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Successful Surgical Treatment of Mitral Valve Endocarditis Caused by *Staphylococcus Lugdunensis*

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Abstract. Staphylococcus lugdunensis, a very virulent coagulase negative species, has been recently recognized, and rarely reported in few cases, as a cause of endocarditis. This infection, in contrast to the ordinary staphylococcus epidermidis, is frequently lethal and carries a very high risk of devastating embolic complications. In this paper, it was reported that aggressive infection in a child presenting with mitral valve endocarditis, major left cerebral infarction, bulbar palsy and incontinence, with a favorable outcome after combined medical and surgical treatment in King Abdulaziz University Hospital ─ Open Heart Unit. The aim of this report is to emphasize the importance of detailed and advanced microbiological identification of the exact coagulase negative species to avoid overlooking an aggressive pathogen.

Keywords: Endocarditis, *Staphylococcus lugdunensis* infection, Heart valve surgery, Stroke.

Introduction

Staphylococcus lugdunensis was first described in 1988[1] and reported as a cause of serious infection including endocarditis, osteomyelitis and septicemia[2]. It produces bound coagulase and occurs as a commensal on human skin. Less than 5% of native valve endocarditis is caused by

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coagulase negative staphylococci, mostly epidermidis which normally presents as a subtle, subacute, or chronic illness; where as, *S. lugdunensis* increasingly appears to more closely resemble that of *Staphylococcus aureus* – being aggressive and associated with high mortality and complications including systemic embolization, congestive heart failure annular abscesses and disruption of valve leaflets[3,4]. Early surgical intervention, commonly valve replacement, is recommended in these cases.

Case Report

A 13-year-old boy, with no significant past medical history, was admitted to King Abdulaziz University Hospital (KAU) through the Emergency Room with high grade fever, rigors, and night sweats for the last five weeks which was relieved with Tylenol intake. He was complaining also of generalized weakness, fatigue, nausea, vomiting, anorexia, and weight loss of about 5 kilograms over the last month. He noted erythematous macular rash on the extremities 2 days prior to admission. There was no past history of dental procedure or upper respiratory tract infections. He received three different courses of antibiotics and one course of antimalarial medication, prescribed by the general clinic, with no improvement.

On examination, the patient was conscious, oriented, pale and dyspnoea; respiratory rate was 22/min; heart rate 135/min; blood pressure 116/65 mmHg; temperature 38.9°C; normal jugular venous pressure; and mild left lower limb ankle edema. Chest examination showed equal air entry with normal vesicular breathing, abdomen was soft, with tender mild hepatosplenomegaly. Neurological system was grossly intact, heart examination revealed muffled first heart sound, normal second heart sound with pan systolic murmur over the mitral area.

Investigation showed hemoglobin of 10 gm/dl; white blood count (WBC) 20.7 × 10/l; normal platelet count; normal electrolytes; urea; and creatinine. Liver function tests showed normal bilirubin, mild elevation of transaminases and alkaline phosphatase. Hepatitis and HIV screenings were negative.

Chest X-ray showed cardiomegaly. Echocardiography revealed thickened mitral valve leaflets, severe mitral regurgitation with 2

vegetations (0.7 × 0.8 cm and 0.3 × 0.6 cm) attached to both anterior and posterior leaflets, respectively. Mild tricuspid regurgitation, ejection fraction was normal with mild left atrial and ventricular dilatation. Electrocardiogram (ECG) showed sinus tachycardia. Abdominal ultrasound showed slight hepatosplenomegaly.

The patient was started on empiric antibiotics initially including ceftriaxone 1 gm every 12 hours, gentamycin 70 mg three times daily and vancomycin 1 gm twice daily. Three days after admission, the patient suddenly developed loss of consciousness, Glasgow Coma Scale was down to 6/15, with bilateral dilated reactive pupils, and right-sided marked weakness of both upper and lower limbs associated with aphasia and inability to swallow. Magnetic resonance imaging (MRI) of the brain showed acute embolic infarction in the left middle cerebral artery territory (frontoparietal). The patient was tachypneic, tachycardic, and hypotensive. He was transferred to the intensive care unit (ICU), intubated and mechanically ventilated, requiring inotropic support and vasoconstrictors to maintain adequate perfusion pressure. He continued to have high grade fever. Blood cultures were positive for coagulase negative staphylococcus that was subsequently identified as *S. lugdunensis*. Ceftriaxone was changed to Flucloxacillin 2 g every 4 hours. The patient remained hemodynamically unstable, febrile, and suffered temporary deterioration of renal function over a 10-day-period, followed by gradual improvement and eventually was ex-tubated 12 days later. Follow-up transthoracic and transeosophageal echocardiogram confirmed the previous findings. The patient was transferred to the medical ward with dense right-sided hemiplegia, bulbar palsy, aphasia, lack of both urinary and bowel control, inability to stand and was fed by nasogastric tube. He was followed-up by cardiology, infection control, and neurological teams. The patient was referred to cardiac surgery after completion of 6 weeks of antibiotics and intensive physiotherapy.

