Staphylococcus aureus 심내막염과 관련된 내인성안내염과 망막혈관색전증 증례

Endogenous Endophthalmitis and Embolic Retinopathy Associated with Infective Endocarditis Caused by Staphylococcus aureus

Kim EunAh1,2, Park Sung Who2,3, Kwon Han Jo2,3, Park Bo Hyun2,3, Byon Ik Soo2,3

1Department of Ophthalmology, Inje University Haeundae Paik Hospital, Inje University School of Medicine, Busan, Korea
2Department of Ophthalmology, Pusan National University Hospital, Pusan National University School of Medicine, Busan, Korea
3Biomedical Research Institute, Pusan National University Hospital, Busan, Korea

Purpose: We report a rare case of bilateral endogenous endophthalmitis and unilateral embolic retinopathy from methicillin-sensitive Staphylococcus aureus (MSSA) infective endocarditis in a Korean patient with systemic lupus erythematosus (SLE).

Case summary: A 22-year-old woman was transferred to a tertiary university hospital for fever, dyspnea, and drowsiness for one day. An echocardiogram revealed mitral regurgitation and mitral valve vegetation, and MSSA was isolated from blood samples. Based on these findings, she was diagnosed with MSSA infective endocarditis. Multifocal discoid chorioretinitis with vitritis was noted in both eyes. Intravitreal injections of vancomycin (1 mg/0.1 mL) and ceftazidime (2 mg/0.1 mL) were administered. Optical coherence tomography (OCT) revealed hyperreflective vegetation in the suprachoroidal area, causing pigment epithelial detachment, which spread to the sensory retina. Embolic retinopathy was found in the right eye. Magnetic resonance imaging of the brain showed multifocal subacute infarctions caused by septic emboli. These findings led to a second diagnosis of SLE and associated nephritis, for which she underwent mitral valve replacement surgery. Her final visual acuity was 20/32 in the right eye and 20/20 in the left eye. There were chorioretinal atrophic scars in both eyes and an area of nonperfused vascular sheathing of the distal retinal arteries in the right eye. OCT showed areas of pigment epithelial atrophy and outer retinal defects in the areas with previous chorioretinitis.

Conclusions: Physicians should consider endogenous endophthalmitis and embolic retinopathy in patients with MSSA infective endocarditis.

Keywords: Embolic retinopathy; Endogenous endophthalmitis; Infective endocarditis; Staphylococcus aureus
Introduction

Infective endocarditis is an infection in the lining of the heart that also affects the valves. The major diagnostic criteria for infective endocarditis are at least two positive blood cultures drawn at least 12 hours apart and evidence of endocardial involvement with new valvular regurgitation or positive echocardiographic evidence of a mobile intracardiac valvular mass, abscess, or dehiscence of a prosthetic valve [1]. Complications associated with infective endocarditis include heart failure triggered by valvular destruction, paravalvular and extracardiac abscesses, arterial emboli, and glomerulonephritis [2]. Arterial emboli occur in up to 50% of infective endocarditis cases, and the most common site is the brain, but spleen, kidneys, and limbs may also be involved [3].

Streptococcus species are seen in more than 58% of infective endocarditis cases [4], with Staphylococcus aureus leading to ocular complications in more than 56% of cases [5]. Ocular manifestations of infective endocarditis include Roth spots [6], endogenous endophthalmitis [5], retinal artery occlusions [7], and a choroidal neovascularization [8]. Roth spots are the most common; others are described in case reports. A Roth spot is an oval-shaped superficial retinal hemorrhage with a pale center. In endocarditis, it is a cluster of red blood cells surrounding inflammatory cells collected in response to a septic embolism from valvular vegetations [6]. Roth spots usually affect the peripapillary region and may appear and disappear rapidly [9]. However, we observed retinal septic emboli with sequelae. Here, we report a rare case of bilateral endogenous endophthalmitis and unilateral embolic retinopathy from infective endocarditis with methicillin-sensitive Staphylococcus aureus (MSSA) in a Korean patient with systemic lupus erythematosus (SLE).

Case Report

This case report was approved by the Institutional Review Board at Pusan National University Hospital (IRB No: 2303-017-125). The authors adhered to the tenets of the Declaration of Helsinki throughout the study.

A 22-year-old female patient was transferred to the emergency room (ER) of a tertiary-referral university hospital for fever, dyspnea, and drowsiness for one day. Her medical history was non-contributory, and she was not an intravenous drug user. She had visited a local medical center two months earlier due to mild difficulty breathing and whole-body edema, but only mild pulmonary effusion was found on a chest X-ray. In the ER, her blood pressure was 100/60 mmHg, and her pulse rate was 108 beats/min. Laboratory tests revealed leukocytosis (white blood cell count = 14,550/μL), anemia (serum hemoglobin = 7.0 g/dL), and thrombocytopenia (platelet count = 51,000/μL). A chest X-ray taken in the ER revealed significant pulmonary edema in both lungs with costophrenic angle blunting (Fig. 1A). Arterial blood gas analysis showed partially compensated metabolic acidosis. The patient was intubated in the ER. On echocardiography, the left ventricular ejection fraction was decreased (34%) and there was diastolic dysfunction of the left ventricle. The mitral valve showed mild thickening, with mild to moderate eccentric regurgitation. A highly mobile echogenic elongated oval mass (2.4 × 0.5 cm) was noted at the posterior leaflet (Fig. 1B). Staphylococcus aureus was isolated from two blood cultures collected at least 12 hours apart. Diagnoses were infective endocarditis and complicated sepsis, and she was admitted to the intensive care unit. The Staphylococcus aureus isolated was susceptible to all antibiotics tested, including methicillin, penicillins (amoxicillin and ampicillin), ceph-
Alosporins (cefazolin, cefoxitin, cefotaxime, cefepime, and ceftazidime), aminoglycosides (amikacin and gentamicin), a monobactam (aztreonam), quinolones (ciprofloxacin and trimethoprim-sulfamethoxazole), carbapenems (ertapenem and imipenem), and piperacillin-tazobactam. Systemic intravenous antibiotics and immunoglobulins were prescribed by the attending physician.

