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Research Article

Myelodysplastic Syndromes: Experience of the Hematology and Immuno-hematology Laboratory at Mohamed V Military Teaching Hospital in Rabat over a 5-Year Period (January 2018 – December 2022)

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Abstract

Myelodysplastic syndromes (MDS) are clonal hematologic disorders characterized by cytopenias, bone marrow dysplasia, and a risk of transformation into acute myeloid leukemia. This five-year retrospective study at Mohammed V Military Teaching Hospital (2018–2022) analyzed 46 confirmed MDS cases to assess their clinical, biological, and prognostic profiles. The mean patient age was 66 years, with a slight female predominance. Anemia was the most frequent clinical presentation (89%), often associated with hemorrhagic (56%) and infectious syndromes (24%). Hematological analysis revealed predominantly normocytic or macrocytic, non-regenerative anemia, thrombocytopenia in 56%, and neutropenia in 26% of patients. Dysplasia affected multiple lineages in most cases, and ring sideroblasts were observed in 22%. According to the WHO 2016 classification, 41% of cases were MDS with excess blasts (EB), 19% had ring sideroblasts, and 11% transformed into acute leukemia. Cytogenetic analysis was normal in all interpretable cases, though 20% were non-evaluable due to technical issues. Using the IPSS score, most patients were classified as low to intermediate risk. Transformation to AML occurred in 11% of cases, mainly from MDS-EB subtypes. The findings underscore the variability of MDS presentation and highlight diagnostic delays and the need for better molecular characterization. This study confirms known MDS patterns while revealing local particularities, including a younger patient subset and a high rate of advanced disease at diagnosis. These insights support the necessity for improved diagnostic strategies, multidisciplinary awareness, and integration of molecular tools to enhance prognosis and personalize therapy.

Keywords: Myelodysplasia; Hematology; Blood count; Bone Marrow; Leukemia

Introduction

The term *dysplasia*, meaning "abnormal formation" in Ancient Greek, has long referred to abnormalities in the development of tissues and organs. In 1982, the FAB group introduced the term *myelodysplasia* to describe abnormalities of myeloid cells in pre-leukemic states, known as Myelodysplastic Syndromes (MDS). In 2001, the WHO revised this classification to incorporate morphological and genetic data, with the most recent update published in 2022.

MDS are heterogeneous hematologic disorders that predominantly affect individuals over 60 years of age. They are often underdiagnosed, with a slow progression, persistent cytopenias, and a risk of transformation into acute leukemia. Diagnosis is based on complete blood count and bone marrow examination. Most cases are primary, but secondary forms (post-chemotherapy, radiotherapy, etc.) are on the rise.

Due to the aging population, MDS are attracting growing research interest. The retrospective study conducted at Mohamed V Military Hospital (2018–2022) aims to analyze the characteristics of MDS, assess their management within the hospital, and identify prognostic factors influencing patient outcomes.

Materials and Methods

This retrospective, descriptive, and analytical study was conducted at the Hematology and Immuno-hematology Laboratory of the Mohammed V Military Teaching Hospital in Rabat over a five-year period (January 2018 – December 2022). It included 46 patients diagnosed with Myelodysplastic Syndrome (MDS), confirmed through clinico-cytological correlation.

Diagnostic investigations included complete blood count (CBC), bone marrow aspiration (myelogram), and bone marrow karyotyping, which allowed classification of patients according to the IPSS prognostic score (low, intermediate, or high risk), serving as the basis for therapeutic management.

The collected data concerned: age, sex, admitting department,

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CBC parameters (anemia, leukocyte count, neutropenia, hyperleukocytosis, platelets), blood smear abnormalities (blasts), myelogram findings, and progression to acute leukemia.

Statistical analysis was performed using Excel and EpiInfo 06. A descriptive analysis of epidemiological, biological, and cytological data was carried out, with calculation of means, standard deviations, minimum and maximum values, as well as percentages. A univariate analysis then compared groups according to age, type of MDS (WHO classification), and leukemic transformation, using Chi², Student's *t*-test, and ANOVA depending on the variables.

Results

Epidemiological Data

A. Age of Patients:

This retrospective study included 46 patients with MDS. The mean age was 66 years [26–88]. One-third (32%) of patients were younger than 60 years, while two-thirds were older than 60 years (Figure 1).

B. Patient Sex:

There was a slight female predominance with 25 women and 21 men. The female-to-male sex ratio was 1.1 (Figure 2).

