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Case Report

A case of acute post-streptococcal glomerulonephritis that developed posterior reversible encephalopathy syndrome

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Abstract

A 10-year male patient presented with swelling in the face, legs and scrotal area which developed 8 days after tonsillitis treatment. Acute post-sterotococcal glomerulonephritis (APSGN) was considered in the patient whose urinalysis revealed hematuria and proteinuria at nephrotic level, whose urea, creatinine, lipid profile and anti-streptolysine O antibody levels were increased, albumin and C3 value were decreased and whose 24-hour urine test revealed proteinuria. Renal biopsy was found to be compatible with APSGN. In the follow-up, severe headache, vomiting and convulsion were observed under antihypertensive and diuretic treatment and when the blood pressure was 130/80 mmHg (the 99th percentile for the patient: 129/88 mmHg). During the follow-up, the blood pressure values increased to 160/90 mmHg. The electroencephalogram (EEG) performed was found to be normal and magnetic resonance imaging (MRI) findings were compatible with posterior reversible encephalopathy syndrome (PRES). MRI was found to be normal at the first month following antihypertensive and anticonvulsive treatment. In the first year of the follow-up, the blood pressure, neurological examination and urinalysis findings were found to be normal. This patient was presented to draw attention to the fact that PRES can also present with a blood pressure tending to increase and with blood pressure values which are not so high. (Türk Ped Arş 2014; 49: 348-52)

Key words: Acute glomerulonephritis, childhood, posterior reversible encephalopathy syndrome

Introduction

Posterior reversible encephalopathy syndrome (PRES) is a clinico-radiological picture which presents with vomiting, severe headache, clouding of consciousness, behavioral changes, seizures and visual disorders and typical magnetic resonance imaging (MRI) findings (1, 2). The radiological findings are frequently characterized with transient bilateral grey and white-matter changes compatible with vasogenic edema in the posterior cerebral hemispheres, parieto-occipital areas and cerebellum (1).

Although it is generally described in adult patients, it has been started to be reported in children with a gradually increasing frequency (2). In children, cases of PRES occuring with acute post-sterptococcal glomerulonephritis (APSGN), Henoch-Schönlein purpura (HSP),

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nephrotic syndrome (NS), lupus nephritis and use of calcineurin inhibitor (CNI) have been reported (3-5). Although the underlying cause is generally sudden increases in blood pressure, it may also be observed in relation with renal failure, fluid accumulation and cytotoxic effects of immunosupressive drugs on vascular endothelium (6).

Here, a pediatric patient who had a seizure during APSGN, although hypertension was not so prominent and whose clinical complaints were supported by radiological imaging in terms of PRES was presented.

Case

A 10-year old male patient presented with swelling in the face, legs and scrotal region. It was learned that he was treated with a diagnosis of tonsillitis 8 days before his complaints started, had diarrhea (up to 3-4 times a day) a few days before his presentation and his urinary output was reduced. On physical examination, his body weight and height were in the 25-50th percentile, his blood pressure was measured to be 135/80 mmHg (the 95th percentile: 121/80, the 99th percentile: 129/88 mmHg), he had pretibial 2+ edema and diffuse edema in the palpebraes, pubic region and scrotal region. At presentation, urinalysis findings were as follows: pH: 5, density: 1020, protein 3+, erythrocyte 3+, leukocytes 1+, urinary microscopic examination: abundant erythrocytes, 4-5 leukocytes. The other laboratory tests were as follows: hemoglobin: 11.1 g/dL, hematoctrit: 37%, white blood cells: 10 700/mm^3, platelets: 115 000/mm^3, urea: 195 mg/dL, serum creatinine: 2.58 mg/dL, uric acid: 9 mg/dL, sodium: 134 mmol/L, potassium: 4.4 mmol/L, calcium: 7.2 mg/dL, phosphorous: 7.8 mg/dL, total protein: 6.5 g/dL, albumin: 2.4 g/dL, triglyceride: 246 mg/dL, total cholesterol: 182 mg/dL. 24 hour urine protein: 256 mg/m^2/h, anti-sterptolsine O antibody: 586 IU/L, C3 20.1 mg/dL (N: 83-177), C4 23.5 (n: 15-45). APSGN was considered in the patient, but biopsy was planned, since nephrotic syndrome accompanied. As a result of renal biopsy, increased matrix in the mesangial area, moderate cellular increase, polymorphonuclear leukocyte (PNL) infiltration, mild PNL infiltration in the tubulointerstitial area, mild thickenning in the arterial and arteriolar walls and closing in the capillary loops were observed in a total of 21 glomerules. Granular staining with C3c was observed on immunoflourescent microscopy. The result was interpreted to be compatible with APSGN.

