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Renal Impairment in a Patient with Multiple Myeloma: A Case Report

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Abstract

Multiple myeloma (MM) is a type of cancer occurs due to malignant plasma cell that affects with various clinical manifestations including renal impairment, anemia, bone disease and infection. The most common renal presentation of multiple myeloma is myeloma cast nephropathy. We described a case of multiple myeloma along with renal impairment in a 62-year old male patient. His serum B2-Microglobulin was 19.18 mg/L, which is much higher than reference value. His serum creatinine was 2.58 mg/dL. After continuing medication, the patient's renal function was restored. This case is being reported for clinical knowledge dissemination and building clinical insight.

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Introduction

Renal impairment is a worldwide public health problem due to its high costs and poor outcomes. Sudden renal impairment (acute kidney injury) is a type of disorder which is relatively common feature of multiple myeloma (MM) and it should be treated as a medical emergency.[1] Renal diseases in multiple myeloma may responsible for various factors. In minor cases, the renal function can be recovered easily with infusion solution and serum calcium level correction but sometime the condition may become worse such as acute kidney injury and progressive CKD.[2] Due to invention of modern anti-myeloma therapy, the survival rate of myeloma patients with renal impairment has significantly improved.[4] In this case study, we have examined the clinical outcomes of myeloma associated acute renal impairment.

Case Summary

In April 2022, a 62-year old man came to the Department of Nephrology, Community Based Medical College, Bangladesh (CBMC,B) Hospital, presenting with swelling in the body and low back pain (Fig. 1). The patient developed acute renal failure with respiratory distress and the pain was relieved by intact of NSAID drugs. The patient was non-diabetic. We did some renal function tests and found his serum creatinine value 6.15 mg/dl, and ESR 96 min/hour. The patient was anemic. He was admitted into the HDU for body fluid retention and received blood transfusion to correct anemia and Inj. Meropenem Trihydrate 500 mg as long spectrum of antibiotic to combat any infection. After few days of treatment, his condition was slightly improved and discharged. After an interval, the patient was again admitted in the same hospital for better management in June 2022. The clinical manifestations like respiratory distress with leg swelling and acute confession. The clinical manifestation found that

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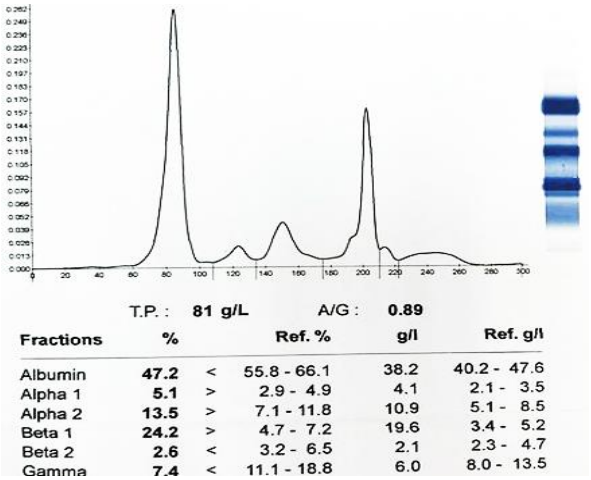
serum creatinine was 2.58 mg/dl and creatinine clearance rate was 6.59 mL/min with was much lower than normal. The B2-Microglobulin level was 19.18 mg/L with is higher than normal. His x-ray of skull P/A view showed multiple small rounded translucent areas of frontal parietal and occipital bones suggestive of small lytic lesion due to MM or hyperparathyroidism. Cardiomegaly and small bilateral pleural effusion fund in his X-ray chest report. His intact PTH level found 5.30 pg/ml, ACR value 135.64mg/g, serum ferritin was >5000 ng/mL, Uric acid level was 7.20 mg/dl. After continuing medication for 1 month, his serum creatinine level decreased to 1.43mg/dl.

Fig. 1: A 62-year old man presented with multiple myeloma and acute kidney injury.

