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Case report

Why Could there be a Significant Difference between the Results of Spot Urine Albuminuria and 24-Hour Urine Quantitative Proteinuria?

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Abstract

Patient's urine analysis revealed trace amounts of proteinuria and 17.22 g/day proteinuria in 24-hour urine. Given the dramatic difference between these two tests (spot urine albuminuria and 24-hour urine quantitative proteinuria), an investigation of plasma cell dyscrasia was planned. Patients who do not have albuminuria but have significant proteinuria on 24-hour urine analysis should be examined for plasma cell dyscrasia and bone marrow examination should be performed.

Key words: Spot urine albuminuria, 24-hour urine quantitative proteinuria, multiple myeloma

Introduction

Multiple myeloma (MM) is a disease characterized by plasma cell neoplasia, which accounts for 1% of all cancers and 10% of all hematological malignancies, respectively. At the time of diagnosis, the median age is 66 years, and abnormal laboratory values may not always be observed, even if it is accompanied by anemia, impairment of renal function, hypercalcemia, hypoalbuminemia and hypergammaglobulinemia. While investigating the etiology of renal failure, we wanted to present a case of myeloma, even though it did not show the characteristic laboratory values mentioned above.

Case

A 69-year-old male patient was referred to the outpatient-clinic for nephrological evaluation after completing pneumonia treatment. During the follow-up after pneumonia in Chest Disease Hospital, high serum creatinine level was noted. The patient was admitted to the Nephrology Clinic to investigate renal insufficiency etiology. Creatinine was found to be 6.2 mg/dl, urea was 97 mg/dl, calcium was 9.3, albumin was 3.9 g/dl, globulin was 2.5 g/dl and hemoglobin was 8.5 g/dl. Renal ultrasonography showed normal kidney size and parenchymal thickness. As first impression, the clinical presentation of the patient was thought to be due to acute renal failure secondary to pneumonia and hypoxia. During the follow-up period, the patient did not require hemodialysis and regression was observed in renal function tests with intravenous hydration. In the patient's spot urine and 24-hour urine analyzes, trace amounts and 17,22 g/day proteinuria were detected. It was planned to investigate in terms of plasma cell dyscrasia from the inconsistency between these two tests, albuminuria and quantitative protein measurement methods in spot urine and 24-hour urine tests, respectively. Bone marrow aspiration and biopsy were performed and evaluated by a hematology specialist. When bone marrow aspiration was assessed, approximately 60% of plasma cells were reported to be detected. Histopathological evaluation of bone marrow biopsy indicated that 80% of atypical plasma cell infiltrates were distributed in the interstitial space. A diagnosis of multiple myeloma was made and the patient was scheduled to undergo chemotherapy in the hematology clinic.

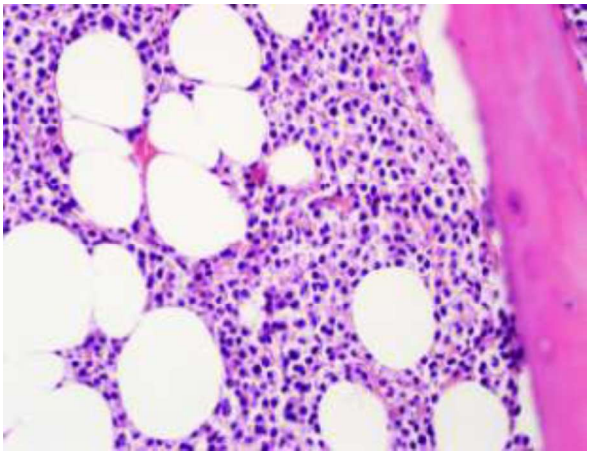

Fig. 1. Diffuse atypical plasma cell infiltration in bone marrow biopsy, H & E, x100

