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An 8-Years-Old Child With Post Streptococcal Related Acute Glomerulonephritis Accompanied By Pleural Effusion: Case Report

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ABSTRACT
The inflammatory process in the glomerulus caused after infection from group A nephritogenic type beta-hemolytic streptococcal bacteria is called acute post-infectious streptococcal glomerulonephritis (GNAPS). Patients who exhibit symptoms such as gross hematuria, puffiness, and hypertension, as well as acute renal failure after streptococcal infection, should suspect post-streptococcal acute glomerulonephritis. Typical signs of glomerulonephritis in urinalysis, evidence of laboratory streptococcal infection (ASTO more than 100 Todd), and low levels of C3 complement (less than 4 years or more than 15 years) have a history of disease with similar symptoms, accompanied by chronic renal failure, GFR below 50% of normal age, macroscopic hematuria more than 3 months or microscopic hematuria more than 1 year, C3 levels decrease over 3 months as well as refractory proteinuria. Administration of antibiotics (Penicillin for 10 days) in the acute phase does not affect the worsening of the condition of glomerulonephritis but rather reduces the spread of Streptococcal infections that may still exist. In addition, treatment of hypertension is also necessary. Peritoneal measures of dialysis or hemodialysis may be considered in cases of acute renal failure.

Keywords: Acute Post-Infectious Glomerulonephritis Streptococcal (GNAPS), Post Streptococcal, Pleural Effusion, Case Report

INTRODUCTION

Acute post-infectious streptococcal glomerulonephritis (GNAPS) is a condition that can lead to acute renal failure, hypertension, and other complications. It is caused by group A nephritogenic type beta-hemolytic streptococcal bacteria, which trigger an inflammatory process in the glomerulus. Symptoms of GNAPS include gross hematuria, puffiness, and hypertension, as well as acute renal failure after streptococcal infection. Typical signs of glomerulonephritis in urinalysis, evidence of laboratory streptococcal infection, and low levels of C3 complement are indicative of the condition (Duong & Reidy, 2022).

In this study, we present a case report of an 8-year-old child who experienced bilateral pleural effusion and was diagnosed with GNAPS. The case report method was chosen to provide in-depth insights into the condition, and the data was sourced from the patient's medical record and supported by a literature review. The patient's medical record included clinical records, laboratory results, and radiological examination results related to cases of GNAPS and bilateral pleural effusion in the child.

In the case presented, the patient experienced swelling throughout their body, reduced urine output, and reddish urine. They also complained of headaches and shortness of breath. The patient's history revealed that they had a fever, cough, and runny nose about a week

before the swelling appeared. High blood pressure, positive undulations test, pitting oedema, and bilateral pleural effusion were also observed.

Treatment for GNAPS typically involves diuretics, calcium channel blockers, and symptomatic therapy. In cases of acute renal failure, peritoneal measures of dialysis or hemodialysis may be considered. The administration of antibiotics in the acute phase does not affect the worsening of the condition of glomerulonephritis but rather reduces the spread of Streptococcal infections that may still exist (Satoskar, Parikh, & Nadasdy, 2020).

In conclusion, acute post-infectious streptococcal glomerulonephritis is a serious condition that can lead to acute renal failure and other complications. Early diagnosis and appropriate treatment are crucial for managing the condition effectively (Mosquera-Sulbaran, Pedreañez, Vargas, & Hernandez-Fonseca, 2023). This case report provides valuable insights into the presentation, diagnosis, and management of GNAPS in the pediatric population.

RESEARCH METHODS

This study adopted the case report method conducted on an 8-year-old child with a diagnosis of acute post-infectious streptococcal glomerulonephritis (GNAPS) and experienced bilateral pleural effusion. The case report method was chosen to focus on in-depth investigations into specific cases that can provide valuable insights into understanding the condition. The object of this study was an 8-year-old child with GNAPS and bilateral pleural effusion.

The source of this study data involved the patient's medical record, including clinical records, laboratory results, and radiological examination results related to cases of GNAPS and bilateral pleural effusion in the child. In addition, to support the analysis, a literature review was also conducted using the PubMed database to gain broader insight into GNAPS in the pediatric population.

