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Comparative Study of Hematological Parameters in Myeloproliferative Syndromes

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Abstract:

- ***Introduction***

Myeloproliferative syndromes, including conditions such as chronic myelogenous leukemia, essential thrombocythemia, polycythemia vera, and primary myelofibrosis, are characterized by the excessive production of stem cells in the bone marrow. This study aims to describe the epidemiological and cytological profile of these syndromes at the Mohammed V Military Instruction Hospital in Rabat. Materials and Methods: The study, conducted over one year, was observational, cross-sectional, descriptive, and analytical. Data were collected from the hematology laboratory registers, and statistical analysis was performed using IBM SPSS Statistics 19 and Microsoft Excel 2019.

- ***Results***

Fourteen suspected cases of myeloproliferative syndrome were identified, with a male predominance (69.2%) and an average age of 57.75 years for CML, 61.75 years for PMF, 73 years for PV, and 81 years for ET. The main presentations included leukocytosis for CML, thrombocytosis for PV, and multilineage dysplasia for PMF.

- ***Conclusion***

Our study at HMIMV Rabat highlights the importance of a multidisciplinary approach to myeloproliferative syndromes. Advanced hematological and cytological analysis methods were crucial for confirming the diagnosis and guiding treatment.

Keywords*: Myeloproliferative Syndromes, Hematopathy, Diagnosis.*

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I. INTRODUCTION

The myeloproliferative syndromes (MPS) (also called myeloproliferative neoplasms (MPN) – WHO) are a group of rare and potentially lethal conditions resulting from excessive production of stem cells within the bone marrow, leading to an imbalance in hematopoiesis. The World Health Organization (WHO) classifies MPS based on the presence of the BCR-ABL1 fusion gene mutation (Figure 1) [1], They encompass four main conditions: Chronic Myeloid Leukemia (CML), Essential Thrombocythemia (ET), Polycythemia Vera (PV), and Primary Myelofibrosis (PMF) [2]. The objective of our study is to establish the epidemiological and cytological profile of the main conditions of myeloproliferative syndromes at the Mohammed V Military Instruction Hospital (HMIMV) in Rabat.

II. MATERIALS AND METHODS

The study conducted at the Hematology and Immunohematology Laboratory of the Mohammed V Military Instruction Hospital (HMIMV) in Rabat over a one-year period (from April 2023 to April 2024) was observational, cross-sectional, descriptive, and analytical, based on a case series. The study population consisted of men and women suspected of having a myeloproliferative syndrome (MPS). Inclusion criteria included patients newly suspected of having an MPS. In our study, we included patients hospitalized in the clinical hematology department of HMIMV Rabat. Data were collected from the laboratory

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registers and subjected to statistical analysis using IBM SPSS Statistics 19 and Microsoft Excel 2019.

III. RESULTS

Fourteen cases suspected of myeloproliferative syndrome were recorded, with a gender distribution of 69.2% men and 28.6% women. The sample includes a majority of men, with a male-to-female ratio of 2.5, including eight cases (57%) of Chronic Myeloid Leukemia (CML), four cases (29%) of Primary Myelofibrosis (PMF), one case (7%) of Polycythemia Vera (PV), and one case (7%) of Essential Thrombocythemia (ET). The average ages were 57.75 ± 16 years, 61.75 ± 7 years, 73 years, and 81 years, respectively, with a clear male predominance (Figure 2)

The types of anemia in our sample are distributed as follows: non-regenerative normocytic normochromic anemia is the most frequent, accounting for approximately 35.71% of cases. This is followed by regenerative normocytic normochromic anemia, with a frequency of 28.57%. Microcytic anemias, whether hypochromic or normochromic, are less common, each representing 7.14% of cases. Finally, the absence of anemia is observed in 21.43% of cases (see Table I)

For patients suspected of having Chronic Myeloid Leukemia (CML), significant leukocytosis was observed, with an average of 100.19 Giga/L of white blood cells (WBC). The average platelet count was also elevated (431.08 Giga/L). Blood smears (BS) showed a significant presence of myelocytes at various stages of maturation. Additionally, bone marrow smears (BMS) revealed hyperplasia of the granulocytic lineage, with the presence of cells at all stages of maturation.

