e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(6); 01-05

Original Research Article

Spectrum Of Plasma Cell Dyscrasias: A Clinicopathological Study In A Tertiary Care Hospital

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Received: 25-03-2024 / Revised: 23-04-2024 / Accepted: 26-05-2024
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Conflict of interest: Nil

Abstract:

Background: Plasma Cell Dyscrasias (PCD) by definition include a wide range of disorders represented by excessive proliferation of a single clone of plasma cells producing entire immunoglobulins, immunoglobulin fragments, heavy chains or light chains.

Materials and Methods: This study was carried out in a tertiary care Hospital (AGMC & GBP Hospital) prospectively for a period of three years from June 2020 to June 2023. All the cases diagnosed with PCD were selected. Data from hematological, biochemical, and radiological investigations were collected. For evaluation of each case of multiple myeloma, revised International Myeloma Working Group criteria were applied.

Results: 25 patients were diagnosed during the study period, with the majority of them in the 6th decade. The male to female ratio was 3.2:1. Most common clinical feature was fever (52%), bone pains (44%), and generalized weakness (44%). Anemia was the most common hematological manifestation. All the patients had 'M band' on serum electrophoresis, and 31.81% of patients had urinary Bence Jones proteins.

Conclusion: PCD are rare group of disorders, the diagnosis of which requires a systematic approach. Out of total 25 cases of PCD, many of them could not be diagnosed clinically or radiologically, but exclusively diagnosed based on cytological, haematological and histopathological examination (HPE).This demonstrates the challenge in the clinical diagnosis of the condition and stress upon the importance of tissue/hematological diagnosis.

Keywords: Plasma Cell Dyscrasias, Multiple Myeloma.

Introduction

Plasma cell dyscrasias (PCD) include a wide spectrum of disorders characterized by malignant proliferation of monoclonal population of plasma cells; which may or may not be accompanied by secretion of detectable levels of monoclonal immunoglobulins or paraproteins commonly referred to as M protein. This broad spectrum of PCD include Monoclonal gammopathy of undetermined significance (MGUS); asymptomatic/ symptomatic Multiple Myeloma; Solitary Plasmacytoma of Bone; Extramedullary Plasmacytoma; Waldenstrom's Macroglobulinaemia (WM); Primary Amyloidosis and Heavy chain Disease.[1]

Multiple myeloma is a clonal malignant neoplasm of plasma cells originating in the bone marrow along with the presence of monoclonal immunoglobulin in the blood and/or urine associated with end-organ damage. It accounts for 1% of all malignant tumors, 10-15% of all hematologic malignancies, and 20% of deaths from haematological malignancies.[2] Multiple myeloma is a disease of the elderly, with a peak age of 60-70 years at presentation. It is more common in males when compared to females. There is marked variability in the clinical features seen in patients with multiple myeloma from healthy patients to those presenting with generalized weakness, bone pains, fever, infections, anemia. In some patients, complications like renal failure, pathological fractures, and lytic bone lesions may lead to significant morbidity and mortality.

Aim: Aim of the study is to find out the clinicopathological spectrum of plasma cell dyscrasias in our tertiary care hospital.

Objectives

1. To determine frequency distribution of various plasma cell dyscrasias.
2. To estimate the clinicopathological manifestations in patients with plasma cell dyscrasias.

Materials and Methods

The present study was done prospectively (cross sectional study) in 25 patients of PCD diagnosed over a period of 3 years from June 2020 to June 2023 in our teaching hospital. A detailed history was taken and clinical examination was performed. Hematological investigations like Hemoglobin estimation (Hb), total count, platelet count, Erythrocyte sedimentation rate (ESR), peripheral blood smear, and bone marrow examination were done. Serum protein electrophoresis reports were evaluated and urine was examined for Bence Jones Proteinuria. Serum calcium and serum creatinine levels were evaluated. Radiological investigations included X-ray, imaging studies like magnetic resonance imaging. Revised International Myeloma Working Group criteria were applied for evaluation of multiple myeloma patients. As per the revised International Myeloma Working Group criteria, the diagnosis of multiple myeloma requires the presence of one or more myeloma defining events in addition to evidence of 10% or more clonal plasma cells on bone marrow examination or biopsy-proven plasmacytoma. Myeloma defining events consist of established CRAB features (hypercalcemia, renal failure, anemia, or lytic bone lesions) as well as three specific biomarkers: clonal bone marrow plasma cells>-60%, serum-free light chain ratio-100 and more than one focal lesion on magnetic resonance imaging (MRI).[3]

Inclusion Criteria: All the patients diagnosed with plasma cell dyscrasias were included in the study.

Exclusion Criteria: Cases with clinical relapse and residual disease post treatment were excluded.

Result:

Table 1: Frequency distribution of various plasma cell dyscrasia diagnosed in our study period

Diagnosis	Male(19)	Female(6)	Total
Multiple myeloma	16(73%)	6(27%)	22
Plasma cell leukaemia	2(100%)	0(0%)	02
Solitary Plasmacytoma	1(100%)	0(0%)	01

Out of 25 patients, 19 were males (76%) and 6 were female (24%) with male preponderance, as shown in Table 1.