Intraoperatively, the left atrium was dilated and the mitral valve was not suitable for repair as it was heavily diseased with vegetations on both leaflets. The valve was excised and replaced with a tissue perimount valve, which has relatively good durability, to avoid the complications of anticoagulation. The patient was weaned of pump well, hemostasis was secured and the rest of the operation was smooth. Postoperatively, the patient was ex-tubated within a few hours and started mobilization and

feeding on the following morning. Intensive chest physiotherapy was instituted. Valve cultures did not grow any bacteria. The patient's general condition improved, regained swallowing, continued on intensive course of physiotherapy and discharged home with close medical follow-up.

Discussion

S. lugdunensis is a novobiocin-susceptible, coagulase negative species found among the normal flora of skin and mucous membranes and described as a rare cause of endocarditis[3-6].

In general, most coagulase negative staphylococcal infections are nosocomial, increasingly resistant to multiple antibiotics, and, like *S. aureus*, about 80% of strains produce an inducible beta-lactamase and are methicillin resistant. The increasing incidence of coagulase negative staphylococcal native valve endocarditis is caused by the increased use of indwelling intravascular catheters. *S. lugdunensis* is considered the most virulent strain since the infection is usually aggressive because of the above features and in addition their ability to secrete bound, not free, coagulase, a feature it shares with *S. aureus*. Bound coagulase has the ability to bind vitronectin and fibrinogen to extracellular matrix[7]. This may explain the toxemia, the destructive nature and the embologenic feature of this pathogen. Early identification of these virulent strains, using the most recent microbiological detailed techniques ─ especially the detection of the coagulase fibrinogen affinity factor and the ornithine decarboxylase activity ─ is very crucial to avoid delayed treatment[8]. Their colonies are usually hemolytic, sticky, yellow or tan, about 2-4 mm in diameter after 48-hours incubation and have a characteristic odor.

Based on the world literature, only 73 cases of *S. lugdunensis* endocarditis have been reported[5,6,9-15]. Fifty-seven (78%) patients had native valve endocarditis mainly mitral involvement and frequently complicated by heart failure, abscess formation and embolism. Surgery was needed in 51% of cases and mortality was 42%. Nine (12%) patients had prosthetic valve endocarditis, mainly aortic, and were associated with abscess formation, required surgery with high mortality (78%). Pacemaker lead endocarditis was seen in seven (10%) patients with better prognosis when medical treatment is combined with surgery.

With the patient, the infection was very aggressive causing severe toxemia requiring mechanical ventilation and inotropic support also resulting in serious neurological deficits in the form of massive left frontoparietal infarction, bulbar palsy, aphasia and incontinence of urine and stool. Early surgical intervention is recommended in these cases.

The message we conclude from this case, which is also emphasized by other reports, is to remember that endocarditis due to *S. lugdunensis* has a different natural history and prognosis than does endocarditis caused by other coagulase negative staphylococcal strains. Early identification of the pathogen and the prompt institution of the proper medical and surgical management are important to avoid the morbidity and mortality of this serious infection.

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عملية قلب ناجحة لحالة عدوى تجرثم صمامات القلب بفصيلة نادرة من البكتريا الكروية العنقودية (لوقدوننسز)

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المستخلص. تم إجراء عملية قلب ناجحة لطفل أصيب بتجرثم الصمام التاجي بفصيلة نادرة شرسة من البكتريا الكروية العنقودية. أدخل المريض المستشفى بشكوى حرارة شديدة مستمرة مع اعتلال حاد وعام بالصحة، وأجريت له الفحوصات والتحاليل وأعطي المضادات، وبعد ٣ أيام أصيب باحتشاء حاد بالمخ الأيسر، تسبب فى غيبوبة، وشلل الجهة اليمنى، وفقدان النطق والقدرة على الكلام، مع هبوط حاد بالدورة الدموية، مما استدعى نقل المريض للعناية المركزة، حيث إجري له التنفس الصناعي وأعطي منشطات الدورة الدموية. بعد أكثر من ١٠ أيام تحسنت حالة المريض وأجريت له عملية قلب مفتوح لاستبدال الصمام التاجي، وتمت بنجاح والحمد لله. الغرض من نشر هذه الحالة هو للتذكير بخطورة فصيلة البكتريا الكروية العنقودية (لوقدوننسز) النادرة، إذ تم نشر ٧٣ حالة فقط على المستوى العالمي.