The population that was the focus of this study was children with GNAPS, while the sample studied was a specific case of an 8-year-old child with GNAPS and bilateral pleural effusion. Research techniques and tools include collecting medical data from patient medical records, including physical examination, laboratory results, and radiological results. Data analysis techniques involve in-depth evaluation of the patient's clinical and laboratory data, as well as benchmarking with findings from literature reviews that have been conducted to present comprehensive information about the case.

Thus, this study not only describes a specific case of GNAPS with bilateral pleural effusion in an 8-year-old child but also provides a supportive literature review to enrich the understanding of the case in the context of the pediatric population.

RESULTS AND DISCUSSION

In this study, it was found that patients experienced swelling throughout their bodies, namely the face, both hands and feet, including the testicles. In addition, the patient's urine is also reduced (oliguria) and becomes reddish (hematuria). Patients also complain of headaches and shortness of breath. From previous history, it is known that patients experience fever, cough, and runny nose about a week before swelling appears. In addition, high blood pressure of 150/110 mmHG (hypertension), positive undulations test, pitting oedema in the periorbita, both legs and scrotum. As well as obtained x-ray results of bilateral pleural effusion thorax, laboratory results of BUN (91) and ASTO (159.26) increased, but GFR (75) and C3c (43.3) decreased, and urinalysis results obtained erythrocytes +2 on the dipstick

and 1-3 / LP in sediment. Treatment consists of diuretics and calcium channel blockers, followed by symptomatic therapy and diet management.

Case Report

Identity

a. An. ASP, 8 years old, Male, Lamongan
b. Mr. S, 48 years old, Private
c. Mrs. S, 46 years old, Housewife

Anamnesis

Main Complaint: Swelling all over the body for one week before being taken to the hospital.

The patient is a referral from a type C hospital in one of the districts in East Java Province. The patient had swelling all over the body for one week before being taken to the hospital. Initially, the patient only experienced swelling of the eyes, especially in the morning, and slightly deflated during the day. By the time he arrived at the emergency department, there was swelling all over the face, both hands and feet and the patient's testicles. Patients also complain of shortness of breath at the beginning of the appearance of swelling, which is felt increasingly aggravated so that the patient is more comfortable in a half-sitting position. About a week before the swelling occurred, the patient developed a fever accompanied by a cough and runny nose but recovered after 5 days of taking antibiotics. When there begins to be swelling, the patient's urine becomes slight and reddish. In addition, patients also often complain of headaches. A previous history of shortness of breath was denied. A history of shortness of breath during activity is also denied. There is no history of morning sneezing and yellow eyes. There are no complaints of difficult farting or defecation.

Patients have received prednisone tablets at a dose of 2 mg (5-5-4), NSAID type mefenamic acid 3x1 tablets, furosemide half tablets 24 hours, and captopril 3x12.5 mg, but there has been no improvement after treatment for 7 days.

The patient was born normally, full-term, assisted by a midwife with a birth weight of 3800 grams, crying immediately, not blue and not yellow. At the time of pregnancy, the patient's mother routinely controls the village midwife and does not experience any complaints. Patients have the same history of growth and development as their peers. Patients can prop their heads at 3 months of age, lie on their stomachs at 6 months of age, sit at 9 months of age, stand at 12 months of age and walk at 16 months of age. Patients can play stacking cubes or play ball at 23 months of age. Patients can talk at the age of 2 years, and until now patients are known to communicate well in the environment around home and school. In infancy, patients do not get breast milk intake, so patients get nutrition from formula milk alone from the age of 0 months to 2 years with sufficient frequency and amount. Patients begin to get MP-ASI at the age of 6 months with a balanced type and amount. Patients from the age of 1 year begin to eat a balanced adult diet and have no history of allergy to chicken, eggs, or fish.

The patient has no history of allergies to food, dust, smoke, or drugs. The patient also had no history of congenital heart disease. From birth to the present, the patient has never been hospitalized, nor has he had a history of previous surgery. The patient's previous immunization history can also be said to be complete, namely BCG and measles immunization once and DPT, Hepatitis B, and polio immunization 3 times. In the patient's family, no one has the same history of illness as the patient is currently experiencing. However, the patient's grandmother had a history of heart disease.