In contrast, patients suspected of having Primary Myelofibrosis (PMF) showed less pronounced leukocytosis, with an average of 6.20 Giga/L of WBC, and moderate thrombocytosis, with an average platelet count of 131.50 Giga/L. BMS also revealed multilineage dysplasia.

For the patient suspected of having Polycythemia Vera (PV), normal WBC values and moderate thrombocytosis (409.00 Giga/L) were observed, with no significant abnormalities in the maturation stages of granulocytic cells, suggesting the absence of major disturbance in the granulocytic lineage.

Finally, in the case of Essential Thrombocythemia (ET), significant thrombocytosis (557.00 Giga/L) was observed, with no notable presence of abnormalities in the other cell lines.

IV. DISCUSSION

Myeloproliferative syndromes are rare but significant forms of chronic hematologic malignancies, representing a notable proportion of leukemias in adults. According to epidemiological data, Chronic Myeloid Leukemia (CML) is the most common form among these syndromes [3]. According to the results of our study, CML stands out as the most frequent myeloproliferative syndrome, representing 57% of the cases studied. This prevalence is consistent with previous findings by Chakour et al., who reported a high incidence of CML among hematologic malignancies studied over a six-year period (2002-2007), with 44 cases identified. In contrast, Polycythemia Vera (PV) was observed in four patients, while Primary Myelofibrosis (PMF) was diagnosed in two individuals. The average age of patients varied significantly according to the type of syndrome, with average ages of 42 years for CML, 56 years for PV, and 43 years for PMF. A clear male predominance was apparent in all groups, with specific sex ratios of 3.2 [4].

In our study, we identified fourteen suspected cases of myeloproliferative syndrome, with a clear predominance in men (69.2% versus 28.6% in women) and a male-to-female ratio of 2.5. Among these cases, 57% were diagnosed with Chronic Myeloid Leukemia (CML), 29% with Primary Myelofibrosis (PMF), 7% with Polycythemia Vera (PV), and 7% with Essential Thrombocythemia (ET). The respective average ages for these syndromes were 57.75 ± 16 years for CML, 61.75 ± 7 years for PMF, 73 years for PV, and 81 years for ET. These results highlight significant differences in sex distribution and the average age of patients with myeloproliferative syndromes.

The study period and sample size may influence these results, as evidenced by the observed differences in sex distribution and the average age of patients according to the type of syndrome. The higher prevalence of CML in men and the advanced age of patients diagnosed with PV and ET emphasize the importance of considering these factors when evaluating and clinically managing these conditions. These findings suggest the need for further studies to better understand the impact of demographic variables on the presentation and progression of myeloproliferative syndromes.

The types of anemia identified in our study show similarities with those reported previously, although we observed a notable proportion of patients without anemia, which may indicate a diversity in the hematological manifestations of myeloproliferative syndromes. For Chronic Myeloid Leukemia (CML), we observed marked leukocytosis, with an average of 100.19 Giga/L of white blood cells, and elevated thrombocytosis (431.08 Giga/L), which aligns with previous findings of persistent leukocytosis and thrombocytosis in some patients. The blood smears showing myelocytes at various stages of maturation also correspond to the characteristics described in the previous study [5].

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Regarding Polycythemia Vera (PV), our result indicating normal white blood cell values and moderate thrombocytosis (409.00 Giga/L) is consistent with the absence of leukocytosis and major disturbances in the granulocytic lineage observed in the previous study for this syndrome.

For Primary Myelofibrosis (PMF), we noted less pronounced leukocytosis (6.20 Giga/L) and moderate thrombocytosis (131.50 Giga/L), along with the presence of multilineage dysplasia in the blood smears.

In summary, our findings, which corroborate previous data, enhance the clinical understanding of myeloproliferative syndromes, emphasizing the importance of a differentiated approach based on the specific characteristics of each pathology for appropriate diagnosis and clinical management.

