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Infective Endocarditis Caused by *Staphylococcus aureus* in a 6-Year-Old Girl with No History of Heart and Dental Problems: A Case Report

Case Report

Mohsen Ebrahimi
Children's Research Center, Department of Pediatrics, Taleghani Medical Education Center, Golestan University of Medical Sciences, Gorgan, Iran

Hassan Esmaeili
Children's Research Center, Department of Pediatrics, Taleghani Medical Education Center, Golestan University of Medical Sciences, Gorgan, Iran
& Congenital Malformations Research Center, Department of Pediatrics, Taleghani Medical Education Center, Golestan University of Medical Sciences, Gorgan, Iran

Corresponding author: Hassan Esmaeili (MD)

Email: he_md1972@yahoo.com

Tel: +989131407028

Address: Congenital Malformations Research Center, Department of Pediatrics, Taleghani Medical Education Center, Golestan University of Medical Sciences,

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ABSTRACT

Infective endocarditis is rare in children but can cause significant morbidity and mortality. *Streptococcus* and *Staphylococcus* species are the leading causes of this disease. *Staphylococcus* is more common in people with underlying heart disease, and *Streptococcus viridans* is more common in people who have had a dental procedure. In general, any fever of unknown origin in children with an underlying heart problem should be carefully evaluated for endocarditis, and empiric therapy should be performed. The main symptoms of the disease include fever, new murmur, deterioration of the previous murmur, hematuria, embolic events, splenomegaly, bleeding splinter, Osler's nodes, Janeway lesion, and Roth spots. One of the important complications of infective endocarditis is cerebrovascular event and stroke. Herein, we describe a 6-year-old girl presented with fever and skin lesions and no history of underlying heart problem or dental procedure. The patient expired after three days of mitral valve infection with *S. aureus*.

Keywords: Staphylococcus aureus, endocarditis, Stroke.

INTRODUCTION

Infective endocarditis is a rare disease in children in which cerebrovascular and thromboembolic events are the leading causes of morbidity and mortality (1). *Streptococcus viridans* and *Staphylococcus aureus* are the leading causes of this disease. *S. viridans* is more common in people who have had a dental procedure, while *S. aureus* is more common in people with an underlying problem (2-4). This study presents a rare case of a child with no history of dental procedure and heart disease admitted to the Taleghani hospital complaining of fever. The patient deceased after three days of mitral valve infection with *S. aureus*.

CASE PRESENTATION

A 6-year-old girl who complained of 40 °C fever was referred to the Taleghani Hospital in Gorgan, Iran. The patient had developed a skin rash after taking antibiotics and was hospitalized. At the time of admission, the patient had a non-itchy skin rash and fever for three days. The patient complained of myalgia, anorexia, and two episodes of vomiting. There was no specific underlying medical condition. The patient also had normal growth and development concerning her age. At the time of admission, the patient's blood oxygen level (SpO_2) was 97%. In addition, 60/90 mmHg blood pressure and a 38.5 °C fever were noted. The patient was alert during the examinations. There were non-itchy papulomacular rashes on the trunk, limbs, and palms of the hands and feet on skin examination. Examination of the eye did not reveal conjunctivitis or conjunctival bleeding. Cardiac sounds S1, S2, and murmur were heard on cardiac examination. There was no hepatosplenomegaly on abdominal examination. No damaged teeth were observed. Complete blood count with differential (CBC/diff), erythrocyte sedimentation rate (ESR), C-reactive protein test (CRP), and blood culture (BC) were requested. The following results were recorded: leukocytosis (WBC = 15500, Poly = 85%), ESR = 34 mm/hour, CRP = +2, hemoglobin (Hb) = 12.3 (thrombocytopenia), and platelet = 93000/microliter. Hematuria was also seen in urine analysis. Biochemical tests were normal. Treatment with clindamycin and gentamicin was started according to the infectious disease specialist.

In the next 24 hours (4 a.m.), the patient suffered from drowsiness and hemiparesis on the right and lateral gaze on the left. Extensive ischemia was seen on computerized tomography (CT) scan. According to the infectious disease specialist, acyclovir was added to the treatment due to decreased level of consciousness. Magnetic resonance imaging (MRI) and magnetic resonance angiography were requested for the patient to rule out other diagnoses. Based on the findings, thrombosis in the left internal carotid region was diagnosed, and an emergency angiography thrombectomy was performed for the patient (Figure 1). Accordingly, the patient was admitted to the pediatric intensive care unit ward. Amikacin, clindamycin, and vancomycin were prescribed for preventing re-infection, and previous antibiotics were discontinued.