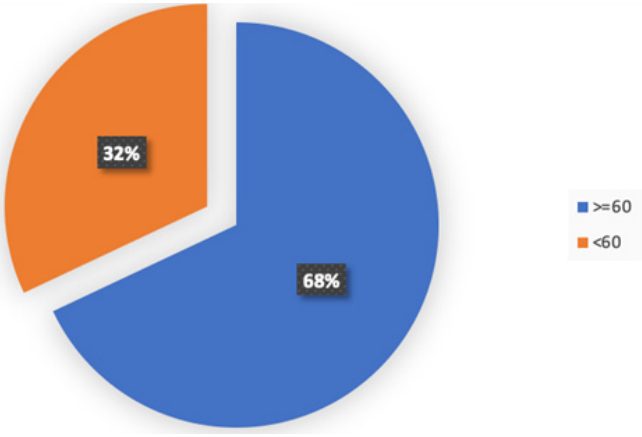

Figure 1: Distribution of patients according to age.

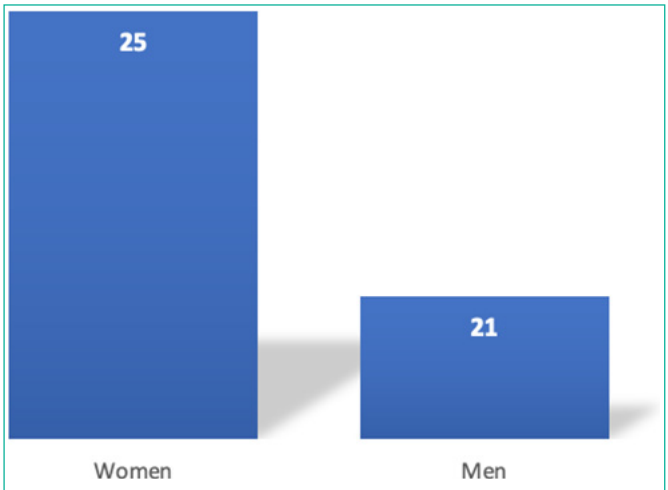

Figure 2: Distribution of patients according to sex.

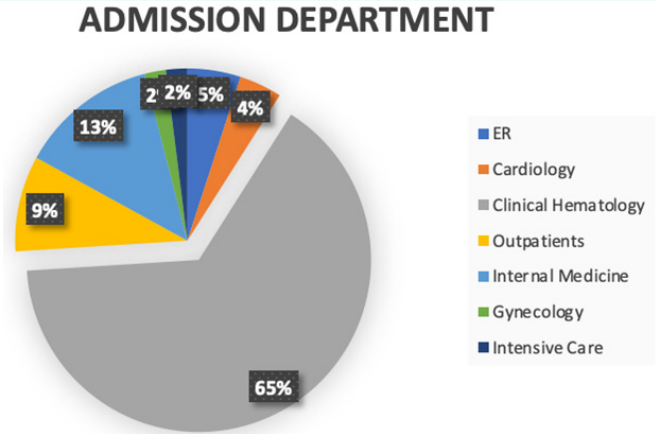

Figure 3: Distribution according to admission department.

C. Admission Department:

Two-thirds of the patients (65%) were hospitalized in the Clinical Hematology Department, 13% in Internal Medicine, 8% were diagnosed incidentally during outpatient consultations, and the remainder were admitted to other clinical departments (emergency medicine, cardiology, gynecology, and intensive care) (Figure 3).

Clinical Data

A. Clinical Manifestations :

The main clinical manifestations were:

- Anemic syndrome in 89% of cases (n=41)
- Hemorrhagic syndrome in 56% of cases (n=25)
- Infectious syndrome in 24% of cases (n=11)

None of the patients presented with tumoral syndrome (hepatosplenomegaly, lymphadenopathy) or dysimmune manifestations.

1. **Anemic Syndrome:**

Eighty-nine percent of patients (n=41) had anemic syndrome, characterized by asthenia, pallor of the skin and mucous membranes, and exertional dyspnea.

2. **Infectious Syndrome:**

Twenty-four percent of patients (n=11) developed infectious syndrome (pulmonary, ENT, urinary, or undetermined focus), with a mean neutrophil count of $15.53 \times 10^3/mm^3$.

3. **Hemorrhagic Syndrome:**

Fifty-six percent of patients (n=25) presented with hemorrhagic manifestations such as mild epistaxis and gingival bleeding, and purpura without signs of severity.

4. **Tumoral Syndrome:**

None of the patients showed evidence of tumoral syndrome (hepatosplenomegaly, lymphadenopathy).

5. **Dysimmune Manifestations:**

Dysimmune manifestations were not observed in any of the patients.

