



Case Report

Bilateral renal artery stenosis in pediatric patient with Post-Streptococcal Glomerulonephritis in children: A case report

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ABSTRACT

The immune-complex mediated inflammation known as post-streptococcal glomerulonephritis (PSGN) was once thought to be one of the most common causes of acute nephritis in children. In this case, we present a 12-year-old girl experiencing symptoms of cough phlegm, congested breath, change of urine color, decreased urine production, as well swelling in the area face and legs after experiencing fever, pain swallowing, cough, and runny nose 3 weeks before admission. On physical examination, the pressure blood was 130/80 mmHg. In addition, the palpebral and extremity were edema bilateral, hyperemia of the tonsil and pharynx, enlarged tonsils T2/T3, and detritus were found. Laboratory and Imaging Tests: hematology; leukocytes 12,930, albumin 2.4 g/dl, on urinalysis, obtained urine cloudy, brownish, leukocyturia, hematuria, and proteinuria, there was also an increase in ASTO titers, abdominal ultrasound found bilateral renal artery stenosis and nephritis bilateral acute. The patient in this case presented with bilateral renal artery stenosis, which is a rare finding in PSGN cases. Management of PSGN include bed rest, low salt diet, fluid balance, as well supportive treatment with IVFD D5 ½ NS 15 drops/min (micro), Antibiotics injection of Ceftriaxone 1 gram/12 hours on the first day and continued with oral Erythromycin 4x500mg, injection prednisolone 3x1, injection Furosemide 1x1 amp, oral spironolactone and sublingual nifedipine, and hypoalbuminemia correction. Prognosis in patients with the given GNAPS governance optimally will give good results.



INTRODUCTION

Post-streptococcal glomerulonephritis (PSGN) is a kidney condition caused by an untreated infection with specific nephrotoxic strains of the A beta-hemolytic streptococcal family. One of the most typical causes of acute nephritis in children is thought to be PSGN. 97% of the 470,000 cases found worldwide were in developing nations. Patients with PSGN manifest clinically in a variety of ways. They might not even exhibit symptoms; they might have microscopic hematuria or a full-blown nephritic condition. After an infection of the skin (impetigo) or throat (pharyngitis) brought on by nephritogenic strains of group A beta-hemolytic streptococci, a gram-positive bacteria that enters the body through pores in the skin or mucus epithelia, PSGN is characterized by a proliferation of cellular elements secondary to an immunologic mechanism. (Alhamoud et al., 2021). Glomerulonephritis is divided into acute and chronic. End-stage renal failure and a high morbidity rate in both children and adults can often be brought on by glomerulonephritis. The majority of glomerulonephritis is chronic and immunological in origin. (Arsid et al., 2019). The chance of survival for PSGN is frequently very good, especially in younger patients. The long-term effects may not be good in some uncommon circumstances. Acute nephritic syndrome (PSGN) is an immune-complex-induced inflammation of the glomerulus, which is a collection of capillaries in the functional unit of the kidney called the nephron.

This case report discusses a 12-year-old girl who presented with symptoms of post-streptococcal glomerulonephritis (PSGN), including cough, phlegm, change in urine color, decreased urine production, and swelling in the face and legs. The patient was

diagnosed based on clinical symptoms, physical examination, and laboratory tests (Alhamoud et al., 2021). PSGN is a rare but important cause of acute nephritis in children, typically occurring after a streptococcal infection. The condition is characterized by inflammation of the glomeruli in the kidneys, leading to symptoms such as hematuria, proteinuria, and hypertension. While PSGN often resolves on its own, it can lead to complications such as chronic kidney disease if not managed properly.

Management included bed rest, a low salt diet, fluid balance, antibiotic therapy, and supportive therapy (Alhamoud et al., 2021). The treatment of fluid retention involves fluid and sodium restriction, diuretic use, and management of underlying conditions such as PSGN. Antibiotic therapy is important for preventing PSGN and its complications. Diuretics and antihypertensive medications are used to manage hypertension and edema. Close attention to diet and nutritional supplementation may also be necessary. Albumin correction may be required in cases of low albumin levels. Overall, proper management of PSGN is crucial to prevent chronic kidney disease.