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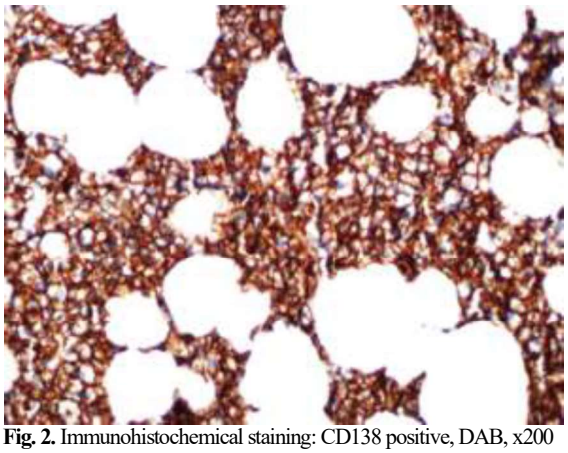

Fig. 2. Immunohistochemical staining: CD138 positive, DAB, x200

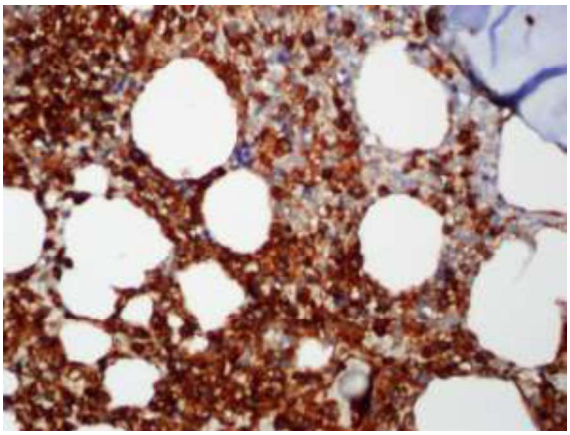

Fig. 3. Immunohistochemical staining: Kappa positive, DAB, x200

Discussion

The most appropriate method for measuring urine protein is uncertain and there are inconsistencies in the guidelines for recommending total urinary protein excretion or only urinary albumin excretion for risk assessment and therapeutic decisions. The urine essentially contains 2 groups of proteins; plasma proteins that cross the filtration barrier, and non-plasma proteins that originate from the renal tubules or urinary tract [1]. The major ones are albumin and Tamm-Horsfall proteins, respectively. In addition to albumin and Tamm-Horsfall proteins, immunoglobulins, low molecular weight proteins and light chains are also present in variable proportions. Dipstick method is a proteinuria assay using a pH sensitive dye impregnated strip that changes color in the presence of negatively charged urinary proteins. Although the use of dipsticks is very practical and easy, they are not very sensitive for proteinuria. On average, dipsticks have low sensitivity and variable specificity for detection of total protein levels and that positively charged proteins such as immunoglobulin light chains may not be detected even when the concentrations of these proteins are high [1]. In general, to detect albumin, a negatively charged protein, their sensitivity remains low. The standard urine dipstick test is not sensitive enough to detect non-albumin proteins, only albumin can be detected [2]. On the other hand, the detection of proteinuria by precipitation is performed by adding acid based on the measurement of turbidity. Among the most commonly used acids, sulfosalicylic acid and trichloroacetic acid are more sensitive for albumin, light chains and globulin, respectively. Precipitation methods have low sensitivity and precision for immunoglobulins. Electrophoresis is the preferred method when focusing on the detection of immunoglobulin and immunoglobulin light chains in the urine. Urine electrophoresis and immunoelectrophoresis, respectively show monoclonal peak and define the specific protein with very high sensitivity [1,3].

