International Summit on Science Technology and Humanity
ISETH 2024
ISSN: 2615-1588 (online)

Case Report: Nephrotic Syndrome in a 27-Year-Old Male Patient

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Abstract

Introduction : Nephrotic syndrome (SN) is a glomerular disorder characterized by severe proteinuria, hypoalbuminemia, hyperlipidemia, and peripheral oedema. The annual incidence of nephrotic syndrome in adults is three per 100,000 people.
Case : A 27-year-old man came to the Internal Medicine Polyclinic with complaints of swelling throughout the body. Swelling was felt since 2 weeks ago, initially swelling in the face and eyelid area then increased in weight to the whole body. The patient often takes stall medicine Paracetamol when headache is felt. The eyes were found to have palpebral swelling (+/+). Physical examination of the abdomen revealed distension, undulation test was positive and shifting dullness was positive indicating ascites. Examination of the inferior and superior extremities revealed pitting oedema on all four extremities (+/+/+/+). Examination of genitalia on inspection found the scrotum looks erythema, swollen, scrotum painful when moved, negative phren sign, negative cremaster reflex.

Introduction

Nephrotic syndrome is a glomerular disorder that is characterized by severe proteinuria, hypoalbuminemia, hyperlipidemia, and peripheral oedema. Diagnosis is typically based on clinical features and examinations, including blood tests, renal imaging, and biopsy (Ramdhani et al., 2022). Adults with nephrotic syndrome have an incidence of three cases per 100,000 annually. About 80% to 90% of adult cases of nephrotic syndrome are idiopathic, with membraneous nephropathy accounting for about 30% to 35% of cases in white people and focal segmental glomerulosclerosis for Black people. The remaining 10% of adult cases are secondary to underlying medical conditions (Kodner, 2016).

The prevalence in Indonesia is reported to be 6 per 100,000 per year in children less than 14 years of age. The boys to girls ratio ranges from 2:1 to 3:2. Nephrotic syndrome is one of the three most prevalent kidney illnesses in children, accounting for 35% of cases. Acute post-streptococcal glomerulonephritis comes in second at 26%, and urinary tract infections come in third at 23% (Ramdhani et al., 2022). Primary glomerular disorders or systemic renal diseases can both cause nephrotic syndrome. Most reasons need a kidney biopsy to be diagnosed, and they are categorized based on the pattern of minor microscopic damage (Mahalingasivam et al., 2018).

The main manifestation of nephrotic syndrome is oedema. Oedema usually varies from mild to severe (anasarca). Oedema is usually soft and sunken when pressed (pitting), and is commonly found around the eyes (periorbital) and extends to the abdomen genitalia and lower extremities. Decreased urine output: dark, foamy urine. Pallor, haematuria, anorexia/nausea and diarrhea due to oedema of the intestinal mucosa. Headache, malaise, abdominal pain, weight gain and fatigue are common. Growth failure and muscle shrinkage (long term) (Mumtaza, 2023). Diagnosis is generally based on clinical features and examinations that include blood tests, renal imaging, and biopsy (Ramdhani et al., 2022).

Case Presentation

A 27-year-old man came to Polyclinic Internal Medicine with complaints of swelling throughout the body. Swelling was felt since 2 weeks ago, initially swelling in the face and eyelid area then increased in weight to the whole

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body. The patient also complained of swelling in his genital area. The patient also complained of pain in the extremities and the whole body. Initially (16 days ago) the patient had a fever for 2 days and began to appear swelling in the eyelid area, then the face and the whole body including the four extremities and swelling of the patient's testicles. The patient then checked at the clinic and received medicine, but the swelling was felt to increase and did not heal. The patient complained that his bowel movements were hot and painful. The patient's bowel movements were dark brown in color, but plentiful, with no pain or heat during bowel movements. The patient often takes paracetamol when headache is felt. There were no other complaints such as nausea, vomiting, cough, or runny nose. There are no family members and neighbours who have similar complaints.

The patient has no previous history of hypertension, diabetes mellitus, lungs disease, heart disease and allergies, and has never had a history of sexual intercourse. The patient's family history also had no previous hypertension, diabetes mellitus, acid reflux, lungs disease, heart disease and allergies. The patient works as a cattle farmer at home and has a habit of smoking every day. The patient also has a history of drinking alcohol every week +3 times before for 3 years (2016-2019) and has stopped since 5 years ago. The patient is not married and lives at home with his biological mother, while the patient's father has passed away.