This case report aims to highlight the importance of early recognition and management of PSGN in children, as well as to discuss the management of complications such as bilateral renal artery stenosis. This case emphasizes the need for prompt diagnosis and appropriate treatment to prevent long-term kidney damage and associated complications in pediatric patients with PSGN.

CASE REPORT

A 12-year-old girl came to the emergency room at Bhayangkara Hospital Kediri with complaints of coughing up phlegm, and painful swallowing, accompanied by shortness of breath during activities and especially severe

when the patient lay down the last 5 days before entering the hospital. The patient's face, especially around the eyes and legs, was swollen and the patient's urine was cloudy and brown for 4 days before entering the hospital. About 1 day before entering the hospital there was a decrease in urine production where the patient only urinated 2 times in 24 hours.

Approximately 3 weeks SMRS patients experience fever, painful swallowing, cough, and runny nose. Three days after the fever, the patient's body had red spots all over the body starting from the hands and disappearing by itself, the patient did not get treatment for complaints of cough and cold. The patient had no history of abnormalities in the stomach and urinary tract. Complete immunization history. The patient's birth history, nutrition, and development were normal.

The results of the physical examination found the patient composmentis, weight (BB) 56 kg, height (TB) 150 cm, pulse 81 times per minute, breathing 20 times per minute, SpO₂ 96%, temperature 36.0 C, blood pressure 130/80 mmHg, CRT < 2 seconds. The general state of the patient was found on the eyelids with

edema, in the oral cavity. Hyperemic pharynx and tonsils were seen with enlarged T2/T3 tonsils. Detritus was found on the surface of the tonsils. There were additional breath sounds in the form of fine wet rhonchi and wheezing in the right lung, and edema in both lower limbs. Intravascular fluid volume is typically normal or expanded in diseases like focal and segmental glomerulosclerosis, acute post-streptococcal glomerulonephritis, lupus nephritis, and several other glomerulonephritis because of improperly stimulated Na⁺ and fluid retention, which combined with decreased GFR results in an "overfill" state (Ellis, 2016).

On hematological examination Hb: 11.6 g/dl, Leukocytes: 12,930, Platelets: 212,000, ESR: 28/hour. Immunological examination Anti Streptolysin O Titer (ASTO): positive 400 IU/ml, Albumin: 2.4 g/dl, Creatinine: 2.40 mg/dl, BUN: 62.1 mg/dl. On urinalysis, brownish urine was found, Leukocytes: 1+, 4-5 cells/LPF, Protein: 3+, Erythrocytes: 3+, >30 cells/LPF. Chest X-ray examination found bronchopneumonia dextra, and kidney ultrasound found bilateral renal artery stenosis and bilateral acute nephritis.



Fig 1. Chest X-ray examination found bronchopneumonia dextra



Fig 2. Abdominal ultrasound found bilateral renal artery stenosis and nephritis bilateral acute

Patient management includes bed rest, low salt diet, fluid balance, antibiotic therapy in the form of injection of ceftriaxone 1 gram/12 hours on the first day, followed by oral erythromycin 4x500 mg, as well as supporting therapy IVFD D5 ½ NS 15 drops/min (micro), injection of prednisolone 3x1, injection of antihypertensive injection of furosemide 1x1 amp, oral spironolactone, and sublingual nifedipine, as well as correction of hypoalbuminemia.

DISCUSSION

The immune - complex - mediated inflammation known as post-streptococcal glomerulonephritis (PSGN) was once thought to be one of the most common causes of acute nephritis in children (Alhamoud et al., 2021). More boys than girls were affected; other studies have reported a ratio of 2:1 and 3:2 (Albar H & Rauf S, 2005). In this case, a 12-year-old girl with complaints 3 weeks before entering the hospital experienced fever, coughing up phlegm, painful swallowing, and runny nose. Three days after the fever, red spots appear on the patient's body all over the body starting from the hands, and disappear by themselves After a 1-3 week latency phase (streptococcal tonsillitis, scarlet fever) or a 3-6 week latency period (erysipelas or impetigo),

symptoms of a Streptococcal infection start to manifest (Rodriguez-Iturbe & Musser, 2008).