On the sixth day of the follow-up, severe headache and vomiting started from the morning hours while he was receiving antihypertensive treatment (calcum channel blocker) and diuretic treatment and blood pressure was under control. The blood pressure values measured during this period were found to be 120/80 mmHg. At the noon hours, convulsion in the form of eye fixation and tonic contraction of the whole body was observed. At this time, the blood pressure was measured to be 130/80 mmHg. Midazolam at a dose of 0.1 mg/kg was given to the patient. In addition, a loading dose of phenytoin (20 mg/kg) was given and treatment was continued with the maintenance dose. In the following hours, the blood pressure reached the values of 160/90 mmHg. Blood pressure was controlled with nifedipine and additional diuretic doses. MRI was ordered considering PRES. Magnetic resonance imaging revealed contrast uptake [isointense on T1A images, hyperintense on T2A and T2 FLAIR (Figure 1)] leading to mild sulcal effacement and lesions which did not show diffusion restriction in relation with cortico-subcortical edema in the right temporooccipital lobe. Electroencephalography was found to be normal. Follow-up MRI performed one month later in the patient who received anticonvulsant treatment was found to be normal and treatment was

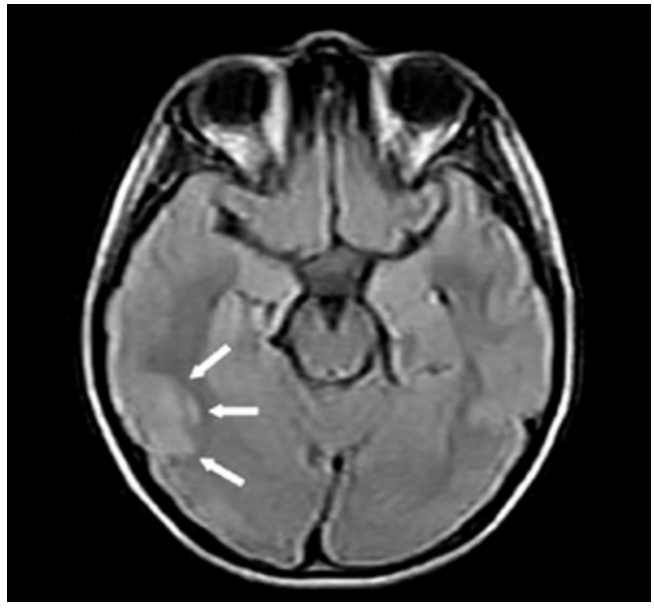

Figure 1. **Hyperintense lesion (white arrows) leading to mild sulcal effacement localized in the cortico-subcortical region in the right temporooccipital lobe on T2 FLAIR images**

discontinued. Multiple antihypertensive drugs were tapered and discontinued in the follow-up. Currently, the blood pressure is within the normal limits, neurological examination is normal and urinary findings are normal in the first year of the follow-up. Consent was obtained from the relatives of the patient for publication of this case.

Discussion

Posterior reversible encephalopathy syndrome was described in 1996 for the first time and it is gradually being more frequently recognized in children (1, 7). It is thought that posterior reversible encephalopahty syndrome is a kind of brain capillary leak syndrome (7). Especially sudden increases in the systemic blood pressure lead to exceeding of the autoregulatory capacity in the brain vessels (8). Consequently, vasoconstriction, subsequently vasodilatation, increase in vascular permeability, disruption in the brain-blood barrier, fluid transduction and petechial hemorrhages occur (6, 9). The reason that the findings are mostly observed in the posterior hemispheres is the fact that sympathetic innervation which provides autoregulation in cases of increased blood pressure is found less in the posterior cerebral vessels (6). Posterior reversible encephalopathy syndrome occurs as a result of increased blood pressure or endothelial damage which is observed in relation with acute glomerulonephritis, HSP, lupus, nephrotic syndrome or immunosupressive drug usage which lead to disruption of the blood-brain barrier (4). The cause leading to PRES in our patient was APSGN which is the most common renal cause of PRES in children (3).

