DIAGNOSIS AND COMPREHENSIVE MANAGEMENT OF ACUTE POST-STREPTOCOCCAL GLOMERULONEPHRITIS IN A PEDIATRIC PATIENT : A CASE REPORT

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ABSTRAK

Glomerulonefritis pascastreptokokus akut (GNAPS) adalah kelainan ginjal yang dimediasi imun setelah infeksi streptokokus, yang terutama menyerang anak-anak. Laporan ini membahas diagnosis, penanganan, dan tindak lanjut GNAPS pada pasien anak. Seorang anak perempuan berusia enam tahun datang dengan edema, hipertensi, dan riwayat infeksi pernapasan. Evaluasi klinis, uji laboratorium (proteinuria, hematuria, peningkatan titer ASTO), dan pencitraan mengonfirmasi GNAPS. Penanganannya meliputi diuretik, ACE inhibitor, dan antibiotik, dengan pemantauan ketat untuk komplikasi sistemik. Pengobatan secara efektif mengurangi edema, menstabilkan tekanan darah, dan mengatasi infeksi streptokokus. Tindak lanjut menunjukkan penurunan proteinuria dan hematuria, tanpa reaksi merugikan terhadap pengobatan. Pasien dipulangkan dalam kondisi stabil dengan rencana tindak lanjut untuk memantau pemulihan ginjal. Intervensi dini pada GNAPS, termasuk manajemen cairan dan tekanan darah, sangat penting dalam mencegah hasil ginjal yang parah. Kasus ini menyoroti pentingnya rencana perawatan terstruktur dan tindak lanjut rutin untuk mengurangi kekambuhan dan masalah ginjal jangka panjang pada GNAPS pediatrik.

Kata kunci : antibiotik, diuretik, fungsi ginjal, GNAPS, pediatrik

ABSTRACT

Acute post-streptococcal glomerulonephritis (GNAPS) is an immune-mediated renal disorder following streptococcal infections, predominantly affecting children. This report discusses the diagnosis, management, and follow-up of GNAPS in a pediatric patient. A six-year-old female presented with edema, hypertension, and history of respiratory infection. Clinical evaluation, laboratory tests (proteinuria, hematuria, elevated ASTO titers), and imaging confirmed GNAPS. Management included diuretics, ACE inhibitors, and antibiotics, with close monitoring for systemic complications. Treatment effectively reduced edema, stabilized blood pressure, and addressed streptococcal infection. Follow-up showed decreased proteinuria and hematuria, with no adverse reactions to medications. The patient was discharged in stable condition with follow-up plans to monitor renal recovery. Early intervention in GNAPS, including fluid and blood pressure management, is critical in preventing severe renal outcomes. This case highlights the importance of a structured treatment plan and regular follow-up to mitigate recurrence and long-term renal issues in peadiatric GNAPS.

Keywords *: antibiotics, diuretics, GNAPS, pediatric, renal function*

INTRODUCTION

Glomerulonephritis Acute Post-Streptococcal (GNAPS) represents a rare yet significant immunological response leading to acute glomerular injury, which can precipitate edema, hypertension, and acute renal failure in pediatric patients. This case involves a six-year-old female presenting with facial and extremity edema, accompanied by a history of fever and respiratory infection. GNAPS is typically triggered by streptococcal infections of the skin or pharynx, wherein the body's immune response results in the deposition of immune complexes within the renal glomeruli, inciting inflammation. A thorough clinical understanding of GNAPS is crucial for anticipating and managing potential complications, particularly in

vulnerable pediatric populations.(Cannon & Bowen, 2021; Hidayani et al., 2016; Pardede, 2016)

This case exhibits several distinctive features, including pronounced periorbital edema, hypertension, and urinary proteinuria. While GNAPS commonly affects children between the ages of five and six, this patient displayed complex symptoms requiring a comprehensive therapeutic approach, including antibiotic and antihypertensive treatment. The literature indicates a higher incidence of GNAPS in developing countries, where challenges in maintaining hygiene and providing prophylactic antibiotics contribute to disease prevalence. Although GNAPS is often self-limiting, untreated or inadequately managed cases can escalate to severe complications.(Anígilájé et al., 2020; Armitage et al., 2019; Kanzaki et al., 2023)

Among the critical complications of GNAPS are severe hypertension and hypertensive encephalopathy, both of which demand prompt intervention. These arise due to sodium and fluid retention secondary to glomerular damage. In this case, the administration of diuretics and ACE inhibitors, such as captopril, played a vital role in managing elevated blood pressure and controlling fluid volume. Antibiotic therapy was also employed to eradicate residual streptococcal bacteria, thereby mitigating prolonged inflammatory responses. The patient was closely monitored during hospitalization due to the risk of systemic complications.(Floege et al., 2021; Rovin et al., 2021; Tang, 2023)

Despite a generally favorable prognosis for pediatric GNAPS, long-term monitoring remains essential, as proteinuria or microscopic hematuria can persist well beyond the acute phase. Studies recommend regular assessments of urinary protein and blood levels during recovery to detect potential chronic glomerulonephritis.(Lauriero et al., 2021; Pérez et al., 2021) As part of family education, preventive measures against streptococcal infections and improved hygiene are emphasized to reduce recurrence risk. Optimal management of GNAPS during the acute phase can enhance patient outcomes and prevent long-term morbidity.