The patient was referred to the ophthalmology department to screen for Roth spots. Her fundus examination revealed multiple Roth spots with disseminated small discoid chorioretinitis foci and vitreous haziness in both eyes. Under a diagnosis of endogenous endophthalmitis, intravitreal injections of vancomycin (1 mg/0.1 mL) and ceftazidime (2 mg/0.1 mL) were administered. Anterior chamber fluid cultures were negative.

Diffusion-weighted magnetic resonance imaging of the brain showed multifocal subacute infarctions in the bilateral...
frontal and parietal, right temporal, and occipital lobes and bilateral corona radiata, along with septic emboli in the bilateral cerebral hemispheres and cerebellum (Fig. 1C, D). Serologically, anti-dsDNA immunoglobulin G (IgG) (> 200 IU/mL) and anti-Ro antibody (25.6 U/mL) were positive. Serum C3 (47.0 mg/dL) and C4 (5.7 mg/dL) were decreased, and urine protein/creatinine ratio was elevated (3.4 g/g). Therefore, she was diagnosed with SLE and associated nephritis. High-dose steroid pulse therapy was administered for the lupus nephritis. Abdominal computed tomography showed mild hepatosplenomegaly and several liver and spleen infarctions. Her serum homocysteine level was elevated (16.5 μmol/L), but prothrombin time was within normal limits (12.7 seconds).

On day seven of admission, the Roth spots had largely resolved, and the infective chorioretinitis and vitritis in both eyes had responded well to intravitreal antibiotics. The patient recovered mentally and was extubated, and a comprehensive ophthalmologic examination was performed. On day nine, embolic retinopathy was observed in her right eye (Fig. 2A, C). Optical coherence tomography (OCT) showed hyper-reflective vegetation in the suprachoroidal area causing pigment epithelial detachment, which spread through the retinal pigment epithelium into the sensory retina (Fig. 2B, D). Best-corrected visual acuity was 20/40 in the right eye and 20/32 in the left. Intravitreal injections were continued once a week, and the infective chorioretinitis improved significantly. As the infective chorioretinitis foci resolved, they formed small, round chorioretinal atrophic scars (Fig. 3A, C). Thinning of the sensory retina due to nonperfusion distal to the embolic retinopathy was noted. On day 12, the patient underwent successful mitral valve replacement. Both eyes received six weekly intravitreal antibiotics injections. After two months, the vitritis had resolved. Her final visual acuity was 20/32 in the right eye and 20/20 in the left. There were chorioretinal atrophic scars in both eyes, as well as areas of nonperfusion and vascular sheathing of the distal retinal arteries of the right eye. OCT showed defects in the pigment epithelium and outer retina (Fig. 3B, D). Multifocal discoid window defects from the pigment epithelial defects were seen on fluorescein angiography. Indocyanine green angiography showed defective filling at the scars, indicating damaged choriocapillaris (Fig. 4).

Discussion

Endogenous endophthalmitis accounts for 2-8% of endophthalmitis cases [10]. Because of hematogenous spread of pathogens, chorioiditis and retinitis occur relatively in early in the disease course, and the visual prognosis is usually poor. Endogenous endophthalmitis usually arises in individuals with underlying conditions such as diabetes mellitus, urinary tract infections, an immunosuppressive state, intravenous drug abuse, or indwelling catheters [11]. Klebsiella pneumoniae liver abscesses are a common cause of endogenous endophthalmitis in East Asia [12], while infective endocarditis is an important systemic infection associated with endogenous endophthalmitis in Western countries [13].

Retinal vascular occlusion can also be a manifestation of lupus retinopathy. Vascular occlusion associated with SLE is commonly ascribable to microemboli and microvascular infarcts, and it presents with multiple cotton wool spots. More uncommon and severe retinal vascular occlusions can be accompanied by a hypercoagulability state associated with antiphospholipid syndrome or hyperhomocysteinemia [14]. Central or branch retinal artery occlusion as the sole presentation of retinopathy in SLE is extremely rare and generally manifests concurrently with cottonwool spots, retinal hemorrhage, and retinal arteritis with immune complex formation [14,15]. Neovascularization has been observed in 40% of cases, resulting in devastating visual outcomes [14]. Our patient had elevated serum homocysteine but was not diagnosed with antiphospholipid syndrome, and her serum prothrombin time was within normal limits. Formation of Roth spots was the major finding from the fundus exam, and multiple cottonwool spots or retinal arteritis was not observed. The patient’s vision was fairly well-preserved, although multiple chorioretinal scars and a retinal nonperfusion area remain as sequelae. Physicians should consider endogenous endophthalmitis and embolic retinopathy in patients with MSSA infective endocarditis.

Conflicts of Interest

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