Posterior reversible encephalopathy syndrome is generally observed with increased blood pressure. The blood pressure values were found to be above the 99th percentile in all 17 pediatric patients with PRES presented by Prasad et al. (6). However, PRES may also be observed when the blood pressure is not increased (8). Children tend to develop PRES at lower absolute blood pressure values compared to adults (10). It has been thought that this is related with insufficient autoregulation in children (10). In addition, signs belonging to increased blood pressure which can not be controlled can not be observed at presentation in most of the children who are found to have PRES. This suggested that PRES is related with sudden increases in blood pressure rather than absolute blood pressure values (9). In our patient, the blood pressure value measured at the time of severe headache and subsequent convulsion was at and below the 99th percentile according to the Revised Task Force criteria, whereas they markedly increased above the 99th percentile values in the following hours. This suggested that PRES findings in our patient were related with the sudden increase in blood pressure.

It has been reported that posterior reversible encephalopathy syndrome-related signs are more severe in girls and the possibility of recurrence of seizures is higher in younger ages (4). Maturation of autoregulator response with advancing age explains the tendency of the brain at young ages (4). In addition, it has been thought that higher mean intensity in the parieto-occipital areas and lower interneuronal relations in girls explain more frequent neurological findings (4). It can be thought that these findings were observed to be mild, since our patient was 11 years old and male.

It is thought that the functional vasomotor response which occurs as a result of exceeding of the autoregulator capacity in posterior reverible encepahlopathy syndrome is transient. It can be stated that the findings rapidly reverse with improvement of blood pressure (6). However, PRES may not always be reversible in contrast to the phrase "reversible" included in its name (8). Permanent neurological damage may be observed as a result of prolonged hypertension and convulsions. Hence, the findings became permanent in three of 17 cases of PRES presented by Prasad et al. (6). In addition, chronic epilepsy developed in two patients and abnormal EEG findings were observed in one patient in a series including 11 pediatric patients presented by Yamada et al. (4). In our patient, the findings were observed to be normalized on imaging methods repeated in the first month of the follow-up.

Delayed diagnosis in presence of posterior reverible encephalopathy syndrome may lead to permanent neurological damage (7, 8). The diagnosis is made with typical MRI findings accompanying clinical findings. The most common radiological finding is edema which is especially observed in the parieto-occipital area (6). In addition, involvement of the brainstem, cerebellum, basal ganglia and even frontal lobes may be observed (6). In our patient, lesions was observed in the right temporooccipital lobe.

The lesions belonging to posterior reversible encephalopathy syndrome are observed to be hypointense on T1 weighted images, hyperintense on T2 weighted images and compatible with increased diffusion on diffusion weighted images. In presence of vasogenic edema which is the main finding of posterior reversible encephalopathy syndrome, water molecules surrounding the cells can move freely and an increase in diffusion is observed. In conditions leading to cytotoxic damage including infarction, a decrease in the movement of water molecules and thus a limitation in diffusion is observed because of a decrease in the Na/K ATPase enzyme activity. Therefore, diffusion MRI is helpful in the differential diagnosis between PRES and ischemic conditions (8). This also affects treatment. Hence, recent guidelines do not recommend to reduce blood pressure in mild-moderate hypertension in ischemic stroke, whereas reducing blood pressure in PRES is the absolute treatment to eliminate edema (3). The main treatment recommended for posterior reversible encephalopathy is controlling blood pressure. The main objective in treatment is to reduce blood pressure below the 99th percentile in the first hour or reduce the mean blood pressure by 25% (8). Prolonged seizures resulting from lack of administration of appropriate treatment in a short time and/or prolonged hypertension may lead to permanent neurological damage or brain infaction (4, 6).

Magnetic resonance imaging findings belonging to posterior reversible encephalopathy syndrome may be confused with glyomatosis cerebri, progressive multifocal leukoencephalopathy, demyelinating conditions and infacts. This may lead to unnecessary tests and treatment which may arrive at biopsy (1, 6). Since early recognition of posterior reversible encephalopathy syndrome will provide administration of the most appropriate treatment and prevention of severe neurological sequelae, keeping PRES in mind in presence of clinical findings is very important (4). In our patient, hypertension was not found at the beginning of the complaints, but MR was performed when increased blood pressure values were found a few hours later in the follow-up and intensive treatment was started.

Conclusively, PRES should be primarily considered in the differential diagnosis when complaints including severe headache, seizure, visal disturbance or loss of consciousness are observed in children in presence of acute glomerulonephritis, lupus and nephrotic syndrome and therapies directed to reduce blood pressure should be administered as soon as possible by completing imaging investigations including diffusion MRI. We presented this patient who developed PRES in the course of acute post-streptococcla glomerulonephritis to draw attention to the the possibility of development of PRES at the time when the blood pressure values tend to increase and are not very high.

Informed Consent: Informed consent was obtained from patients' parent for publishing this case.

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