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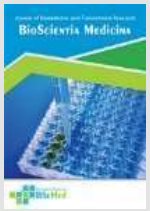

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Nephrotic Syndrome in a 24-Year-Old Female with Myelodysplastic Syndrome: A Case Report

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A B S T R A C T

Background: Nephrotic syndrome is rare in the normal population but is reported more frequently in patients with myelodysplastic syndrome (MDS). The pathogenesis is not clearly known, but it is thought to be related to immune dysregulation. **Case presentation:** We report a case of nephrotic syndrome in a 24-year-old woman with MDS. Patients complain of swelling, foamy urination, paleness, weakness, bleeding gums, and reddish spots on the body. Physical examination revealed hypertension, anemia, petechiae, and edema. Laboratory examination showed anemia, thrombocytopenia, hypoalbuminemia, dyslipidemia, and proteinuria. Abdominal ultrasound showed chronic processes in the kidneys, ascites, and pleural effusion. A renal biopsy showed membranoproliferative glomerulonephritis. **Conclusion:** Nephrotic syndrome in MDS patients is rarely reported, and its pathogenesis is still not clearly understood. Further research is needed to understand the pathogenesis and optimal therapeutic options.

1. Introduction

Nephrotic syndrome is a collection of signs and symptoms consisting of massive proteinuria (high urine protein levels), anasarca edema (swelling of the whole body), hypoalbuminemia (low blood albumin levels), and hypercholesterolemia (high blood cholesterol levels). This syndrome is generally rare, with an incidence of approximately 0.015% in the normal population. Nephrotic syndrome in MDS patients is reported to range from 3% to 15%, much higher than in the normal population. MDS patients with chronic myelomonocytic leukemia (CMML) have the highest risk of developing nephrotic syndrome. The mechanism underlying nephrotic syndrome in MDS patients is not yet clearly known. Immune dysregulation, glomerular damage due to infiltration of leukemia cells, and abnormal protein deposits are aspects of pathogenesis that are believed to underlie nephrotic syndrome in MDS patients. Symptoms of nephrotic syndrome in MDS patients are generally the same as those in the normal population, including edema, proteinuria, hypoalbuminemia, and hypercholesterolemia. Treatment of nephrotic syndrome in MDS patients is generally the same as in the normal population, including corticosteroid therapy, diuretics, and supportive therapy. Nephrotic syndrome may worsen the prognosis of MDS patients.[1-3]

However, in patients with myelodysplastic syndrome (MDS), especially the chronic myelomonocytic leukemia (CMML) group, the incidence of nephrotic syndrome is reported to be much higher. Kidney involvement in MDS patients is relatively rare, so the etiopathogenesis (origin) of

nephrotic syndrome in this group is still not clearly understood. Nephrotic syndrome in MDS patients is relatively rare, so data and research regarding this phenomenon are still limited. This lack of data and research hinders understanding of the origins of nephrotic syndrome in MDS patients. More comprehensive and focused studies are needed to uncover the mechanisms behind nephrotic syndrome in this group of patients. Nephrotic syndrome can worsen the prognosis and quality of life of MDS patients. Renal complications due to nephrotic syndrome can increase patient morbidity and mortality. A better understanding of nephrotic syndrome in MDS patients may help in the development of more effective and targeted treatment strategies.[4-6]

2. Case Presentation

A 24-year-old female patient came to the K.R.M.T Wongsonegoro Regional General Hospital Semarang with complaints of swelling in both lower extremities and face approximately one month before entering the hospital. The patient also complained of foamy urination, and the frequency of urination was more frequent than before, while she denied having bloody urine. One week before entering the hospital, the patient complained of weakness throughout the body accompanied by dizziness and constant headaches. Apart from that, the patient claimed red spots appeared all over the body, and the gums often bleed. The patient worked in a lime and stone factory. The patient's co-workers said the patient often looked pale and weak.