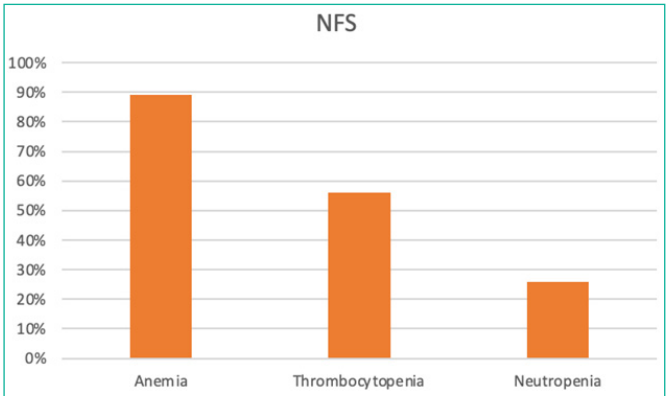

Figure 4: Blood count abnormalities.

Biological Data

A. Complete Blood Count (CBC):

In our cohort, 89% of patients (n=41) presented with anemia, with a mean hemoglobin level of 7.5 g/dL [2.3–14.8]. Anemia was non-regenerative in all patients (n=41), normocytic in 72% (n=30), and macrocytic in 23% (n=11). Thrombocytopenia was found in 56% of patients (n=25). Thirty percent (n=14) had a normal platelet count, while 52% (n=20) had a platelet count below 100,000/mm^3, with a mean of 49,619/mm^3 [15,000–98,000/mm^3].

Neutropenia was present in 26% of patients (n=12), with a mean neutrophil count of 0.74 × 10^3/mm^3, showing a slight female predominance (61%). Four patients had agranulocytosis (neutrophil count < 0.5 × 10^3/mm^3) (Figure 4).

B. Peripheral Blood Smear:

A peripheral smear was performed in all patients. No cases of myelemia were observed. Signs of dysgranulopoiesis and dysplasia were present in 43% (n=20). Circulating blasts were detected in two patients (3% and 4%, respectively). No circulating plasma cells were identified (Figure 5).

C. Bone Marrow Examination:

Bone marrow aspiration was performed in all patients and confirmed the diagnosis of MDS.

- Marrow cellularity was very high in 63% of patients (n=29), high in 28% (n=13), slightly diluted in 4%, and diluted in 4% (Figure 6).

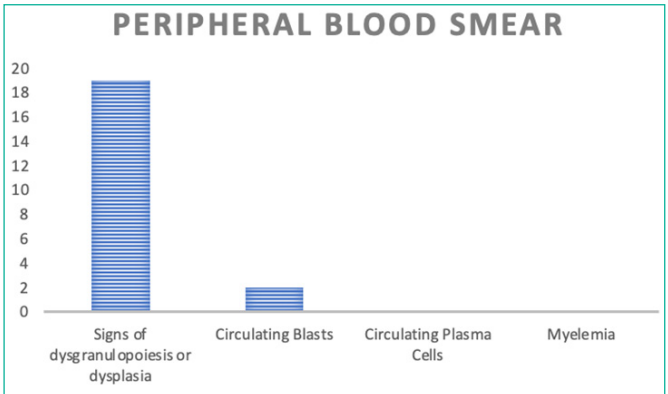

Figure 5: Peripheral blood smear abnormalities.

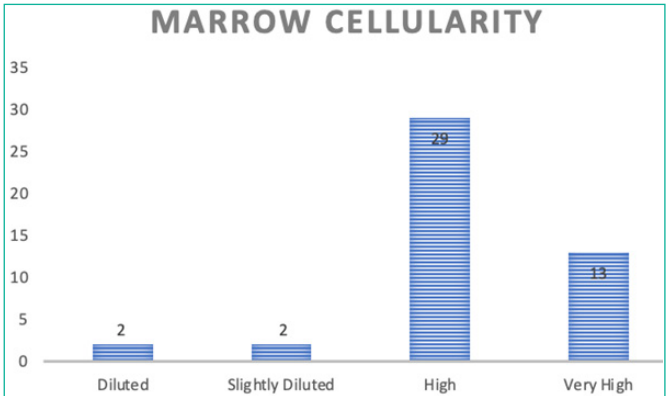

Figure 6: Bone marrow cellularity.

- Bone marrow blasts were present in 95% (n=44), with a mean value of 8.7% [1–25].

- Morphological abnormalities were present in all patients, affecting multiple lineages: dysgranulopoiesis in all patients, dysmegakaryopoiesis and dyserythropoiesis in 89% (n=41) (Figure 7).

- Perls' staining revealed ring sideroblasts in 21.7% of patients (n=10), with a mean rate of 44.1% [6–87].