Fever accompanied by cough and runny nose are symptoms of Acute Respiratory Infection (ARI). The patient also complains of a sore throat which causes difficulty swallowing. Based on this information, the authors concluded that the patient had pharyngitis. Pharyngitis is one of the triggers for the occurrence of GNPS. During the epidemic of group A streptococcal infection (GAS) (skin and throat infection), the estimated incidence of PSGN in such cases among children was estimated at 25% with skin infections and 5 to 10% with pharyngitis (Alhamoud et al., 2021). APSGN commonly occurs following pharyngitis due to the activation of antibodies and complements proteins against streptococcal antigens through the immune-complex-mediated mechanism (Ong, 2022).

Patients were diagnosed based on clinical examination of symptoms of GNAPs and physical examination. Based on the results of clinical symptoms, the patient had a history of fever, cough, and runny nose in the previous 3 weeks with symptoms of edema, hematuria, and hypertension. It was also found in patients with ASTO 400 IU/ml clinical examination results for a diagnosis of GNAPs which was enforced if a complete case was found with symptoms



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of hematuria, hypertension, edema, and oliguria which are typical symptoms of GNPS. Laboratory tests were carried out in the form of ASTO (increased) (Rauf et al., 2012). More than two-thirds of PSGN patients with throat infections had raised Antistreptolysin O (ASO) titers, and 73% of post-impetigo cases have elevated anti-DNAse B titers. (Rodríguez-Iturbe et al., 2010). Traditionally, GN has only been associated with specific group A *Streptococcus pyogenes* nephritogenic strains. PSGN typically accompanies Streptococcal impetigo of M types 47, 49, 55, and 57 in the tropics and southern United States. *Streptococcus* types 1, 2, 4, and 12 throat infections are also nephrotoxic. (Abul K. Abbas, 2018). Definitive diagnosis is enforced when culture is positive for β -hemolytic Streptococci group A (Jawetz, et. al, 2016), however not done in this case.

An imaging study in our case from abdominal ultrasound found bilateral renal artery stenosis and nephritis. Renal artery stenosis (RAS) frequently coexists with chronic kidney disease and hypertension. RAS has not been identified as a significant contributor to excessive proteinuria in previously reported reviews, despite being a common cause of treatable hypertension and renal insufficiency. However, a small number of occurrences of nephrotic-range proteinuria in renovascular disease patients have been documented (Hwang et al., 2016). Children with renovascular hypertension often present with very high blood pressure (Gidi et al., 2021). The interesting part of this case is the presence of bilateral renal artery stenosis, which is not commonly seen in PSGN cases. The patient in this case presented with bilateral renal artery stenosis, which is a rare finding in PSGN cases. This unique aspect of the case adds complexity to the management and prognosis of the patient.

Based on the examination when the patient was admitted to the hospital, the patient's blood pressure was 130/80 mmHg, calculation

according to the age sex percentile, the patient's blood pressure exceeded the 99th percentile, namely > 128/87 mmHg, the patient was said to have hypertension degree 2 (kemenkes, 2021). Hypertension generally occurs in the first week and disappears with the disappearance of other clinical symptoms. In most cases, mild hypertension is found (diastolic pressure 80-90 mm Hg). Mild hypertension does not need to be treated, with adequate rest and a regular diet, blood pressure will return to normal (Rauf et al., 2012).

Management in our case includes bed rest, a low salt diet, and fluid balance. The majority of the time, PSGN is a self-limiting condition that just needs symptomatic care. Supportive management aims to maintain renal function or repair renal damage. Case management in PSGN includes bed rest, observation of fluid balance, diet, antibiotics, and symptomatic therapy. (Alhamoud et al., 2021). Bed rest is very necessary, especially if complications are encountered which usually arise in the first week of the course of GNPS. After the acute phase, it is no longer recommended to rest in bed, but are not allowed to do strenuous activities as before the illness. The duration of treatment depends on the state of the disease. In the past, prolonged bed rest was recommended for months because proteinuria and microscopic hematuria had not gone away. Now it is more progressive, the patient is sent home after 10-14 days of treatment with the condition that there are no complications (Trianti & Widyastuti, 2019).