The patient is currently in elementary school. The patient lives at home with the patient's father, mother, grandmother, and brother with adequate ventilation conditions and uses well water for daily purposes.

Physical Examination

a. General Examination: General condition is good, composed of consciousness, Moderate pain, and Normal speech voice.
b. Pemeriksaan anthropometers: BB 36 kg, TB 123 cm, BB/U 138 %, TB/U 97,6 %, BB/TB 90,2 %, LL 17 cm, LK 51 cm, BMI 24,8
c. Vital Signs: TD 150/110 mmHg, HR 92 bpm, regular lifting strength, RR 30x/min, no dyspnea or tachypnea is obtained. Axillary temperature 36.5 $^{oC.}$

Pain complaints were obtained with a value of 2 using the Wong-Baker face scale. On skin examination, no hypopigmentation, hyperpigmentation, petechiae, or purpura abnormalities; skin tone, and turgor were also within normal limits. On examination, the hair is also within normal limits. On examination of the nails, no koilonychia or paronychia was obtained.

On general examination of the head, periorbital oedema is obtained. There are no leonine facies, mongolism, full-moon face, or anything else. Conjunctiva within normal limits, no anonym, hyperemia, or bleeding is obtained. In the sclera, there is no icteric, hyperemia, or bleeding. On examination of the pupils, the results of round pupils of the isochorus diameter of 3 mm symmetrical were obtained. On examination of the cornea, no infiltration or erosion was obtained. The lens is within normal limits, and no cataracts are obtained. In-ear examination, the shape and ear holes are within normal limits, and no tofi and secret are obtained. At the touch of the process mastoids, there is no pain. On examination of the nose and paranasal sinuses within normal limits, no blockage, secret, odour, deviation of the septum, or bleeding was obtained. On examination of the lips there were no pigmentation abnormalities, cyanosis, oedema, or cheilosis on examination the mucosa was within normal limits, not pale, with hyperemia, or abpigmentation. On examination of the tongue, no microglossia, macroglossia, papi atrophy, papyl hypertrophy or geographic tongue was obtained. On examination of the pharynx, no beslag and hyperemia were obtained. On examination of the tonsils also found no hypertrophy, detritus and beslag. On examination of the palate within normal limits, there is no detritus.

General examination of the neck within normal limits, no enlargement of the lymph glands, deviation of the trachea and enlargement of the thyroid was obtained.

General examination of the thorax within normal limits, no tumours, kyphosis or scoliosis were obtained, and no enlargement of the axillary lymph glands was obtained.

On lung examination, vesicular auscultation decreased, percussion dimmed, palpable frequency decreased and positive vocal fremitus in 1/3 inferior lung dextra and sinistra. On inspection, the chest shape is symmetrical, and no abnormalities of chest wall movement and retraction are obtained. In auscultation, there are no additional breathing sounds in the form of Ronchi, wheezing, amphoric and pleural friction sounds.

General examination of the heart within normal limits. The Ictus cordis is invisible and not palpable. Heart pulsation is also not palpable. In exclamations within normal limits, a single S1/S2 is not obtained, S3 and S4 are obtained. There is no systolic ejection click, opening snap, friction noise and heart noise.

A general examination of the abdomen found that the abdomen appeared bulging, with dim percussion and a positive undulations test on palpation. No abnormalities of the abdominal skin (shiny, dry, atrophic). In auscultation, intestinal noise is obtained within normal

limits. Turgor and tone examination was within normal limits and no local or complete pain was found, there were no signs of peritonitis, peritoneal irritation or rebound tenderness. Hepar, lien and kidney are not palpable during the examination. No Murphy's Sign and Courvoisier's Sign.

A general examination of the inguinal, genitalia and anus found a bilateral hydrocele on the scrotum. There were no inguinal, scrotal or femoral hernias and no enlargement of the inguinal and femoral lymph nodes. On examination of the penis and anus found no abnormalities.

On general examination of the upper extremities within normal limits, no swelling, deformity, or signs of inflammation in the joints, no atrophy in the muscles, no clubbing finger, and no physiological reflexes of the biceps and triceps within normal limits.