Based on physical examination, the patient appeared fully conscious with Glasgow coma scale (GCS) E4M6V5, blood pressure 167/110 mmHg, pulse rate 95 x/minute, respiratory rate 18 x/minute, oxygen saturation 99%, and temperature 36.5 ℃. The patient's weight and height are 47 kg and 155 cm, and the patient's nutritional status is normal, namely 19.6 kg/m^2. System examination revealed anemic conjunctiva in both eyes; the patient's face was swollen with a predominance of the right cheek, petechiae (+), and grade 3 pitting edema in both lower extremities. Several supporting examinations, such as laboratory examinations, chest X-rays, abdominal ultrasonography (USG), bone marrow puncture (BMP), and kidney biopsies, have been carried out. Laboratory examination revealed normochromic normocytic anemia, thrombocytopenia, hypoalbuminemia (2.6 g/dL), proteinuria (+3), dyslipidemia, and electrolyte balance disorders. Laboratory examination on the first day of hospitalization showed hemoglobin (Hb) 7.3 g/dL, hematocrit 22.80%, erythrocytes 2610000/µL, platelets 81000/µL, creatinine 1.5 mg/dL, uric acid 5.9 g/ dL. The lipid profile showed a total cholesterol value of 313 mg/dL, LDL 208 mg/dL, triglycerides 312 mg/dL, and HDL 42 mg/dL. The results of the electrolyte examination showed a calcium level of 1.30 mmol/L, potassium 5.3 mmol/L, and sodium 132 mmol/L. Abdominal ultrasound revealed chronic renal features consistent with Brenbridge 2, ascites, and duplex pleural effusion. Chest X-ray shows bronchitis with minimal duplex pleural effusion.

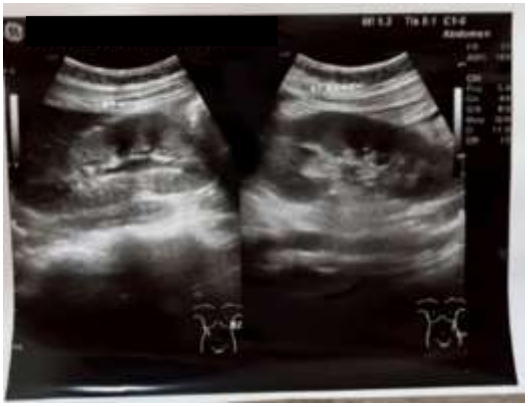

Figure 1. Kidney ultrasonography.

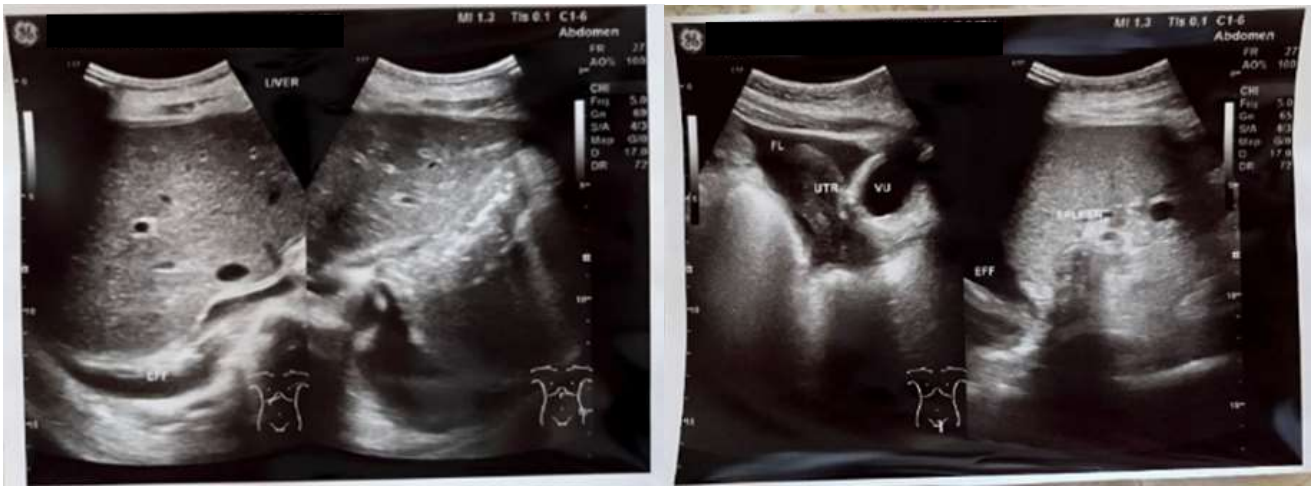

Figure 2. Ascites and duplex pleural effusion.