Plasma cell dyscrasias are a consequence of the clonal expansion of the neoplastic plasma cell and can be detected by the presence of one of the following: monoclonal light chain in the serum by serum immunofixation electrophoresis, monoclonal light chain in the urine by urine immunofixation electrophoresis or monoclonal plasma cells in the bone marrow by immunohistochemistry [4]. Each abnormally expanded malignant plasma clonal cells produce an excess of intact immunoglobulin or a single type of free light chains. These free light chains of a single type, called monoclonal protein (M-protein) or paraprotein [5]. Practically, plasma cell dyscrasias can be diagnosed by bone marrow aspiration, biopsy and clinical laboratory tests [4,6]. However, plasma cell dyscrasias including multiple myeloma (MM) are diseases with many faces. Renal functions are often impaired in plasma cell dyscrasias [7]. Acute renal failure due to multiple myeloma may rarely be a chatacteristic of the disease [8]. Hutchison and colleagues have suggested that measuring the concentrations of serum monoclonal free light chains (FLCs) and calculating the serum kappa/lambda ratio is a convenient, method for determining monoclonal FLC production in patients with multiple myeloma and acute renal failure [9]. Since multiple myeloma may be a disease that can be diagnosed without characteristic physical examination and laboratory findings, patients should be evaluated for multiple myeloma, while the underlying cause of renal failure is investigated. Patients who do not have albuminuria but have significant proteinuria on 24-hour urine analysis should be examined for plasma cell dyscrasia and bone marrow examination should be performed. Diagnostic evaluation of MM includes extensive history and physical examination, laboratory tests such as proteinuria (in spot and 24 hour urine specimens), peripheral blood smear, erythrocyte sedimentation rate, plasma albumin, globulin, calcium, urea, creatinine levels, serum immunoglobulin levels, serum and urine immunofixation electrophoresis, skeletal radiography and bone marrow aspiration and biopsy. Renal failure is one of the most common complications of MM and occurs in about 20% of patients and in 40-

50% of patients throughout the course of the disease. Multiple myeloma, a plasma dyscrasia, can be diagnosed in the process of investigation of unexplained renal disease that can not be underestimated. Plasma cell dyscrasia is becoming increasingly recognized as a cause of kidney damage. In order to prevent misdiagnosis, adults with unexplained. Acute kidney injury or proteinuria should also be tested for plasma dyscrasia in addition to vasculitis and autoimmune disease serologies. In a patient with renal failure whose etiology is unknown, immunofixation electrophoresis should also be included among the tests to be performed. As with this case, the possibility of underlying multiple myeloma should be considered in the case of acute renal failure and anemia of unknown etiology.

Conflict of interest statement. None declared.

Reference

1. Viswanathan G, Upadhyay A. Assessment of proteinuria. *Adv Chronic Kidney Dis* 2011; 18(4): 243-248.
2. Nowak A, Serra AL. [Assessment of proteinuria]. Praxis (Bern 1994). 2013; 102(13): 797-802. doi: 10.1024/1661-8157/a001340.
3. Roden AC1, Lockington KS, Tostrud LJ, Katzmann JA. Urine protein electrophoresis and immunoelectrophoresis using unconcentrated or minimallyconcentrated urine samples. *Am J Clin Pathol* 2008; 130(1): 141-145.
4. Akar H, Seldin DC, Magnani B, *et al*. Quantitative serum free light chain assay in the diagnostic evaluation of AL amyloidosis. *Amyloid* 2005; 12(4): 210-215.
5. Talbot B, Wright D, Basnayake K. The importance of screening for serum free light chains in suspected cases of multiple myelomaand their impact on the kidney. *BMJ Case Rep* 2014; 2014. pii: bcr2014206688.
6. Herrara GA (ed). The kidney in plasma cell dyscrasias. *Contrib Nephrol Basel Karger* 2007; 153: 25-43.
7. Herrara GA. Renal manifestations of plasma cell dyscrasias: an appraisal from the patients' bed-side to the research laboratory. *Ann Diagn Pathol* 2000; 4: 174-200.
8. Lutfiye Bilge Caliskan, Tugba Karadeniz, Sumeyye Ekmekci, *et al*. A Case of Multiple Myeloma Diagnosed by Renal Biopsy. *BANTAO Journal* 2016; 14(2): 89-91.
9. Hutchison CA, Plant T, Drayson M, *et al*. Serum free light chain measurement aids the diagnosis of myeloma in patients with severe renal failure. *BMC Nephrol* 2008; 9: 11. doi: 10.1186/1471-2369-9-11.