- Bone marrow plasmocytosis was observed in 50% of patients, consisting of dystrophic elements ranging from 1% to 7%, with a mean of 3.6%.

- Megakaryocyte cellularity was normal in 52.4% (n=11), increased in one-third (n=7), reduced in 9.5% (n=2), and absent in one patient.

2016 WHO Classification

According to the 2016 WHO classification:

- 18% (n=8) had MDS with multilineage dysplasia.

- 19% (n=9) had MDS with ring sideroblasts, all of which showed multilineage dysplasia.

- 41% (n=16) had MDS with excess blasts (MDS-EB), including 26% MDS-EB1 (5–9% marrow blasts; n=12) and 15% MDS-EB2 (10–19% marrow blasts; n=7).

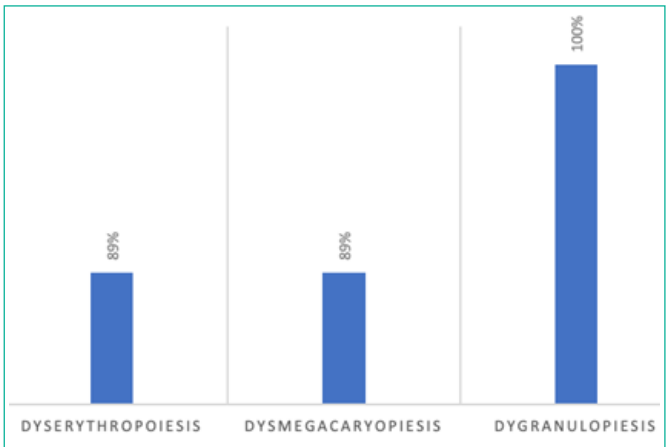

Figure 7: Different lineages morophological abnormalities.

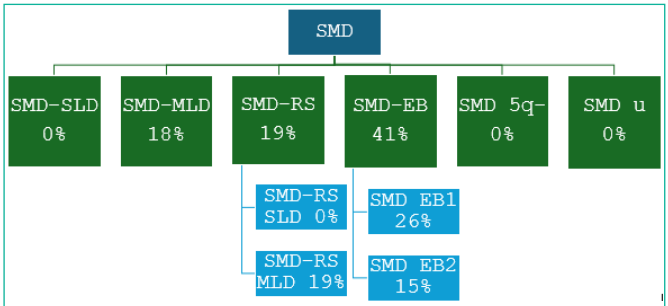

Figure 8: Distribution of patients according to WHO 2016 Classification.

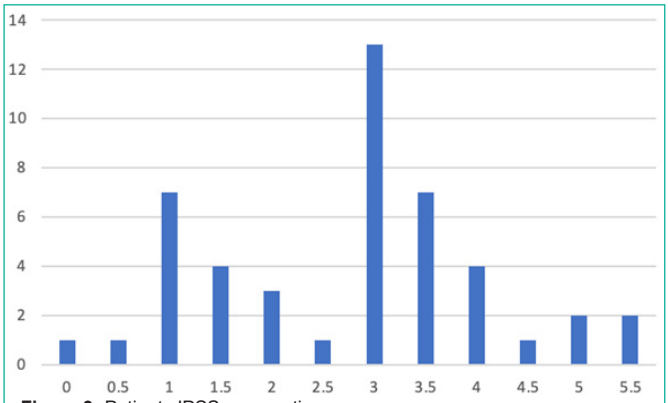

Figure 9: Patients IPSS prognostic scores.

- 11% (n=5) had an overlap MDS/MPN syndrome.
- 11% (n=5) experienced transformation into acute myeloid leukemia (AML) (Figure 8).

No cases of MDS with single-lineage dysplasia or isolated del(5q) were identified.

Cytogenetic Data

Cytogenetic studies were performed in 80% of patients. Bone marrow karyotype was normal in all analyzed cases. In 20% of patients, culture was technically difficult.

IPSS Prognostic Score

The IPSS score ranged between 0 and 1.5 in 13 patients, classifying 28% as very low-risk MDS. It was between 2 and 3 in 37% of cases (n=17), corresponding to low-risk MDS; between 3.5 and 4.5 in 12 patients (26%), classified as intermediate risk; and between 5 and 6 in 4 patients, corresponding to high-risk MDS. No patients had very high-risk MDS (score >6) (Figure 9). For patients without available cytogenetics, the IPSS score was estimated based on cytopenia count and blast percentage. In patients with intermediate or high scores, the absence of cytogenetic data did not influence the risk classification.