V. CONCLUSION

In conclusion, our study on myeloproliferative syndromes conducted at HMIMV Rabat highlights the crucial importance of a multidisciplinary approach for these rare and potentially serious conditions. Our results emphasize the predominance of Chronic Myeloid Leukemia (CML) among the cases studied, as well as significant differences in sex distribution and the average age of patients depending on the type of syndrome. The hematological and cytological characteristics observed confirm the utility of advanced diagnostic methods for accurate identification and appropriate therapeutic management of these diseases. These findings underscore the need for continuous vigilance and further studies to better understand and improve the management of myeloproliferative syndromes in a clinical setting.

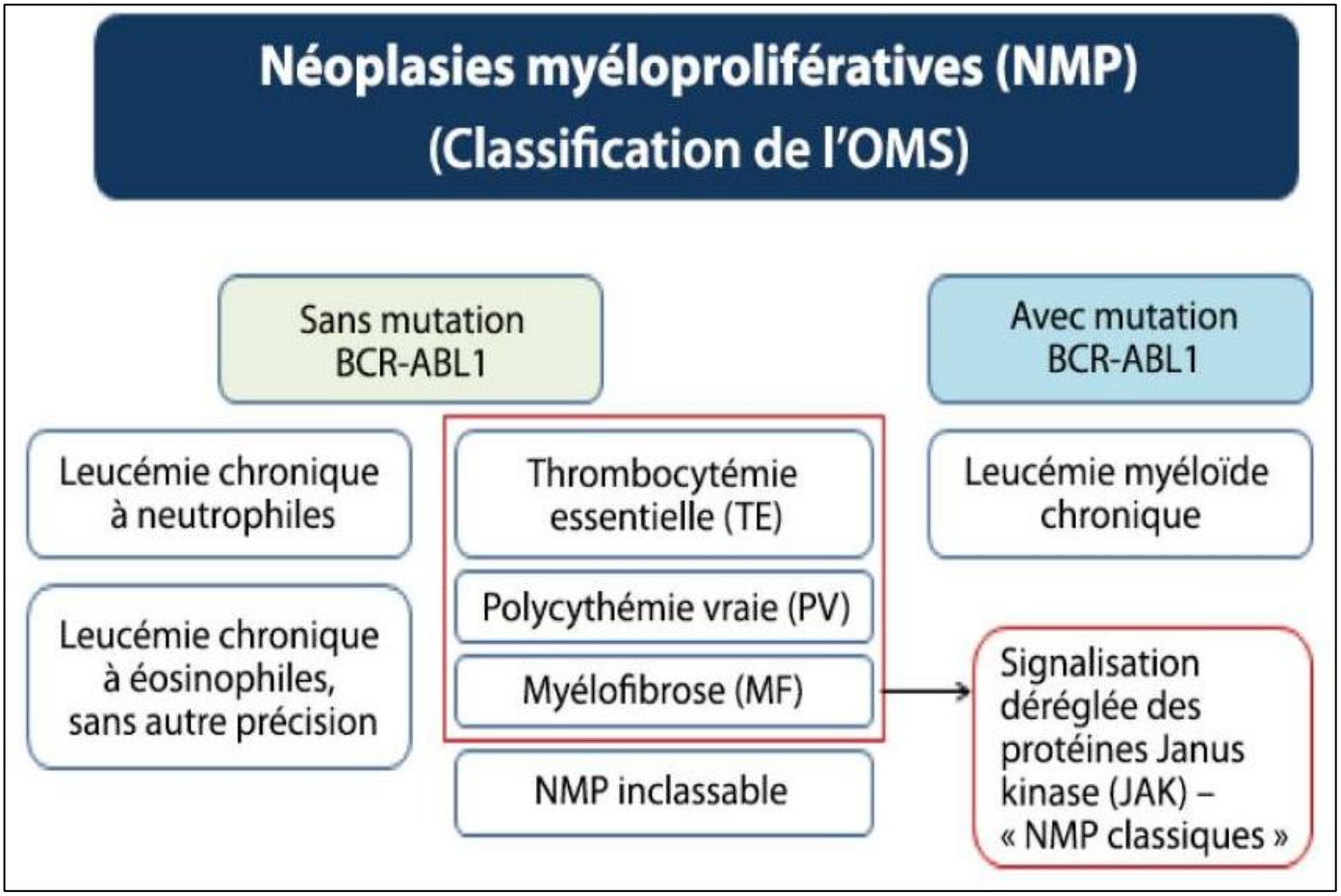

Fig 1: Classification of Myeloproliferative Syndromes according to the WHO [1]