On general examination of the lower extremities, bilateral pitting oedema was found. There is no paresis, myopathy, atrophy or neuropathy. Pulsation of the femoral artery within normal limits. Joints within normal limits, no swelling, deformity and signs of inflammation. No pathological reflexes (Babinski, kernig, laseg, etc.). There are no injuries in the form of cellulitis or gangrene.

On general examination of the spine found no abnormalities in the form of kyphosis, scoliosis or gibus.

Supporting Examination

Extinguishing laboratory Hb 11.4; Leukosit 36270; LED 25-32; HCT 34,2; Thrombosity 347,000; BUN 91; SK 0.9; GFR 75; Albumin 3.1; Cholesterol 258; ASTO 159,26; C3c 43.3; C4 14.22.

Extract urine dipstick BJ 1.015; Erythrocyte +2; Bilirubin-; Ketone -, Leukocyte -; Nitrite-; pH 5; Protein-; Reduksi -; Urobilin -.

Hasil sedimen urin leukosit 0-1/LP; Eritrosite 1-3/LP; Epithelium 0-1/LP; Kristal-.

The x-ray reading of the thorax obtained pleural effusion in both lung fields.

Analysis

From the history obtained data the patient experienced swelling throughout his body, namely the face, both hands and feet including the testicles. In addition, the patient's urine is also reduced (oliguria) and becomes reddish (hematuria). Patients also complain of headaches and shortness of breath. From previous history, it is known that patients experience fever, cough and runny nose about a week before swelling appears.

From the results of physical examination while in the emergency department, high patient blood pressure of 150/110 mmHG (hypertension) was obtained, positive undulations test, pitting oedema in the periorbital and both legs and oedema obtained in the scrotum.

From the results of supporting examinations, bilateral pleural effusion thoracic xray readings were obtained, laboratory results of BUN (91) and ASTO (159.26) increased but GFR (75) and C3c (43.3) decreased, and urinalysis results found erythrocytes +2 on the dipstick and 1-3 / LP in sediment.

Until the conclusion of the diagnosis leads to acute glomerulonephritis accompanied by bilateral pleural effusion.

Tatalaksana

At the time of treatment, patients receive diuretic therapy and calcium channel blockers. Patients received furosemide therapy at a dose of 30 mg every 8 hours and amlodipine at a dose of 10 mg every 24 hours. In addition, patients are also given a low-salt diet, a maximum of 2 grams per day for a total of 1700 kcal. To determine the success of the therapy, patients are monitored on vital signs, signs of worsening conditions, weight, and

support. On day 5 of treatment, the patient had no complaints of fever, cough, runny nose, tightness, and headache, but still found swelling in both legs and scrotum, which was decreasing.

Discussion

The inflammatory process in the glomerulus caused by certain bacterial or viral infections is known as acute glomerulonephritis (GNA), and if it occurs after infection from group A nephritogenic beta-hemolytic streptococcal bacteria is called acute post-infectious streptococcal glomerulonephritis (GNAPS). The incidence of GNAPS is also influenced by climate, nutrition, general state, and history of allergies ((Duong & Reidy, 2022); (Mosquera & Pedreañez, 2021); (Moorani, Aziz, & Amanullah, 2022)).

Although streptococcal bacteria do not damage the kidneys directly, GNAPS produce antigen-antibody complexes that circulate to the glomerulus, where they are mechanically trapped in the basement membrane ((Mosquera & Pedreañez, 2021); (Sumarno & Tjiang, 2022); (Duong & Reidy, 2022)). Complement will fixate, causing injury and inflammation, then polymorphonuclear leukocytes (PMN) and platelets will be attracted to the injured area. The endothelium and glomerular basement membrane (IGBM) are also damaged by phagocytosis and the release of lysosomal enzymes, and the proliferation of endothelial, mesangium, and epithelial cells appear in response to damage.

Increased leakage of glomerulus capillaries allows proteins and erythrocytes to enter the urine, causing proteinuria and hematuria. On microscopic examination, the glomerulus appears swollen and hypercellular with PMN invasion, and antigen-antibody complement complexes appear as subepithelial nodules as granular and lumpy ((Ge et al., 2020); (Glomerulopathy, Glomerulopathy, & Glomerulopathy, 2023); (Mosquera-Sulbaran et al., 2023)). GNAPS occurs due to type III hypersensitivity reactions. In this reaction, the immune complex attacks the streptococcal nephritogenic antigens that settle in the basement membrane of the glomerulus and involve activation of complement.