Physical examination revealed that the patient was generally weak, appeared ill, and had compos mentis consciousness E4V5M6. The patient's vital signs were as follows: blood pressure 164/115 mmHg, pulse 96 x/min, regular, strong, temperature 37.2 C, breathing 20 x/min, SpO2 96%, height 175 kg, body weight 88 kg, and a BMI of 28.7. Physical examination of the head was found to be normocephal. The eyes were found to have palpebral swelling (+/+). Nose and ears were within normal limits. Thorax examination is within normal limits. Physical examination of the abdomen revealed distension, undulation test was positive and shifting dullness was positive indicating ascites. Examination of the inferior and superior extremities revealed pitting edema on all four extremities (+/+/+/+). Examination of genitalia on inspection found the scrotum looks erythema, swollen, scrotum painful when moved, negative phren's sign, negative cremaster reflex.

Figure 1. Swelling of the scrotum

Figure 2. Swelling of both lower extremities

Laboratory examination on the first day showed the following results: Hemoglobin 18.0 g/dL (increased), Total Protein: 3.1 g/dL (decreased), Albumin: 2.1 g/dL (hypoalbumin), Globulin: 1.00 g/dL (normal), Ureum : 59 mg/dL (increased), Creatinine: 1.34 mg/100ml (normal).

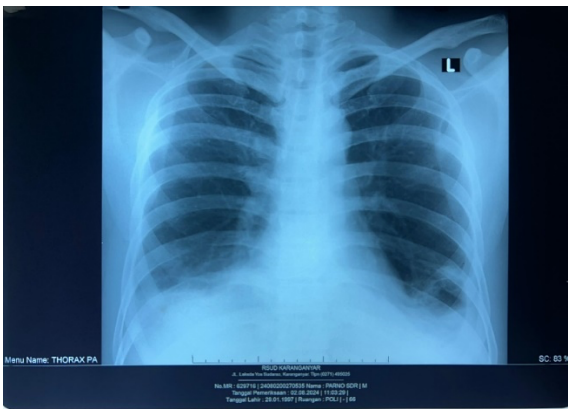

Figure 3. Rontgen Thorax PA

Based on thorax X-ray examination in the patient, the X-ray results were obtained with the impression of bronchopneumonia and sinistra pleural effusion.

Based on anamnesis, physical examination and laboratory examination, the patient's diagnosis is Nephrotic Syndrome. The patient received therapy, namely Ringer Lactate infusion 12 dpm micro, Methylprednisolone injection 62.5mg/12 hours, Furosemide injection 40mg/8 hours, Captopril PO 2x12.5mg.

The following is the patient's follow-up during hospitalization in the ward: Second day observation, complaints of both legs swelling, pain and tightness, general condition is good, compos mentis, BP 164/115 mmHg; N 96 x/min; S 37.2^{0}C; RR 20 x/min, SpO2 96%. The patient's eyes were found to have palpebral oedema. On abdominal examination, distension was found, ascites examination was carried out with an undulation test found positive and positive shifting dullness. On examination of the extremities, pitting oedema was found on all four extremities. On genitalia examination, there was swelling of the scrotum.

Third day observation, complaints of both legs swelling, pain and tightness, general condition is good, compos mentis, BP 147/102 mmHg; N 89 x/min; S 36.9^{0}C; RR 20 x/min, SpO2 96%. The patient's eyes were found to have palpebral oedema. On abdominal examination, distension was found, ascites examination was carried out with an undulation test found positive and positive shifting dullness. On examination of the extremities, pitting oedema was found on all four extremities. On examination of genitalia, there was swelling of the scrotum. Supporting examination obtained Total Cholesterol 329 mg/dL (increased), HDL Cholesterol 28 mg/dL (decreased), LDL Cholesterol 243 mg/100ml (increased), and Triglycerides 291 mg/100ml (increased).