Fluid retention is treated with fluid and sodium restriction. Restricting sodium intake in these patients is useful for reducing the burden of existing sodium retention, whereas a low-protein diet in these patients is not necessary considering that urea levels in the blood have not reached the recommended level for a low-protein diet, namely 75 mg/dl If azotemia



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occurs, then protein is limited to 0.5 g/kg/day (Rauf et al., 2012). Fluid intake is equal to invisible water loss (400-500 ml/m² body surface area/day) plus half or less of urine output. If body weight is not reduced, give diuretics such as furosemide 2 mg/kg, 1-2 times/day. Food restrictions depend on the severity of edema, kidney failure, and hypertension (Made Suadnyani Pasek, 2013).

Treatment of group A Streptococcal infection (GAS) with adequate coverage of antibiotic therapy for patients with primary GAS infection is the major means of preventing PSGN and preventing the onset of sequelae. In PSGN disease, 95% of patients will recover, but 5% of them experience a rapid worsening of the course of the disease and the formation of excess proliferation occurs so that it looks like a crescent shape in the glomerular epithelial cells (Alhamoud et al., 2021). Penicillin antibiotic treatment was given to eradicate germs, it is recommended to treat GAS pharyngitis with antibiotics (usually penicillin or amoxicillin) to stop the spread of the infection, reduce the clinical course, and avoid complications and sequelae, such as acute rheumatic fever (Lewnard et al., 2021). There was no difference in Streptococcal sequelae between a 5-day antibiotic regimen and a 10-day Penicillin V treatment regimen in terms of effectiveness (Bateman et al., 2022). If there is a penicillin allergy, then the patient is given erythromycin. Penicillin as the first line tends to be avoided because it often triggers allergic reactions (Rauf et al., 2012). Despite the current language of references that address it, there is conflicting information regarding the usage of antibiotics to avoid this problem (Sainato & Weisse, 2019). In our patient we give ceftriaxone for treatment and erythromycin when discharged orally, the patient was started on ceftriaxone due to fever and very high inflammatory

markers suggestive of sepsis. We did not detect a particular source or etiologic factor of the present infection, though physical examination revealed pharyngitis. We chose ceftriaxone following the Surviving Sepsis Campaign international guidelines (Weiss SL, Peters MJ, Alhazzani W, et al., 2020). In vitro activities of penicillin and ceftriaxone were compared against 29 strains of *Streptococcus pyogenes* with the result that ceftriaxone showed greater activity than penicillin. These data may at least in part explain the superior in vitro activity of ceftriaxone compared to penicillin against *S. pyogenes* (Yan S, Mendelman PM, Stevens DL, 1993).

In patients given antihypertensive therapy furosemide. Diuretic administration is the first choice because hypertension in GNPS is caused by sodium and water retention. Diuretics are also given to patients with edema and hypertension. Antihypertensive loop diuretics are also given, spironolactone and furosemide are often used together to optimize the diuretic effect and treat edema. Because the side effects of furosemide cause a decrease in blood potassium while spironolactone can help maintain potassium levels, the risk of hypokalemia occurs and electrolyte balance can be maintained properly (kemenkes, 2021). Additionally, compared to diuretics, angiotensin-converting enzyme (ACE) inhibitors have improved blood pressure and edema control in APSGN, according to numerous research. However, because they could make hyperkalemia and any loss in glomerular ultrafiltration worse, ACE inhibitors and angiotensin receptor blockers are often avoided during the acute phase of a condition. Despite the current language of references that address it, there is conflicting information regarding the usage of antibiotics to avoid this problem (Hunt, 2019).



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Paying close attention to your diet is crucial, especially if you have a condition that causes significant proteinuria. If clinically necessary, providing extra calories, protein from egg whites, and nutritional supplements like albumin may be beneficial (Ellis, 2016). Albumin correction was given because the patient's albumin was <2.5 mg/dl (ppt), given by albumin transfusion and followed by oral albumin supplementation because oral albumin is a supplement made from snakehead fish albumin and is effective in increasing the patient's albumin levels and can reduce maintenance time and costs (Ferry, et al., 2022).

CONCLUSION

The diagnosis of post-streptococcal glomerulonephritis is established based on history, physical examination, and supporting examinations. Imaging studies in PSGN can be used to assess possible complications. Management of PSGN is symptomatic. If PSGN is not treated, the patient may develop chronic kidney disease. PSGN disease has a good prognosis if treated properly.

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