The patient was intubated to maintain blood carbon dioxide levels around 25-35 and lower intracranial pressure. Cardiology consultation was requested on the origin of cerebral thrombosis. On echocardiography, an echogenic region was observed to the left of the anterior leaflet of the mitral valve, suggesting endocarditis (Figure 2). The second BC was performed. Due to cerebral thrombosis, prothrombotic and SARS-CoV-2 tests were done. The result of the viral test was negative. Prothrombotic results were as follows: lupus anticoagulant= 32, antithrombin III = 110%, negative anticardiolipin IgM and IgG tests, Pro C = 236, and Pro S = 97. Thrombose was also removed by thrombectomy. The patient was transferred to Shahid Rajaei Hospital (Tehran, Iran) for heart surgery. After 72 hours of thrombectomy due to re-CT, cerebral edema, and midline shift to the right, mannitol treatment was started for the patient. The BC was positive for *S. aureus* 72 hours after the admission, and treatment with acyclovir was initiated. Next, BC was performed again by the BACTEC method based on the measurement of CO_2 produced by bacteria when C-labeled palmitic acid present in the liquid media of the culture is metabolized, which resulted in *S. aureus*-positive result. Acyclovir therapy was discontinued after observing the BACTEC positive result. The patient expired the day after *S. aureus* positive culture. No methicillin-susceptibility test was performed.

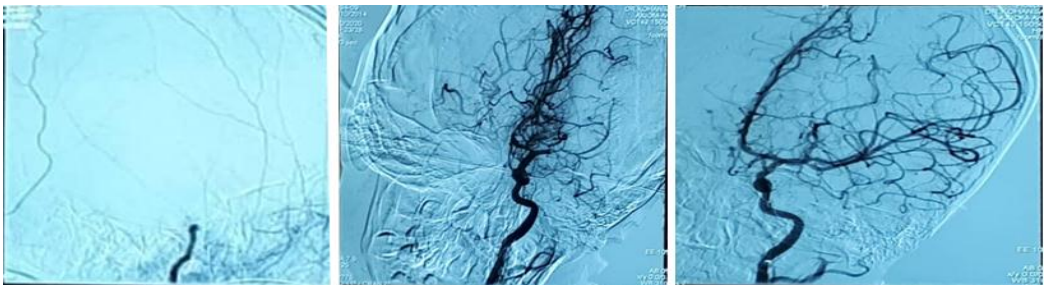

Figure 1 -Magnetic resonance angiography of mycotic aneurysm. Progression of thrombosis from left to right is evident in the left internal carotid region.

Figure 2- Lon axis echocardiography of endocarditis in the left anterior leaflet of the mitral valve

DISCUSSION

We presented a case of infective endocarditis with *S. aureus*, which had a normal heart valve and no specific risk factor for infectious endocarditis. In 10% of cases with endocarditis have a normal valve (5). In 35% of these cases, endocarditis is caused by *S. aureus* (6). The neurological complication of this disease, which occurs due to embolic events, is more significant with this microorganism. The Duke's criteria are used for the diagnosis of infective endocarditis, and early diagnosis is essential. In our case, infective endocarditis with thromboembolic complication in the internal carotid artery and the vertical axis in Talairach space were detected. The patient had no history of heart disease and had positive *S. aureus* BC twice. According to the Duke's criteria, positive BC and echo findings confirmed diagnosis of infective endocarditis.

In general, any fever of unknown origin should be closely monitored in children. Timely treatment of local infectious diseases is also crucial to prevent infective endocarditis because it can also affect the heart through the blood (7,8). The neurological complications of the disease, which include lethargy and paralysis, are due to ischemic and hemorrhagic stroke (9,10). Ways of this involvement include embolism due to partial vegetation or rupture of the intracranial mycotic aneurysm.

There are predictive factors for assessing risk of embolism: a vegetation size of more than 10 mm, the ability to move the vegetation, the vegetation location (the risk is highest when vegetation is located on the mitral valve, artificial or natural mitral valve, and presence of infectious agents such as *S. aureus* (11,12). Cerebral embolism has no apparent symptom in most patients. In more than 80% of patients, MRI shows signs of cerebrovascular disease (13). Intravenous thrombolysis in secondary acute ischemic stroke is contraindicated to infective endocarditis. Mechanical vascular thrombectomy is an intravascular technique used to treat stroke due to the closure of large arteries, which is rare in children (14,15). Cases of endocarditis in which mechanical thrombectomy is performed are sporadic. Evidence suggests that mechanical thrombectomy will be an effective and safe method for treating proximal vascular occlusion if the intervention occurs in less than 4.5 hours (16). Treatment of ischemic stroke is dramatically dependent on the time of recanalization of a blocked vessel due to cerebral ischemia (17).

CONCLUSION

In this case, we introduce a 6-year-old girl who presents with fever and skin lesions without underlying heart problems and dental intervention and suffers from cerebrovascular event because of endocarditis. Current treatment of ischemic stroke is dramatically dependent on the time of recanalization of blocked vessel due to cerebral ischemia. Although rapid neurological recovery has been observed in patients, the prognosis is poor in patients with stroke. Mechanical thrombectomy will be available in the coming years and will significantly reduce morbidity and mortality in these patients.

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DECLARATIONS

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Ethics approvals and consent to participate

Not applicable.

Conflicts of interest

The authors declare that there is no conflict of interest.

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