Fourth day observation, complaints of swollen legs, good general condition, compos mentis, BP 120/80 mmHg; N 75 x/min; S 36.5^{0}C; RR 20 x/min, SpO2 97%. On abdominal examination, distension was found, ascites examination was carried out with an undulation test found positive and positive shifting dullness. On examination of the extremities obtained pitting oedema on all four extremities. On genitalia examination, there was swelling of the scrotum. Laboratory examination obtained Total Cholesterol 309 mg/dL (increased), HDL Cholesterol 27 mg/dL (decreased), LDL Cholesterol 231 mg/100ml (increased), and Triglycerides 259 mg/100ml (increased). Urine examination showed cloudy colour, proteinuria +2, leukocyturia, erythrocyturia, bacteriuria and cylindrical granules.

Observation on the fifth day, the second complaint of swelling was reduced, general condition was good, compos mentis, BP 120/80 mmHg; N 75 x/min; S 36.5^{0}C; RR 20 x/min, SpO2 97%. On abdominal examination, distension was found, ascites examination was carried out with an undulation test found positive and positive shifting dullness. On examination of the extremities obtained pitting oedema on all four extremities. On genitalia examination, there was swelling of the scrotum. The patient was allowed to undergo outpatient treatment and received home therapy namely Furosemide 1x20mg, Methylprednisolone 16mg (2-1-0), Omeprazole 2x20mg, Cefixime 2x100mg, Captopril 2x12.5mg.

Discussion

Nephrotic syndrome (NS) is a glomerular condition distinguished by significant proteinuria, hypoalbuminemia, hyperlipidemia, and peripheral edema. Diagnosis is mostly determined through clinical characteristics and assessments, which encompass blood tests, renal imaging, and biopsy (Ramdhani et al., 2022). Nephrotic syndrome is characterized by a triad of significant proteinuria (≥3g/24 hours), hypoalbuminemia (≤25g/L), and edema. The condition can impact individuals of all ages, manifesting as a primary renal problem or as a consequence of systemic disease, cancer, or drug side effects. Patients may exhibit peri-orbital or site-dependent oedema, additional hypervolemia-related symptoms (such ascites), or consequences from their nephrotic condition, like venous thromboembolism (Mahalingasivam et al., 2018). Nephrotic syndrome is a group of signs that point to injury to the kidneys (Basart et al., 2018).

Albumin is a protein with functions as a sponge, absorbing excess fluid from the body and transferring it into the bloodstream, where it stays until the kidneys filter it out. Oedema results from the blood's inability to absorb excess fluid from the body when albumin seeps into the urine. When tested over a 24-hour period, a damaged glomerulus in nephrotic syndrome permits 3 grams or more of protein to escape into the urine, which is more than 20 times the amount that a healthy glomerulus can contain (Basart et al., 2018). The prevalence of primary minimum lesion nephrotic syndrome, which is the most common type in children, is inversely correlated with the age at which the disease first manifests. Compared to other types, this primary minimal lesion nephrotic syndrome has the best long-term prognosis and the highest degree of responsiveness to conventional therapy (Samsu, 2023).

Nephrotic syndrome affects three out of every 100,000 adults each year. In adulthood, idiopathic nephrotic syndrome accounts for about 80% to 90% of occurrences. About 30% to 35% of adult cases of nephrotic syndrome are caused by either focal segmental glomerulosclerosis or membranous nephropathy, which is the most common cause in white people and the most common in black people (Kodner, 2016). The incidence of nephrotic syndrome in adults is 3 per 100,00 population. On average 80%-90% of cases of nephrotic syndrome in adults the cause remains unknown (Prasetyo, 2024). Nephrotic syndrome is thought to affect 2–7 out of every 100,000 children under the age of 18 each year, with the highest onset happening between the ages of 2 and 3. 75% of patients experience symptoms before the age of 10, and nearly 50% of patients start feeling ill between the ages of 1-4 years. In adults, the incidence of nephrotic syndrome is approximately 3 cases per 100,000 annually (Wiguna, 2019). One of the aetiology of nephrotic syndrome is the consumption of drugs, 40% of which are non-steroidal anti-inflammatory drugs (NSAIDs). Although NSAIDs have broad anti-inflammatory and analgesic benefits, this class of drugs also has multi-organ side effects, such as peptic ulcers, allergic reactions, and renal complications (Mumtaza, 2023).