CASE REPORT

A 6-year-old female, born on March 14, 2017, presented with primary symptoms of swelling in the face and legs for two days, accompanied by cough, sore throat, and occasional fever. The patient had no prior similar health concerns and no significant family or genetic history linked to renal or autoimmune diseases. Her immunizations were up-to-date, and development milestones were age-appropriate, with self-feeding, counting, and independent dressing skills. Previously, there were no ongoing medications or treatments for chronic conditions, and her diet was balanced, consisting of regular meals with various food groups.

The patient present with clinical symptoms of facial and lower limb edema, particularly around the eyelids, which corresponded to an increase in body weight from a baseline of 15.5 kg to 16 kg due to fluid retention. Additional symptoms included mild respiratory issues without significant distress. Anthropometric measurements indicated a height of 92 cm and a body weight of 16 kg, resulting in a body mass index (BMI) of 21.2 kg/m². Nutritional assessments classified the patient's weight-for-age (BB/U) at 90% (normal weight), height-for-age (TB/U) at 80% (short stature), and BMI-for-age (IMT/U) above the 95th percentile, categorizing the patient as obese. Physical examination findings included moderate edema in both upper and lower eyelids, hyperemic tonsils, and swelling in the legs. Vital signs showed elevated blood pressure at 110/80 mmHg, a pulse rate of 113 beats per minute, stable respiratory rate at 18 breaths per minute, body temperature of 36°C, and oxygen saturation (SpO2) at 99%. Supporting laboratory examinations revealed decreased hemoglobin (9.4 g/dL), hypoalbuminemia (2.58 g/dL), positive ASTO, with proteinuria and hematuria. Chest radiography indicated paracardial infiltrates, suggesting a secondary pneumonia infection. These findings provided a comprehensive baseline for case management.

The diagnosis was based on physical examination, laboratory testing (complete blood count, urinalysis), and imaging (chest X-ray). Diagnostic challenges included managing fluctuating blood pressure and monitoring the progression of edema. Primary diagnosis was post-streptococcal glomerulonephritis (PSGN), with secondary consideration of Henoch-Schönlein purpura (HSP) and lupus erythematosus due to similar presenting symptoms. Prognostic factors were favorable, with a high likelihood of recovery given timely intervention and absence of progressive complications. Strict fluid and sodium restrictions were implemented in addressing fluid retention and edema. Fluid intake was calculated to approximate insensible losses (400-500 ml/m²/day) while accounting for urine output, thereby preventing fluid overload. Sodium intake was minimized, with severe edema cases managed with additional restrictions as needed. Dietary protein was restricted to 0.5 g/kg body weight per day to reduce renal workload, particularly due to the risk of azotemia associated with GNAPS.

Antibiotic therapy was initiated to target the underlying streptococcal infection, with penicillin as the first-line agent. In cases of severe oliguria, potassium intake was carefully monitored, and potassium restriction was enforced to prevent complications associated with hyperkalemia. Persistent oliguria or anuria, as seen in a small percentage of GNAPS cases, was managed following acute kidney injury protocols to mitigate renal impairment and prevent progression.

Table 1. Timeline of Key Clinical Events in This Case

Date	Event	Notes
Feb 21, 2024	Initial presentation with swelling and fever	Admitted to emergency department
Feb 22, 2024	Onset of inpatient treatment	Diagnosis confirmed, edema persists
Feb 24, 2024	Improvement noted in lower limb swelling	edema persists, no fever
Feb 27, 2024	Final assessment before discharge	Stabilization of symptoms, reduction in edema, discharge planned

By the end of the inpatient stay, patient-assessed outcomes showed significant improvement, with marked reduction in edema and stable vital signs. Follow-up urinalysis indicated reduced proteinuria and hematuria. Adherence to the medication regimen was observed, with no adverse reactions or complications. Future outpatient follow-ups are planned to monitor recovery progression, assess renal function, and ensure sustained symptom resolution.