Complement activation mainly occurs through alternative pathways, but activation of the classical pathway also occurs due to the binding of immunoglobulin proteins on the surface of streptococci. ((Syed, Viazmina, Mager, Meri, & Haapasalo, 2020); (Zhang et al., 2023)). Blood pressure in glomerular capillaries is almost four times higher than in other capillaries, causing deposits in the immune complex. Deposits are also more abundant in branching areas, where blood flow turbulence occurs ((Sethi, De Vriese, & Fervenza, 2022); (Köppl & Helmig, n.d.)).

The nature of antigens in the immune complex and antigens against their antibodies is associated with the nature of certain tissues. Cationic antigens will attach to anionic areas of the basal membrane, usually in the subepithelial. IgM and IgG immune complexes more often settle in the glomerulus as they flow through the glomerulus, larger immune complexes will collect between the endothelium and the basement membrane, and smaller immune complexes will penetrate the basement membrane and attach to epithelial cells ((Matsumoto et al., 2022)). The cell-mediated mechanism also plays a role in the formation of GNAPS. Glomerular infiltration by lymphocyte cells and macrophages has long been known to play a role in the cause of GNAPS. Lymphocyte intercellular spring molecules such as ICAM-I and LFA are found in the glomerulus and tubulointerstitial and are associated with infiltration and inflammation rates ((Sumarno & Tjiang, 2022)).

GNAPS has varying clinical characteristics. Children usually show mild symptoms, but it is not uncommon for them to show severe symptoms. As mentioned earlier, damage to the walls of glomerulus capillaries leads to flesh-red albuminuria and hematuria. Urine may be

reddish or coffee-coloured and is sometimes accompanied by mild oedema around the eyes or up to the entire body. Oliguria and heart failure usually cause severe oedema. A decreased glomerular filtration rate (GFR) is the cause of oedema, which causes reduced excretion of water, sodium, and nitrogen, causing oedema and azotemia. Increased aldosterone can also affect water and sodium retention ((Colvin, Chang, & Cornell, 2023); (Bertschi, 2020); (Mattoo & Sanjad, 2022)). An increase in the hormone aldosterone can affect sodium and water retention. Although oedema is most common in the lower limbs by noon, oedema of the face, especially the periorbita, often occurs in the morning ((Lombel, Brakeman, Sack, & Butani, 2022)). On the first day of GNA, 60-70% of children develop hypertension, but by the end of the first week, it returns to normal ((Mosquera-Sulbaran et al., 2023)). Blood pressure will remain high for several weeks and become permanent if kidney tissue damage persists. On the first day, the body temperature may be rather high. When there are no other symptoms of infection before, sometimes heat symptoms are still present. People with GNA often experience gastrointestinal symptoms such as vomiting, no appetite, constipation, and diarrhoea ((Rajindrajith, Devanarayana, Chanpong, & Thapar, 2020); (Mosquera-Sulbaran et al., 2023)).

Urinalysis showed that almost 50% of patients had macroscopic hematuria, proteinuria (+1 to +4), urinary sediment abnormalities with dysphoric erythrocytes and leukocyturia, as well as luletal thoracic, granular, erythrocytes (++), albumin (+), and leukocyte cylinders (++), among others. Signs of kidney failure such as hyperkalemia, acidosis, hyperphosphatemia, and hypocalcemia sometimes make serum ureal and creatinine levels rise. Sometimes, the symptoms of nephrotic syndrome are accompanied by high proteinuria. During the first week, almost all patients showed low levels of total serum hemolytic complement (total complement hemolytic) and C3; however, the average C4 is low or drops only slightly, and in 50% of patients, properdin levels fall.