Table 2: Age wise distribution of patients diagnosed as plasma cell dyscrasias in our study period

Age group (in years)	Male(19)	Female(6)
<50	0	0
51– 60	2(10.52%)	0
61–70	13(68.42%)	5(83.33%)
>70	4(21.05%)	1(16.67%)

The sixth decade was the most common age group at presentation with a range of 61–70 years in both the genders as shown in Table 2.

Table 3: Clinico–haematological manifestation

Manifestation	No of patients	Percentage
Anaemia	18	72%
Fever	13	52%
Generalised weakness	11	44%
Bone pain	11	44%
Renal impairment	09	36%

Common clinical presentations were fever (52%), bone pains (44%), and generalized weakness (44%), as shown in Table 3. Hematological features were anemia in 18 patients (72%). The mean haemoglobin concentration was 7.5 gm/dl with a range of 4.2-13.5 gm/dl. ESR was elevated in 09 patients (40.9%) and Rouleaux formation was observed in 13 patients (59.09%) of multiple myeloma.

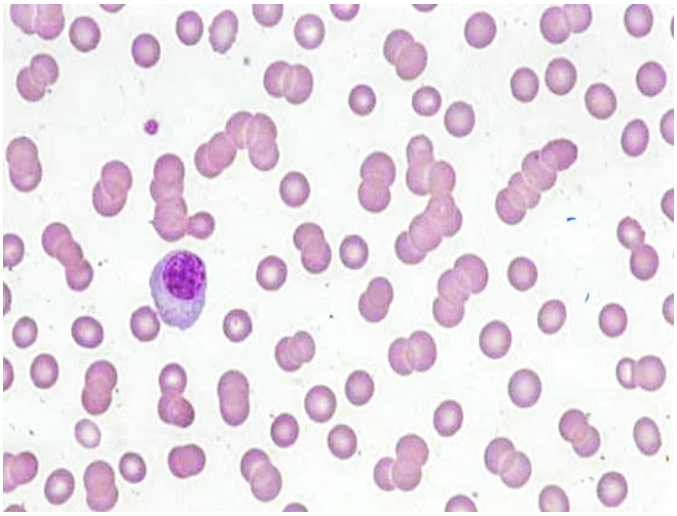

Figure 1: Rouleaux formation

Table 4: Investigation in multiple myeloma (MM) patients

Investigation	Result(No. of patients)	Percentage
S. Creatinine	>2 mg/dl (15)	68.18%
S. Calcium	>12 mg/dl (13)	59.09%
ESR	Raised (9)	40.9%
Peripheral Smear	Rouleaux formation (13)	59.09%
Serum Electrophoresis	M band in gamma region (22)	100%
Urine Bence Jones protein	Positive (7)	31.81%

Serum creatinine of more than 2 mg/dl was seen in 15 patients (68.18%) at presentation and hypercalcemia was observed in 13 patients (59.09%) of multiple myeloma. All patients of MM had the presence of M band in the gamma region on serum electrophoresis. 31.81% of patients had urinary Bence Jones protein -positive as shown in Table 4. Spine followed by ribs was the most frequent site of involvement.

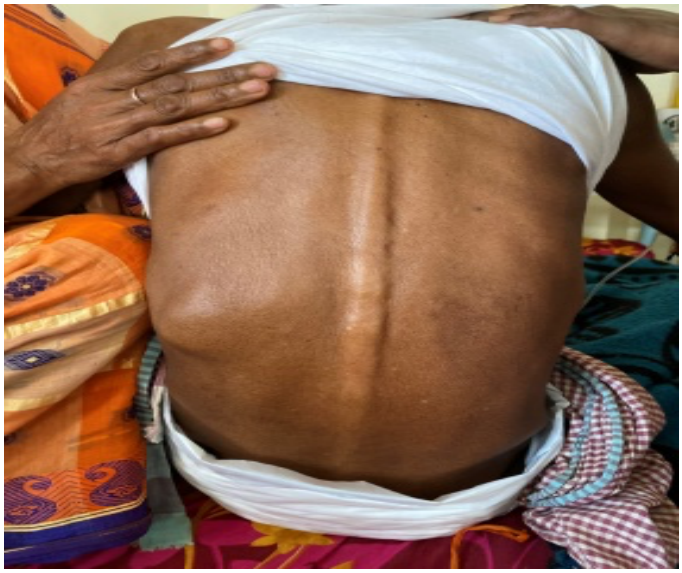

Figure 2: Rib lesion in a patient of multiple myeloma

We got 2 cases of plasma cell leukaemia (PCL) and one case of solitary plasmacytoma of bone. In both the cases of PCL, Hb% and platelet count were low and total leucocyte count was very high. Differential count showed around 90% plasma cells with plasmablast in both cases. Nucleated RBCs were present. Bone marrow aspiration study showed trilineage suppression with around 95% plasma cells in varying degree of maturation along with few plasmablastic and multinucleated forms.

