Clin North Am. 2002; 16: 273-295
14. Mathew J, Abreo G, Namburi K, Narra L, Franklin C. Results of surgical treatment for infective endocarditis in intravenous drug users. Chest. 1995; 108: 73-77.
15. Facklam R. What happened to the streptococci: overview of taxonomic and nomenclature changes. Clin Microbiol Rev. 2002; 15: 613-630.
16. Hedegaard L, Christensen H, Chadfield MS, Christensen JP, Bisgaard M. Association of Streptococcus pluranimalium with valvular endocarditis and septicaemia in adult broiler parents. Avian pathology: journal of the WVPA. 2009; 38: 155-160.
17. Wan L, Chen S, Wang C, Li D, Zheng Z, Wang C, et al. Identification and genotypic analysis of Streptococcus spp. isolated from Giant Pandas in China by PCR-based methods. Afr J Microbiol Res. 2012; 6: 1380-1386.