Transformation to Acute Myeloid Leukemia (AML)

Our cohort included 5 patients who developed progression from MDS to AML. The initial diagnosis was MDS-EB2 in 3 cases, MDS-EB1 in 1 case, and MDS-RS-MLD in 1 case.

Evolution

One patient progressed from MDS-EB1 to AML after 3 years, with worsening cytopenias.

Discussion

Myelodysplastic syndromes (MDS) are a heterogeneous group of clonal hematologic disorders characterized by persistent cytopenias, morphological abnormalities of hematopoiesis, and a risk of progression to acute myeloid leukemia (AML). Our retrospective five-year study at the Mohammed V Military Teaching Hospital in Rabat provides essential epidemiological, clinical, biological, and cytogenetic insights into the understanding of MDS in our setting.

Epidemiological Data

The mean age was 66 years, consistent with published literature showing higher prevalence in older adults [1]. However, the notable proportion (32%) of patients under 60 years may reflect increased diagnostic awareness or possible environmental/occupational influences. Unlike the male predominance usually reported, our cohort showed a slight female predominance (sex ratio = 1.1), suggesting a particular epidemiologic profile in our population. Most patients were admitted to the Clinical Hematology Department, highlighting the importance of specialization in MDS management. Nevertheless, 13% were diagnosed in Internal Medicine or during outpatient consultations, underlining the need for multidisciplinary awareness.

Clinical Data

Anemia was the most frequent and often revealing manifestation (89%). Hemorrhagic (56%) and infectious syndromes (24%) reflected platelet and neutrophil involvement, respectively. The absence of tumoral or dysimmune manifestations at diagnosis reflects the non-proliferative and often subtle nature of MDS compared to other hematologic malignancies.

Biological Data

The most common cytopenia was anemia (89%), typically normocytic or macrocytic and always non-regenerative, a hallmark of MDS. Thrombocytopenia (56%) and neutropenia (26%) were also frequent. Circulating blasts were rare (4%) but remain a poor prognostic marker. Dysplasia on blood smear, present in 43% of cases, reinforces the diagnostic value of this often-underutilized test.

Bone marrow findings showed increased cellularity in most cases, moderate blastosis (mean 8.7%), and multilineage dysplasia with constant dysgranulopoiesis. Ring sideroblasts were found in 21.7%, highlighting the importance of Perls' staining. Moderate plasmocytosis in 50% may reflect either reactive changes or marrow remodeling.

WHO 2016 Classification

The subtype distribution reflected disease severity: 41% had MDS with excess blasts (MDS-EB), higher than other studies [2], possibly related to delayed diagnosis or late referral. No cases of isolated del(5q) were detected, suggesting either under-representation in this population or limitations of conventional cytogenetic analysis.

Cytogenetic Data

All analyzed karyotypes were normal. While this may be related to the limited sensitivity of conventional cytogenetics or technical challenges in culture (20%), it underscores the importance of

molecular approaches (e.g., NGS) to detect cryptic abnormalities with major prognostic impact [3].

IPSS Prognostic Score

Most patients were classified as low or intermediate risk (65%). Only 9% were high risk. The absence of very high-risk cases may reflect selection bias (exclusion of very aggressive cases not confirmed by marrow analysis or lost to follow-up). Prognostic evaluation remained feasible even without cytogenetic results, by integrating clinical and morphological data.

Leukemic Transformation and Evolution

Five cases (11%) progressed to AML, mainly from MDS-EB1 and EB2 subtypes. This aligns with international data reporting a 15–20% risk depending on subtype [4]. The single documented progression over three years from MDS-EB1 to AML confirms the gradual course of MDS and the importance of close follow-up.

Conclusion

Our study confirms the classical clinical and biological profile of MDS while highlighting certain local specificities: relatively younger mean age, female predominance, and high frequency of advanced forms at diagnosis. It also emphasizes the importance of rigorous morphological diagnosis, individualized prognostic assessment, and the need to expand cytogenetic and molecular analyses. In the era of targeted therapies and personalized medicine, improved patient stratification remains essential for optimizing management and clinical outcomes.

References

1. Greenberg PL, et al. Revised international prognostic scoring system for myelodysplastic syndromes. Blood. 2012; 120: 2454–2465.
2. Arber DA, et al. *WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues*. 2016.
3. Haferlach T, et al. Treatment Outcomes in Chronic Myeloid Leukemia: Does One Size Fit All? Leukemia. 2014; 28: 1421–1428.
4. Malcovati L, et al. Time-dependent prognostic scoring system for predicting survival and leukemic evolution in myelodysplastic syndromes. J Clin Oncol. 2007; 25: 3503–3510.