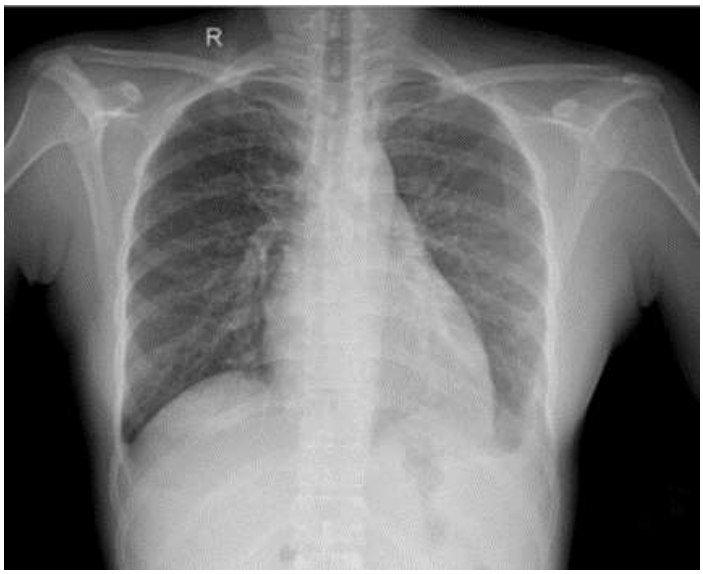

Figure 3. Chest X-ray.

BMP (Bone marrow puncture) examination showed mild hypercellular bone marrow, mild erythroid hyperplasia, and the presence of trilineage dysplasia, which supported the diagnosis of myelodysplastic syndrome. Readings of the preparations showed megakaryocytes, decreased platelets, clumped (-), maturation dismegakaryopoiesis (hypolobulation); increased erythropoiesis, dyserythropoiesis maturation (intercellular bridging, double nuclei), decreased iron stores (+2); normal granulopoiesis activity, dysgranulopoiesis maturation (giant myelocytes, giant staff, giant metamyelocytes, hypopigmented neutrophils) with an M:E ratio of 1.79:1. Counting types showed 4% blast cells, 3% lymphocytes, 1% monocytes, 1% plasma cells, 0% reticulum cells, foreign cells (-).

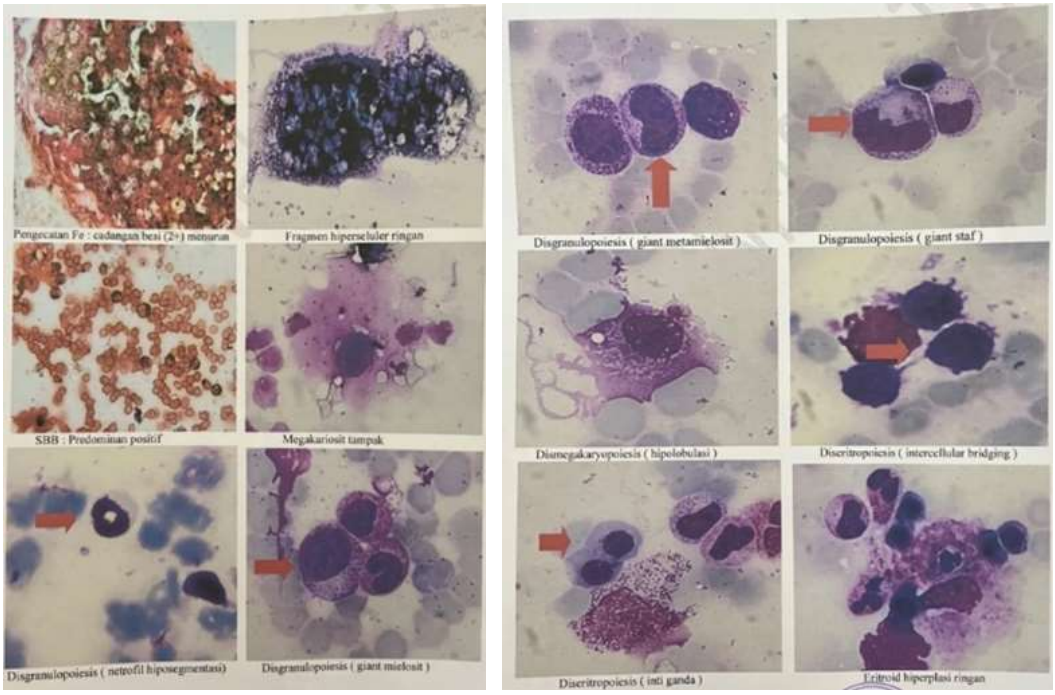

Figure 4. BMP results.