DISCUSSION

The management of this case of acute post-streptococcal glomerulonephritis (GNAPS) illustrates a robust and comprehensive approach to diagnosing and treating an immune-mediated kidney condition following streptococcal infection. GNAPS often presents with classic signs such as hematuria, proteinuria, hypertension, and edema, resulting from the body's immune response damaging the kidney's glomerular structures. In this case, the patient's clinical presentation of edema, elevated blood pressure, and positive antistreptolysin O (ASTO) test results underscored the likelihood of GNAPS. By systematically applying diuretics, antibiotics, and antihypertensive medications, the treatment addressed both the primary symptoms and the underlying infection, demonstrating an adherence to standard guidelines and established clinical protocols. This structured approach not only facilitated an

accurate diagnosis but also allowed for effective management of fluid retention and infection control, which are critical components in preventing further renal impairment.(Anígilájé et al., 2020; Bai et al., 2022; Pennesi, 2023)

The strength of this approach lies particularly in the timely intervention. Rapid and targeted treatment is crucial in GNAPS cases, as the condition, though often self-limiting, has the potential to develop into more severe renal complications, such as acute kidney injury (AKI) and chronic kidney disease (CKD). Administering antibiotics promptly to eradicate the streptococcal infection helps prevent recurrence, while diuretics like furosemide address the fluid overload caused by kidney dysfunction. Additionally, the use of an angiotensin-converting enzyme (ACE) inhibitor, such as captopril, effectively managed the patient's blood pressure, which is vital for minimizing strain on the kidneys and lowering the risk of further kidney damage. This protocol-driven approach underscores the importance of rapid intervention in mitigating the long-term consequences of GNAPS and preserving renal function.(Bhuiyan et al., 2020; Jiya et al., 2021; Kondapalli et al., 2019)

Despite these strengths, there are some limitations in the diagnostic approach. Notably, no renal biopsy was performed in this case. While renal biopsy is not always mandatory in cases with clear clinical and laboratory evidence of GNAPS, it provides critical histopathological insights, especially in atypical cases or those with a prolonged course. A biopsy can reveal the extent of glomerular inflammation and identify any other underlying or concurrent renal conditions, thereby allowing for a more precise diagnosis and prognosis. In patients where the disease's progression deviates from typical self-limiting patterns, a biopsy can help distinguish GNAPS from other forms of glomerulonephritis, such as rapidly progressive glomerulonephritis or IgA nephropathy, which may require different therapeutic approaches. Therefore, the absence of a renal biopsy slightly limits the accuracy and specificity of the diagnosis, particularly if the patient exhibits persistent or unusual symptoms.(Bai et al., 2022; Mayer et al., 2020; Pennesi, 2023)

GNAPS occurrence follows a Group A β-hemolytic streptococcal infection, with hallmark signs including hematuria, proteinuria, edema, and hypertension. The condition primarily affects children rather than adults, and the prognosis is favorable in most cases, especially with timely treatment. However, inadequate management or delays in treatment can lead to severe complications, including acute kidney injury and chronic kidney disease. Diuretics and ACE inhibitors effectively control GNAPS-related hypertension and fluid retention, while antibiotics target the streptococcal infection at its root. In cases where proteinuria or hematuria persists, more intensive monitoring and, in certain circumstances, a renal biopsy may be necessary to assess the likelihood of long-term kidney issues. Thus, a comprehensive, evidence-based approach is critical to optimize outcomes, guide treatment, and determine which cases may benefit from closer follow-up.(Duarte-Neto et al., 2019; Robinson et al., 2020; Rovin et al., 2021)

This case demonstrates the efficacy of treatment in resolving symptoms and normalizing laboratory parameters. Diuretics like furosemide successfully reduced the patient's edema by promoting fluid excretion, effectively addressing one of the most immediate and visible symptoms of GNAPS. Concurrently, captopril, an ACE inhibitor, was instrumental in managing elevated blood pressure, thus reducing stress on the kidneys and facilitating their recovery. The administration of antibiotics eradicated the underlying streptococcal infection, likely playing a significant role in symptom resolution. Although the patient showed notable improvement, consistent follow-up is crucial, as GNAPS can occasionally persist or progress into chronic renal issues. Long-term follow-up ensures that any residual symptoms are monitored and that recurrence or the development of CKD is addressed promptly.(Adhikari et al., 2022; Asinobi et al., 2020; Dowler & Wilson, 2019)

CONCLUSION

This case of acute post-streptococcal glomerulonephritis (GNAPS) highlights the importance of prompt and comprehensive intervention in pediatric patients to prevent complications. Effective treatment with diuretics, ACE inhibitors, and antibiotics addressed key symptoms, including edema, hypertension, and infection, facilitating symptom resolution and laboratory normalization. The absence of a renal biopsy posed limitations in confirming the diagnosis histopathologically, but clinical and laboratory findings supported the GNAPS diagnosis. This case underscores the importance of regular follow-up to monitor for recurrence or chronic kidney complications, ensuring long-term renal health and patient recovery. Overall, a structured, evidence-based approach proved essential for optimizing patient outcomes in managing GNAPS.

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