Serum protein electrophoresis report showed a moderate band is present in the alpha 1 globulin region (Fig. 2). This region is not the typical site for monoclonal band. However, immunofixation is required to confirm or rule out whether this band represent a monoclonal band or not. His urine Bence-Jones Protein value was normal in range. His bone marrow examination report shows hypercellular marrow with increased M:E ratio. Erythropoiesis was depressed but normoblastic. Marrow is infiltrated with large number of plasma cells (58%). All these features consistent with immunocyte dyscrasia probably multiple myeloma.



T.P. : 81 g/L A/G : 0.89

Fractions	%		Ref. %	g/l	Ref. g/l
Albumin	47.2	<	55.8 - 66.1	38.2	40.2 - 47.6
Alpha 1	5.1	>	2.9 - 4.9	4.1	2.1 - 3.5
Alpha 2	13.5	>	7.1 - 11.8	10.9	5.1 - 8.5
Beta 1	24.2	>	4.7 - 7.2	19.6	3.4 - 5.2
Beta 2	2.6	<	3.2 - 6.5	2.1	2.3 - 4.7
Gamma	7.4	<	11.1 - 18.8	6.0	8.0 - 13.5

Fig. 2: Serum Protein Electrophoresis report shows moderate band in alfa 1 globulin region.

He was then admitted in the Department of Hematology, Mymensingh Medical College Hospital for further management. His weight was 51 kg and body surface area was 1.49 m^2. The patient was suggested for CyBort-D protocol (28 days cycle). The treatment was started with Bortezamib, Dexamethasone (4mg) and Cyclophosphamide (300mg). Zoledronic acid 4mg also given as supportive therapy. Combination of Sulphamethoxazole + Trimethoprim and Acyclovir 400 mg was also suggested as prophylaxis.

Discussion

The most common manifestations of Multiple myeloma in patients are hypercalcemia, renal impairment, anemia, and bone lesions. Among these symptoms, around 80% of patients with MM experience pathological fracture and 90% will have bone lesions over the course of their

diseases.[5] Kidney diseases in multiple myeloma occur in 20-50% cases during the disease process.[2] Another study in UK showed that nearly a third of deaths occur with kidney injury within 60 days of diagnosis in myeloma patients.[3] Renal impairment in multiple myeloma is caused by the toxic effects of monoclonal free light chains (FLCs). Monoclonal FLCs in normal amount can be easily filtered at the glomerulus, endocytosed by proximal tubule cells, and catabolized inside the kidney. In MM, monoclonal FLCs can reach concentrations that exceed the absorptive and catabolic capacities of the proximal tubule cells and later causes intense inflammation that leads to fibrosis.[6] Anemia is the most common manifestation of MM.

The widely approved initial therapy for MM is CyBorD protocol. In this treatment protocol, bortezomib, cyclophosphamide, dexamethasone, were used.[7] Here, cyclophosphamide is a chemotherapeutic agent. Dexamethasone use in chemotherapy is to reduce light chain load in patients with MM and AKI.[8] Bortezomib as Proteasome Inhibitors shows proven efficacy in newly diagnosed MM and in relapsed or refractory MM.[10]

Several studies showed that, a significant renal impairment is found in about 75% of patients of MM and 25% patients develops renal failure later during MM. There is still a high mortality rate (30%) in MM associated renal diseases whether the survival rate have been increased in last two decades.[9] Some newer classes of agents also emerged to treat MM with RI patients including antibodies like elotuzumab, daratumumab etc. and histone deacetylase inhibitors. All these shown great promise in some studies.[11] Extensive research should be done to stratify the overall management of the patient in near future.

Conclusion

Renal impairment is a common manifestation of symptomatic MM and cause major complications in clinical management. The management of MM patients with renal impairment is likely to be challenging. Novel invention for serum FLC removal has altered the treatment approach in this type of cases. FLC removal with a combination of chemotherapy may lead immediate decrease in serum FLC concentrations and improve AKI complication in MM. The use of agents importantly bortezomib, improves the overall survival of MM patients with RI. Further scientific research is needed to improve the overall situation regarding MM with renal diseases.

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