In this situation, an alternate path of the compound is enabled. In patients with acute post-streptococcal glomerulonephritis, the decrease in C3 is very pronounced, with levels between 20 and 40 mg/dl (normal values are 50 to 140 mg/dl). Increased C3 is not associated with disease severity or cure. Within six to eight weeks, complement levels will return to normal levels, but only for diagnosis of GNAPS ((Newcomer et al., 2021); (Duong & Reidy, 2022); (Mosquera & Pedreañez, 2021); (Moorani et al., 2022); (Sumarno & Tjiang, 2022)). In addition to antistreptozyme, ASTO, anti-hyaluronidase, and anti-Dnase B, several serological tests of streptococcal antigens can be used to determine the presence of infection.

Antistreptolysin screening is helpful because it can measure antibodies against various streptococcal antigens. Although some streptococcal strains do not produce streptolysin O, serum should be tested against more than one streptococcal antigen. However, anti-streptolysin O titers may be elevated in 75–80% of patients with GNAPS with pharyngitis. More than 90 per cent of cases show streptococcal infection after performing all serological tests. Although ASTO titers increase in only 50% of cases, antibodies to streptococcal antigens are usually positive due to anti-hyaluronidase or other antibodies. The titer test should be done serially because, at the beginning of the disease, the titer of streptococcal antibodies has not increased. If the titer increases two to three times, it indicates that there is an infection. Histopathological examination shows that diffuse glomerulonephritis occurs because almost all glomerulus are affected.

On macroscopic examination, the kidneys look slightly enlarged and pale, and there are bleeding points in the cortex as a result of the proliferation of strong glomerular endothelial cells, capillary lumen, and Bowman's closed hoop space. In addition, there is also

infiltration of monocyte cells, polymorphonuclear, and capsule epithelial cells so that the thickened basement membrane will look irregular when examined through an electron microscope. Streptococcal globulins, complements, and antigens can form hump clumps in the subepithelium (Khalighi & Chang, 2021).

Patients who exhibit symptoms such as gross hematuria, puffiness, and hypertension, as well as acute renal failure after streptococcal infection, should suspect post-streptococcal acute glomerulonephritis. Typical signs of glomerulonephritis in urinalysis, evidence of laboratory streptococcal infection (ASTO more than 100 Todd), and low levels of C3 complement (less than 4 years or more than 15 years) have a history of disease with similar symptoms, accompanied by chronic renal failure, GFR below 50% of normal age, macroscopic hematuria more than 3 months or microscopic hematuria more than 1 year, C3 levels decrease over 3 months as well as refractory proteinuria.

Management of GNAPS patients is symptomatic and more aimed at preventing acute renal failure and eradication of the organism ((Mosquera & Pedreañez, 2021); Smith J.M., 2003; (Sikesa & Loekman, 2020); (Ramdhani, Harun, & Marlina, 2022)). Immediate medical care is required if symptoms of oedema, hypertension, or elevated blood creatinine are present. The patient does not experience a negative impact on the course of the disease after resting for three to four weeks, and can then begin mobilization after three to four weeks from the onset of the disease (Mosquera-Sulbaran et al., 2023). Giving antibiotics in the acute phase does not affect the worsening of the condition of glomerulonephritis, but rather reduces the spread of Streptococcal infections that may still exist. In the acute phase, penicillin administration is recommended only for ten days.

However, after the state of nephritis improves (the causative germ decreases and disappears), the administration of penicillin for prevention or prophylaxis for a long period is not recommended due to the presence of persistent immune mechanisms. Although there is a small chance that a child will be infected again with another nephritogen germ, there is still a chance that the condition of GNAPS will occur again in the future. Penicillin can be combined with amoxicillin 50 mg/kg body weight divided by 3 doses for 10 days.

If allergic to penicillin, replace it with erythromycin 30 mg/kg body weight/day divided by 3 doses ((Newcomer et al., 2021); (Duong & Reidy, 2022); (Mosquera & Pedreañez, 2021); (Moorani et al., 2022); (Sumarno & Tjiang, 2022)). In the acute phase, low-protein (1 g/kgbb/day) and low-salt (1g/day) feedings are required. Patients who have a fever are given soft food until the temperature returns to normal. In case of anuria or vomiting, IVFD with a 10% glucose solution can be administered to patients without complications. If there are complications such as heart failure, oedema, hypertension, and oliguria, the amount of fluid given should be limited ((Hahn, Samuel, Willis, Craig, & Hodson, 2020);(Kellum et al., 2021)).