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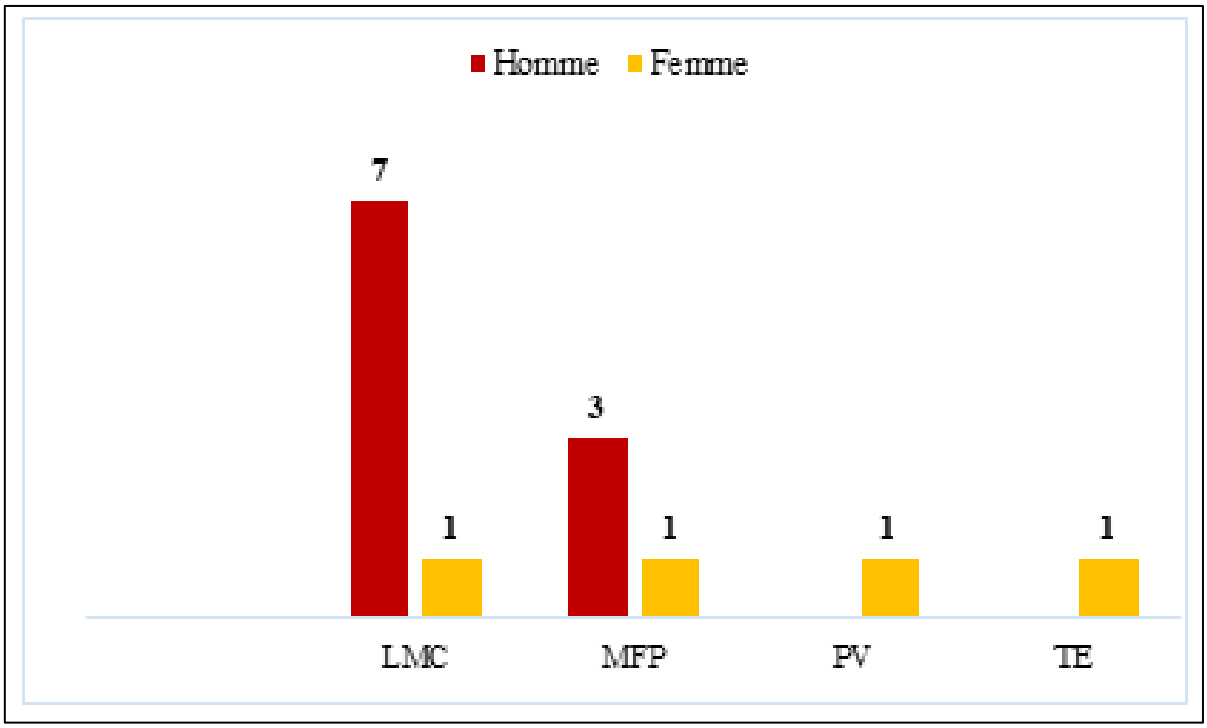

Fig 2 : Distribution of the Sample According to Sex and the Affected Pathology

Table I: Profile of Anemia Cases: Variations and Percentages

Type of Anemia	Identified cases	Percentage
Normocytic normochromic arhegenerative	4 CML 1 ET	≈ 35,71%
Normocytic normochromic regenerative	1 CML 3 PMF	≈ 28,57%
Microcytic hypochromic arhegenerative	CML	≈ 7,14%
Microcytic normochromic regenerative	PMF	≈ 7,14%
Absence of anemia	2 CML 1 PV	≈ 21,43%

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