Initial evaluation of the Ogata score in routine laboratory practice

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Introduction

Myelodysplastic syndromes (MDS) is a heterogeneous group of clonal hematopoietic stem cell neoplasms. It is characterized by ineffective hematopoiesis, peripheral blood cytopenias and increased risk of leukemic evolution.[1] However, diagnosis may be challenging. Ogata score (OS) is a simple flow cytometry-based tool that can be implemented in the diagnostic workup for MDS.[2]

Aims and Objectives

To evaluate the OS performance in patients with suspected hematological malignancies at Pauls Stradins Clinical University Hospital's Joint Laboratory.

Materials and Methods

OS was calculated in routine bone marrow samples sent for hematological disorder immunophenotyping. OS included assessment of neutrophils' side scatter, percentage of myeloblasts and B cell progenitors, evaluation of CD45 and CD7 expression on myeloblasts and CD56 on monocytes, as previously described.[2,3] Gating strategy is shown in Figure 1. Each parameter outside reference range (Table 1) was scored as 1 point. Ogata score ≥ 2 was considered positive. Data from 17 patients were analyzed between January and May 2024. OS were correlated with results from histological analysis.

Parameters	Reference ranges
Side scatter (SSc) of neutrophils (as ratio to lymphocytes)	> 6
CD34+ myeloid progenitors among all nucleated cells, %	< 2
CD34+ B cell precursors among all CD34+ cells, %	> 5
CD45 expression of myeloid progenitors (as ratio to lymphocytes CD45 expression)	4.0 – 7.5
CD7 expression of myeloid progenitors, %	< 30
CD56 expression of monocytes, %	< 30

Table 1. Extended Ogata score calculation. Deviation from reference values was scored as 1 point for each parameter.

Results

Bone marrow biopsy showed that three of the 17 patients had MDS, 1 was inconclusive with suspicion for MDS, 7 – multiple myeloma, 3 – acute myeloid leukemia (two of them had progressed from MDS). The remaining 3 patients had reactive changes in the bone marrow. OS was positive in 9 patients: all 3 confirmed MDS, 1 myeloma case (in this case biopsy was suboptimal and normal hematopoiesis was not evaluated), all three acute leukemias and in 2 patients with reactive changes (one of these also had suboptimal biopsy material) (Table 2).

Conclusions

Initial data shows promising results of OS as an additional test for MDS diagnostic workup. Still, more data is needed for the OS performance verification.

Keywords

myelodysplastic syndrome, Ogata score, flow cytometry

a

b

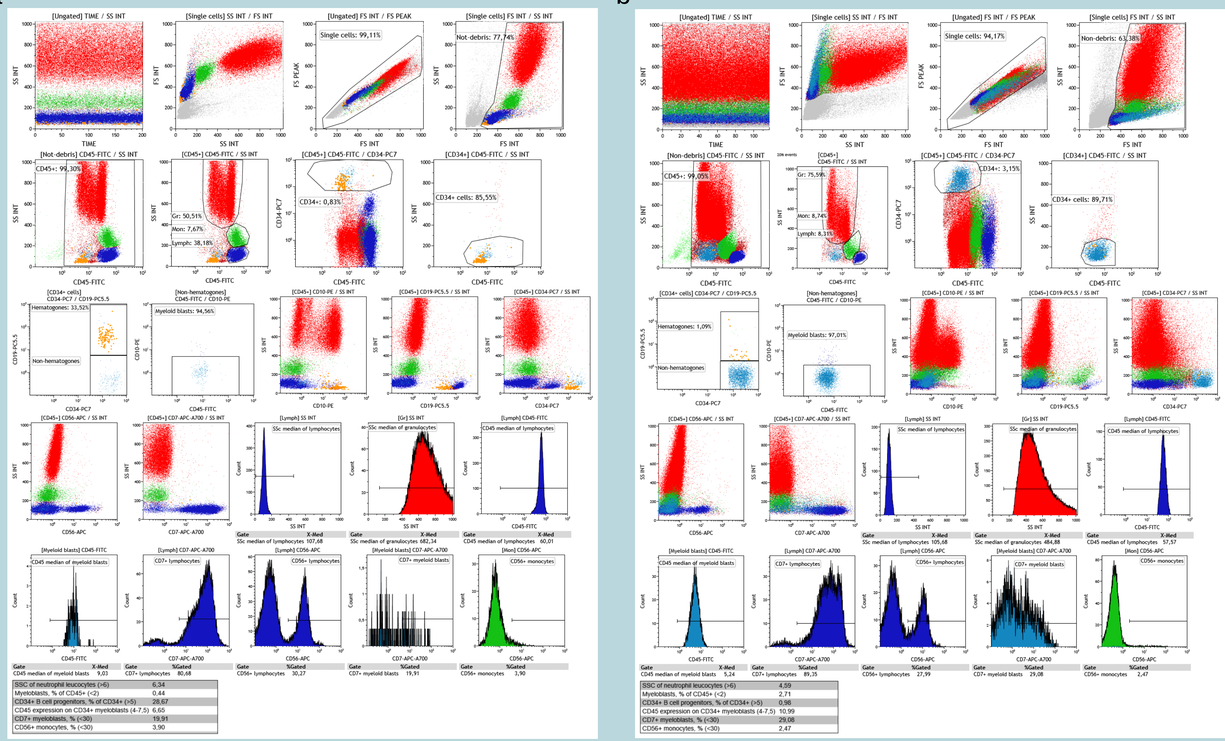


Figure 1. Gating strategy for Ogata score calculation. Example of bone marrow sample with negative (normal) (a) and positive (b) Ogata score calculation.

Case nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Histopathological conclusion	MDS	MDS	MDS	MDS	AML after MDS	AML after MDS	AML	MM	MM	MM	MM	MM	MM	MM	Reactive changes	Reactive changes	Reactive changes
SSc of Neu	**5.65**	**5.96**	**4.59**	6.03	6.71	6.67	6.89	6.54	6.27	6.77	6.96	6.37	**5.15**	8.81	**5.84**	6.34	**5.51**
MyPr, %	0.5	1.43	2.71	0.59	**29.37**	**18.92**	**32**	0.39	0.53	0.62	0.33	0.56	0.22	1.04	0.45	0.44	0.52
CD34+ B-Pr, %	9.99	**1.1**	**0.98**	7.99	**1.64**	**0.43**	**0.29**	14.98	8.2	**3.57**	**1.25**	10.84	7.35	**3.79**	**0.5**	28.67	53.88
CD45+ MyPr,	**8.06**	**11.38**	**10.99**	7.29	**8.18**	4.56	**10.08**	**9.48**	4.77	6.83	4.88	**8.46**	**8.04**	5.99	**10.91**	6.65	**9.21**
CD7+ MyPr, %	16.72	**86.67**	29.08	22.47	0.3	**33.06**	0.37	25.07	18.11	17.23	25.37	11.71	11.02	13.3	3.59	19.91	13.97
CD56+ mon, %	6.6	1.45	2.47	6.12	8.44	**34.04**	17.18	9.68	7.96	11.87	12.02	17.32	11	10.93	**32.01**	3.9	2.5
Ogata score	**2**	**4**	**4**	0	**3**	**4**	**3**	1	0	1	1	1	2	1	**4**	0	**2**

Table 2. Individual results of Ogata score calculation. Cases nr. 4, 10, 13 and 15 had suboptimal biopsy material. MDS – myelodysplstic syndrome; AML – acute myeloid leukemia; MM – multiple myeloma; SSc of Neu – side scatter of neutrophils; MyPr – CD34+ myeloid progenitors; B-pr – B cell precursors; mon – monocytes.

References

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