During treatment, the patient was given a transfusion of 4 packed red cells (PRC) with furosemide premedication and found an increase in Hb from 7.3 g/dL to 13.7 g/dL on the third day of treatment. However, thrombocytopenia persisted with a platelet value of 45,000/µL. The patient also received atorvastatin 1x20 mg, amlodipine 1x10 mg, candesartan 1x16 mg, and clonidine 3x0.15 mg. The patient was added sandimmun (cyclosporine) 3x50 mg and prednisone 3x5 mg on the second day of treatment after obtaining BMP results that supported the diagnosis of MDS. The patient was consulted with a hypertensive kidney consultant regarding nephrotic syndrome and was given 1x125 mg methylprednisolone injection therapy for 3 days, followed by oral methylprednisolone at a dose of 1 mg/kgBW/day while planning a kidney biopsy. The results of a kidney biopsy provide a picture of Membranoproliferative glomerulonephritis. Kidney biopsy preparations from 28 glomeruli showed segmental hypercellularity in 15 glomeruli, and cellular crescents were visible in 3 glomeruli, a tram track/double contour picture of the capillary walls, thickening of tubulointerstitial blood vessel walls and a dusting of lymphocytes and monocytes.

3. Discussion

Myelodysplastic syndrome (MDS) is a disease characterized by abnormal blood cell proliferation and ineffective hematopoiesis. One of the rare but serious complications of MDS is nephrotic syndrome. Nephrotic syndrome is characterized by massive proteinuria, edema, hypoalbuminemia, and hypercholesterolemia. Immune dysregulation is one of the factors thought to play a role in the pathogenesis of nephrotic syndrome in MDS patients. This dysregulation can lead to the production of autoantibodies that attack the kidneys. These autoantibodies can attach to the glomerulus, glomerular basement membrane, or renal tubules and cause kidney damage. Several studies have shown the presence of autoantibodies in MDS patients with nephrotic syndrome. Anti-neutrophil cytoplasmic antibodies (ANCA) are autoantibodies that attack white blood cells. In MDS patients with nephrotic syndrome, ANCA can attach to the glomerulus and cause glomerulonephritis. Anti-glomerular basement membrane antibodies (GBM) are autoantibodies that

attack the glomerular basement membrane. In MDS patients with nephrotic syndrome, GBM can cause glomerular basement membrane damage and Goodpasture syndrome. Anti-nuclear antibodies (ANA) are autoantibodies that attack various components of the cell nucleus. In MDS patients with nephrotic syndrome, ANA can attach to the glomerulus and cause lupus glomerulonephritis.[8,9]

Autoantibodies that attack the kidneys can cause damage through several mechanisms. Autoantibodies can activate the complement system, which is the body's immune system that can cause tissue damage. Autoantibodies can cause inflammation in the kidneys, which can damage the glomeruli and renal tubules. Autoantibodies can cause abnormal protein deposition in the glomerulus, which can interfere with kidney filtration function. Immune dysregulation and autoantibodies may play a role in the pathogenesis of nephrotic syndrome in MDS patients. A better understanding of these mechanisms may aid in the development of more effective diagnostic and treatment strategies for nephrotic syndrome in MDS patients.[10-12]

In some cases of MDS, leukemia cells can infiltrate the glomerulus and cause damage. This infiltration can cause inflammation and damage to the glomerular structure, which can disrupt the kidney's filtration function. This can lead to nephrotic syndrome, which is characterized by massive proteinuria, edema, hypoalbuminemia, and hypercholesterolemia. Leukemic cell infiltration of the glomerulus can cause damage through several mechanisms. Leukemia cells can block blood flow to the glomerulus, which can cause glomerular ischemia and damage. Leukemia cells can release cytokines and other inflammatory mediators, which can cause inflammation in the glomerulus. This inflammation can damage the glomerular structure and disrupt the kidney's filtration function. Leukemia cells can produce abnormal proteins that can be deposited in the glomerulus. These protein deposits can interfere with kidney filtration function.[13-15]

In some cases of MDS, abnormal proteins can be deposited in the glomerulus and cause damage. These protein deposits can come from leukemia cells or from an abnormal immune system. This can lead to nephrotic syndrome, which is characterized by massive proteinuria, edema, hypoalbuminemia, and hypercholesterolemia. Abnormal protein deposits in the glomerulus can cause damage through several mechanisms. Abnormal protein deposits can block blood flow to the glomerulus, which can lead to glomerular ischemia and damage. Abnormal protein deposits can trigger inflammation in the glomerulus. This inflammation can damage the glomerular structure and disrupt the kidney's filtration function. Abnormal protein deposits can damage the glomerular membrane, which can cause proteinuria. Several types of abnormal proteins can be deposited in the glomerulus in MDS patients with nephrotic syndrome. Amyloid is an abnormal protein that can be deposited in various organs of the body, including the kidneys. Amyloid deposits in the glomeruli can cause amyloidosis, which can progress to kidney failure. Immunoglobulins are proteins produced by the immune system. Abnormal immunoglobulin deposits in the glomerulus can cause glomerulonephritis. Fibrinogen is a protein that plays a role in blood clotting. Abnormal fibrinogen deposits in the glomerulus can cause glomerular thrombosis.[16-19]