Nephrotic syndrome might be brought on by a systemic kidney illness or a primary glomerular condition. A kidney biopsy is necessary for the diagnosis of most causes, which are categorized based on the pattern of moderate microscopic injury (Mahalingasivam et al., 2018). Drugs such as NSAIDs can cause direct damage to podocytes and endothelial cells of the glomerulus. The use of drugs that alter blood flow in the glomerulus can cause structural and functional damage to the kidney, leading to nephrotic syndrome (Perazella, 2022)

The glomerular capillaries are bordered by fenestrated endothelium that lives in the glomerular basement membrane. Podocytes, also known as glomerular epithelium, cover the capillaries with foot processes, which are cellular extensions. There are filtration holes in between the leg processes. The three components that make up the glomerular filtration barrier are the glomerular epithelium, glomerular basement membrane, and fenestrated endothelium. Through the endothelium fenestrae and filtration gaps, plasma water and solutes are filtered extracellularly. Genetic illnesses serve as a reminder of the significance of podocytes and the filtering gap. In Finnish-type congenital nephrotic syndrome, a mutation in the gene encoding the filtration gap protein nephrine results in nephrotic syndrome in infancy. Similarly, certain children with steroid-resistant localized glomerulosclerosis may have aberrant levels of podocin, a protein of podocytes. Damage to the endothelium surface, glomerular basement membrane, or podocytes are structural alterations of the glomerulus that can result in proteinuria. Both forms of

nephrotic syndrome may exhibit one or more of these processes. Proteinuria, or the leakage of all plasma proteins, can happen with more severe damage, or albuminuria alone (Sinnakirouchenan, 2023).

Selective proteinuria is defined as having more than 85% albumin in the urine. The glomerular membrane's loss of negative charge is thought to be a major contributing factor in albuminuria, as albumin has a net negative charge. As glomerular leakage of all plasma proteins, nonselective proteinuria would result in a broad permeability defect rather than a change in glomerular net charge. With the exception of nephropathy with few alterations, where proteinuria is selective, this structure makes it impossible to distinguish between the sources of proteinuria (Sinnakirouchenan, 2023).

The patient experienced oedema in all parts of the body, including the scrotum, all four extremities, and both palpebrae. In the paediatric population, face oedema is typically the initial indication of nephrotic syndrome. The entire body then becomes swollen. Adult individuals with dependant oedema may show up. Urine that is foamy could be a presenting sign (Tapia et al., 2023). Nephrotic syndrome is commonly characterized by weariness, weight gain, and progressive lower extremities oedema. Patients with advanced disease may experience pleural or pericardial effusion, ascites, or periorbital or genital oedema. Nephrotic syndrome should be evaluated in patients who come with new oedema or ascites but do not have the dyspneua that is characteristic of congestive heart failure or cirrhotic stigmata. Nephrotic range proteinuria is often defined as more than 3 to 3.5 g of protein in a 24-hour urine collection; however, not all individuals with this range of proteinuria have nephrotic syndrome. Low serum albumin levels (below than 2.5 g per dL [25 g per L]) and severe hyperlipidemia are additional characteristics of nephrotic syndrome. In a study of nephrotic syndrome patients, total cholesterol levels were higher than 300 mg/dL (7.77 mmol/L) in 53% of cases and 400 mg/dL (10.36 mmol/L) in 25% of cases (Kodner, 2009).

Nephrotic syndrome is most common symptom is oedema, which first appears around the legs and eyes. Oedema spreads over time, increasing body weight and initiating the development of pleural effusion or ascites. Although haematuria and hypertension are more noticeable in nephritic syndrome, they may be less frequent. The aetiology of nephrotic syndrome influences other examination characteristics. Furthermore, it is contingent upon whether or not there is decreased renal function. For instance, a patient with chronic diabetes mellitus may develop diabetic retinopathy, which is intimately linked to diabetic nephropathy. Patients who have poor renal function may experience hypertension, aenemia, or both (Tapia et al., 2023).