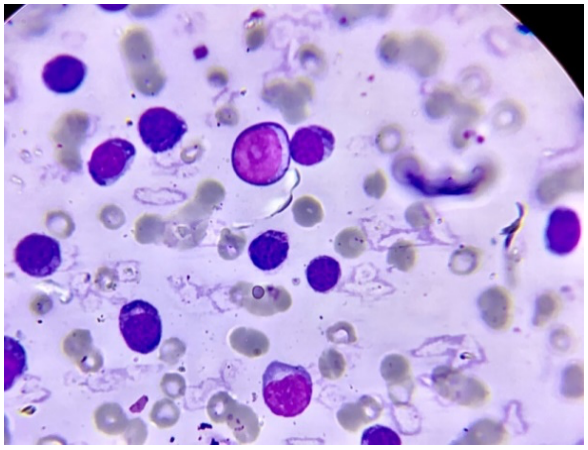

Figure 3: A case of Plasma cell leukemia

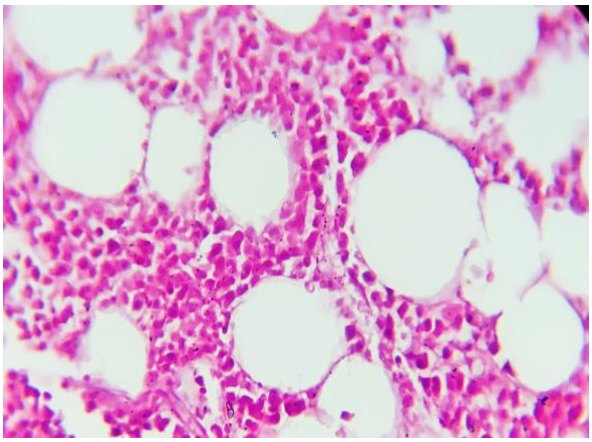

Figure 4: Biopsy proven solitary plasmacytoma of bone (40X)

Discussion

Plasma cell Dyscrasias (PCD) are a heterogenous group of disorders in which there is expansion of clonal plasma cells which may produce monoclonal immunoglobulins. PCD's include Asymptomatic/symptomatic Multiple Myeloma; Monoclonal gammopathy of undetermined significance (MGUS); Solitary Plasmacytoma of Bone [8]; Extramedullary Plasmacytoma; Waldenstrom's Macroglobulinaemia (WM); Primary Amyloidosis and Heavy chain disease.

In our prospective study covering a period of three years, we came across majority cases of Multiple Myeloma (22), Plasma cell leukaemia (2) and 1 case of solitary plasmacytoma of bone. The diagnosis of MM was made based on International Myeloma working group criteria.

Multiple Myeloma is hematological malignancy usually presenting in elderly age group above 60 years and usually associated with an M protein in serum and urine or either one and evidence of organ damage related to the plasma cell neoplasm. The various etiologic factors include occupational radiation exposure, metal industries and benzene exposure**.** The age group included in our study ranged from 50 to 70 years, with a mean age of 60 years. The commonest age group at presentation was the 6th decade, which is similar to studies done by Diwan et al. [4] and Sheik N et al.[5]

The majority of the patients in our study were males with a Male to Female ratio of 3.2:1. Similarly, Sheik N et al [5] and Sagale et al [6] found that multiple myeloma is more common in males. This finding is in discordance with a study done by Vahini et al., which showed female preponderance.[7]

The most common clinical manifestation at the time of presentation was fever (52%), bone pains (44%), and generalized weakness (44%), in our study. This finding is similar to study done by Sheik N et al [5] and in discordance with other studies where bone pains are the most common clinical manifestation.[4,7] The majority of the patients were anemic (72%) showing similarity with other studies.[5] The proposed mechanism of anemia in most is inadequate red blood cell production due to either erythropoietin deficiency from the accompanying renal failure or replacement of the marrow by myeloma cells.

Renal impairment was present in 36% of cases in our study. The incidence of renal involvement is slightly higher in study conducted by Kyle et al.

who have found an incidence of 55%. Hypercalcemia was found in 59.09% patients of MM in our study, which is comparable to the study done by Vahini et al [7] and Irisawa H et al.[9] Comparable to the study done by Diwan et al. and Sheik N et al [4,5], 31.81% of patients in our study had urinary Bence Jones protein–positive. In our study, all cases demonstrated M band on serum electrophoresis in the gamma region similar to the study done by Vahini et al [7,10].

Conclusion

Out of total 25 cases of plasma cell Dyscrasias, many of them could not be diagnosed clinically or radiologically, but exclusively diagnosed based on cytological, haematological and histopathological examination (HPE). This demonstrates the challenge in the clinical diagnosis of the condition and stress upon the importance of tissue/hematological diagnosis.

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