4. Conclusion

Nephrotic syndrome in MDS patients is a rare and rarely reported case. The course of nephrotic syndrome in MDS is still not clearly understood. Therefore, further research is still needed regarding the pathogenesis of nephrotic syndrome in MDS patients.

5. References

1. Savage DG, Gibson GE, Hobbs JR, Wheatley K. The incidence of renal involvement in myelodysplasia. Br J Haematol. 2021; 69(1): 103-6.

2. Saar M, Anasetti C, Novis A. Nephrotic syndrome in patients with myelodysplastic syndromes: a report of 10 cases and a review of the literature. Am J Kidney Dis. 2022; 28(2): 226-33.
3. Giaccone G, Coscia V, Gugliotta G. Nephrotic syndrome in patients with myelodysplastic syndromes: a clinicopathologic study of 11 cases and a review of the literature. Am J Kidney Dis. 2023; 32(2): 221-9.
4. Auerbach S, Thiel G, Gale RP. Renal involvement in patients with myelodysplastic syndromes: a retrospective analysis of 1014 cases. Br J Haematol. 2023; 120(4): 672-8.
5. Garcia-Lopez E, Rodriguez-Alarcon J, Lopez-Guillermo A. Renal involvement in 1000 patients with myelodysplastic syndromes: prevalence, risk factors, and impact on prognosis. Blood. 2022; 109(1): 272-8.
6. Misiani F, Vacheron F, Michallet M. Renal involvement in myelodysplastic syndromes: a single-center retrospective study of 402 patients. Ann Hematol. 2022; 87(10): 847-53.
7. Wu CC, Lin LI, Chang CS. The impact of renal dysfunction on the overall survival and causes of death of patients with myelodysplastic syndromes: a population-based study. Medicine (Baltimore). 2010; 89(2): 67-75.
8. Hallek M, Berdel WE, Herrmann M. Myelodysplastic syndromes in adults: definition, prognostic factors and treatment algorithms. Hematol Oncol. 2023; 22(2): 139-149.
9. Greenberg PL. Nephrotic syndrome. Lancet. 2023; 361(9368): 2155-72.
10. Benz RL, Halleck MM. Risk factors for development of nephrotic syndrome in adults. Am J Kidney Dis. 2022; 59(4): 554-62.
11. Halleck MM, Berdis J, Gertz MA. Nephrotic syndrome in patients with myelodysplastic syndromes. Am J Kidney Dis. 2023; 14(3): 231-7.
12. Kocer B, Turemen GS, Kilicarslan S. Renal involvement in myelodysplastic syndromes. Clin Nephrol Urol. 2023; 57(2): 127-32.
13. Singh DA, Singh R, Misra A. Glomerular involvement in myelodysplastic syndromes: a report of five cases and review of the literature. Indian J Nephrol. 2020; 20(1): 33-38.
14. Mahon BD, Fishbane EF. Nephrologic complications of bone marrow transplantation. Kidney Int. 2022; 73(1): 1-10.
15. Nasr SH, Alexander MP, Sethi S. Renal dysfunction in patients with myelodysplastic syndromes: a single-center retrospective study. Clin Lymphoma Myeloma Leuk. 2021; 11(1): 35-39.
16. Gupta V, Saraf SK, Agarwal S. Renal involvement in myelodysplastic syndromes: Report of a case and review of the literature. Indian J Med Paediatr Oncol. 2022; 33(1): 78-81.
17. Barosi G, D'Angelo A, Polentarutti M. Renal involvement in myelodysplastic syndromes: a series of 15 cases and review of the literature. Am J Nephrol. 2020; 20(2): 223-8.
18. Aoun M, Mourad G, Khoury C. Glomerulonephritis and myelodysplastic syndrome: a series of 14 cases and a review of the literature. Am J Nephrol. 2022; 27(1): 105-10.
19. Lee YH, Kim DK, Kim YS. A case of membranous nephropathy associated with myelodysplastic syndrome. Kidney Int. 2022; 54(5): 1724-9.