The main manifestation of nephrotic syndrome is oedema. Oedema usually varies from mild to severe (anasarca). Oedema is usually soft and sunken when pressed (pitting), and is generally found around the eyes (periorbital) and continues to the abdomen, genitalia and lower extremities. Decreased urine output: dark, foamy urine. Pallor, haematuria, anorexia/nausea and diarrhea due to oedema of the intestinal mucosa. Headache, malaise, abdominal pain, weight gain and fatigue are common. Growth failure and muscle shrinkage (long term) (Mumtaza, 2023)

Elevated triglycerides and cholesterol are signs of dyslipidemia, which is present in the majority of nephrotic syndrome patients. Higher levels of sialyated angiopoietin-like 4 (Angptl4) mediate lipoprotein lipase inhibition, which results in lower triglyceride metabolism, and increased hepatic synthesis of lipoproteins, particularly apolipoprotein B (Apo-B). Although lipids typically return to normal shortly after remission, dyslipidemia is suggested to be a contributing factor to the elevated cardiovascular risk seen in nephrotic syndrome patients (Mahalingasivam et al., 2018). Nephrotic syndrome is typically associated with low serum albumin levels. Serum albumin levels are frequently below the typical range of 3.5 to 4.5 g/dL. The level of renal impairment influences creatinine levels. Typically, levels of triglycerides and total cholesterol are elevated (Tapia et al., 2023).

The therapy given to the patient was Ringer Lactate infusion 12 bpm micro, Methylprednisolone injection 62.5mg/12 hours, Furosemide injection 40mg/8 hours, Captopril PO 2x12.5mg. Fluid therapy with lactated ringer injection is used to maintain the patient's body fluids with 12 drops per minute which aims to prevent the patient's body fluids from overloading. Aims to control fluid retention and reduce oedema. Fluid retention can cause significant swelling and high blood pressure. For patients with severe oedema, regulation of fluid intake may be required. Fluid intake recommendations are usually based on body weight and degree of oedema. Drinks containing added salt or

sugar should be avoided to prevent an increase in body fluids (Alwi et al., 2015). Methylprednisolone 62.5mg/12 hours injection (corticosteroid) aims to improve proteinuria and renal function in people with minimal change disease, but not in membranous nephropathy or proliferative glomerulonephritis (Kodner, 2009).

The patient was given furosemide injection 40 mg/8 hours to function as a diuretic. In order to achieve successful diuresis in individuals with resistant oedema, it may be required to combine diuretics that operate further into the nephron (such as thiazides or mineralocorticoid receptor antagonists) in order to maximally minimize sodium reabsorption. Patients should be encouraged to record their weight regularly as a guide to fluid accumulation (Mahalingasivam et al., 2018). The most widely used loop diuretics are bumetanide and furosemide (Lasix). Due to poor oral drug absorption brought on by intestinal oedema, large doses (such as 80–120 mg of furosemide) are frequently needed, and these medications must typically be given intravenously. Additionally, diuretics are less effective and need larger dosages when serum albumin levels are low. As supplemental or synergistic diuretics, metolazone (Zaroxolyn), potassium-sparing diuretics, or thiazide diuretics may be helpful (Kodner, 2009).

Antihypertensive drugs are also used to monitor blood pressure. The goal blood pressure for patients with persistent nephrotic syndrome is less than 130/80, which is usually reached by combination of diuretics and RASi treatment. Since they may also have antiproteinuric properties, non-dihydropyridine calcium channel blockers (CCBs) like diltiazem are advised as a second line of treatment. However, some data indicate that dihydropyridine CCBs, such as amlodipine, may further aggravate peripheral oedema and proteinuria (Mahalingasivam et al., 2018).

Conclusions

Nephrotic syndrome is defined as the triad of severe proteinuria (≥3g/24 hours), hypoalbuminemia (≤25g/L) and oedema. The three conditions that make up nephrotic syndrome are oedema, hypoalbuminemia (≤25g/L), and severe proteinuria (≥3g/24 hours). All ages of children and adults may be affected by the syndrome, which can manifest as a primary renal disorder, a systemic disease, cancer, or an unexpected side effect of medication. Patients may arrive with oedema, typically peri-orbital or site-dependent; other hypervolemia symptoms, like ascites; or complications from their nephrotic condition, like venous thromboembolism. Even though this presentation is rare for acute medical services, early detection will help with proper diagnosis, management by specialists, and possibly avoid complications. In this instance, the patient had never before suffered from nephrotic syndrome. Clinical improvements for the patient included decreased extremities oedema and non-foaming urine.

Acknowledgments

The authors would to express their gratitude to all staff Faculty Medicine Muhammadiyah Surakarta. Special thanks to the patient whose data were used as sample in this study.

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