In addition, treatment of hypertension is also necessary. For mild hypertension, antihypertensives are usually not given but need close observation. In moderate hypertension, diuretics are given with a minimum dose of 0.5mg to 2 mg/kg/dose or ACE inhibitors at a dose of 0.5 mg/kg/day divided by 3 doses. However, if this treatment does not produce the desired results, vasodilator-class antihypertensives can be given. Meanwhile, in hypertensive crises, vasodilators are given at a dose of 0.002 mg/kg / 8 hours or can be given sublingual nifedipine 0.25-0.5 mg / kgbb ((Mosquera-Sulbaran et al., 2023); (Brant Pinheiro et al., 2022)). Peritoneal measures of dialysis or hemodialysis may be considered in cases of acute renal failure ((Hahn et al., 2020);(Kellum et al., 2021)).

Complications that can occur include, oliguria to anuria due to decreased glomerular filtration (if oliguria lasts more than 2-3 days until anuria and is accompanied by symptoms

such as acute renal failure with uremia, hyperkalemia, and acidosis, peritonial dialysis or hemodialysis can be considered) ((Kellum et al., 2021); (Sethi et al., 2022)), hypertensive encephalopathy (localized vascular spasm with anoxia and brain oedema causing visual disturbances, dizziness, vomiting, and convulsions) ((Mosquera-Sulbaran et al., 2023); (Mattoo & Sanjad, 2022); (Kondziella & Waldemar, 2023)), circulatory disorders due to increased plasma volume in the form of dyspnea, orthopnea, crackles, enlarged heart to heart failure (Rodriguez B &; Mezzano S., 2009), anaemia due to erythropoietin formation disorders ((Sumarno & Tjiang, 2022); (Mattoo & Sanjad, 2022)).

Most pediatric patients with GNAPS will recover, diuresis will become normal again on days seven to ten, and oedema and blood pressure will gradually become normal again. Within one week, kidney function improves and normalizes within three to four weeks. Within six to eight weeks, the serum complex normalizes. However, urinary sediment abnormalities will remain visible in most patients for months, even years ((Mosquera-Sulbaran et al., 2023); (Mosquera & Pedreañez, 2021); (Saha et al., 2022). In a study conducted on 36 individuals who developed biopsy-proven poststreptococcal acute glomerulonephritis, followed for 9.5 years, the prognosis for a complete cure was excellent, one patient developed hypertension, and two others developed long-lasting mild proteinuria (Mosquera & Pedreañez, 2021).

CONCLUSION

From the cases presented, there are indications that the patient suffers from acute post-streptococcal glomerulonephritis (GNAPS) with complications of bilateral pleural effusion. GNAPS is a condition that arises after infection by group A beta-hemolytic Streptococcus bacteria. This is in accordance with the patient's history which shows a history of fever, cough, and runny nose before the appearance of swollen symptoms.

The physical examination also indicates oedema throughout the body, high blood pressure, and bilateral pleural effusion. Laboratory findings, such as decreased levels of C3, hematuria, and proteinuria, also support the diagnosis of GNAPS. Based on the analysis of the examination and the findings, appropriate management should be given to the patient.

Management of GNAPS patients aims to control symptoms, prevent further kidney damage, and provide supportive therapy. Patients can be given antibiotics to treat infections that may be a trigger for GNAPS. In addition, diuretic therapy is given to reduce oedema, while the use of ACE inhibitors or calcium channel blockers can help control blood pressure. A low-salt diet is also recommended to reduce fluid retention. It is also important to periodically monitor the patient's kidney function.

In addition to pharmacological treatment, it is also important to provide non-pharmacological approaches such as educating patients and families about the importance of disease management and a healthy diet. Management of a low-salt diet, control of blood pressure, and periodic checkups are important steps in the long-term management of patients with GNAPS.

Therapy should be adapted to the clinical state of the patient, and it is necessary to conduct regular monitoring to evaluate the response to treatment and detect complications that may arise. With proper management, it is hoped that patients can recover from the condition of GNAPS and prevent further kidney damage.

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