We Get Biased on Things That Make Sense

MERIH T. TESFAZGHI

When I was teaching third year medical students, and bench-lecturing clinical laboratory science students, I emphasized the importance of clinical details and the history of patients in laboratory test processing, especially in the evaluation of peripheral blood films. During those times, one of my students stated, "but including details of patients might somehow affect the decision of the reviewer, and may lead to a bias." I responded that we are biased on things that make sense. This means that we decide based on the evidence we see from a microscopy evaluation in the light of the clinical detail and history. How do clinical details and history help us reach decisions?

If specimens are the "in vitro ambassadors" of patients to the laboratory, then properly completed request forms are their "credentials". The content of the request form is thus a bridge that connects patients and clinicians with the laboratory. The more informative the request form is, the better and more accurate the outcome.

Peripheral blood film evaluation and characterization of blood cells based solely on morphology is inherently complex and prone to error. The complex nature of blood cell morphology becomes apparent when we deal with undifferentiated or immature cells, or in conditions that are characterized by overlapping cellular features, and/or the coexistence of some diseases. These and other factors listed below are some of the reasons why we need to have clinical details and the history of patients included in a request form to maximally contribute to the accuracy of the diagnosis. This ultimately brings quality service and contributes to the overall improvement of healthcare system.

The need for clinical details while reviewing peripheral blood film is essential for the following reasons:

- Clinical details help us to carry out a correct differential diagnosis. There are hematologic disorders characterized by overlapping findings. For example, the differential diagnosis of chronic myeloid leukemia (CML) and leukemoid reaction may sometimes be equivocal when the features, including the total white blood cell count, are at the borderline. In patients that do not have leukemia, very high white blood cell counts, generally greater than50x 10^9/L,[1] may produce a peripheral blood film appearance similar to leukemia. To further compound the diagnosis, severe granulocytic leukemoid reaction might be characterized by a marked left shift which may display a range of immature cells that are also seen in CML. Severe left shift especially in the absence of evident infection (or other underlying diseases) may strongly suggest direct bone marrow involvement. In such scenario, clinical details of patients such as absence or presence of enlargement of extramedullar organs is highly sought.

- The coexistence of multiple conditions in a given patient. One condition may mask the presence of the other condition. For example, the coexistence of megaloblastic anemia with iron deficiency anemia. Usually, megaloblastic anemia is characterized by increased size of red blood cells (MCV), but when coexists with severe iron deficiency anemia, peripheral blood film may overwhelmingly display features of iron deficiency, MCV may fall within normal range, and as a result, megaloblastic features may be underrepresented. Ovalo-macrocytes and hypersegmentation, for example, are major findings of megaloblastic anemia. However, we do also see occasional hypersegmented neutrophils in healthy individuals, and ovalo-macrocytes in myeloproliferative disorders (MPDs). Although it is imperative that we count or average the number of lobes to attribute hypersegmented neutrophil to megaloblastic anemia, to add confusion, lobes are not always discrete. Because the appearance of some findings is also dependent on the severity or stage of diseases, it is likely that one disease may mask the other.

- Patient information helps the reviewer remain "alert" and "thorough". There are some innocent-looking peripheral blood films that do not grab the attention of the reviewer. In such scenarios, the reviewer may be naturally relaxed, or may even get fooled, and consequently, important pathologic alterations may be easily overlooked. Sub-acute leukemia and aleukemic leukemia are characterized by less than $15x10^9$/L white cell count which at times may fall within or below normal range. Morphologically, immature cells are only present in the peripheral blood of sub-acute leukemia,[2] but maybe sparse enough to be missed. Peripheral blood film is also requested to follow the response of patient treatment on previously established diseases. Indicating the intention of the request rather orients and helps the reviewer expect some changes as a result of the

Downloaded from http://hwmaint.clsjournal.ascls.org/ on May 11 2024

treatment, and thus avoids confusion, eases the assessment process, and reduces cost that might be incurred as a result of dwelling on the same but inaccurate diagnosis.

- Certain treatments may cause quantitative and qualitative changes that mimic pathologic conditions. The changes incurred as a result of treatment given to a patient might completely mislead the reviewer, and may create confusion in the diagnosis. For example, pancytopenia secondary to chloramphenicol administration, or red blood cell dimorphism that appears as a result of blood transfusion just prior to specimen collection. Both conditions are also characteristic features (or features) of some other hematologic diseases such as sideroplastic anemia, aplastic anemia, megaloblastic anemia, etc.[1,3]

- Surgical intervention. The pathophysiology of blood cell alterations in blood disorders involves both intra- and extra-medullar hematopoietic organs. For example, teardrop cells are seen in the peripheral blood of patients with altered bone marrow (intra-medullar) and spleen (extra-medullar) structure. Teardrop cells are important findings, if not pathognomonic,[1] of myelofibrosis. However, in patients with history of splenectomy, teardrop cells might disappear.

- Disease progression or transformation. Some blood disorders are characterized by transformation to a different condition. A good example is the transformation of chronic myeloid leukemia to its acute form. In such instances, previous history of patient plays an important role in immediately attaching the scenario to a disease progression or transformation.

Putting together, clinical details and history of patients play an integral role in the diagnosis of peripheral blood film. Insufficient information about patients coupled with the inherent equivocal nature of morphology-based diagnosis may compound the process of reviewing the peripheral blood films, and may at times make the reviewer irresolute. This may eventually delay the standard turnaround time and, therefore, compromise the overall quality of the system.

REFERENCES

1. Rodak BF, Fritsma GA, Keohane EM. Hematology: Clinical Principles and Applications. 4th ed. Elsevier, St Louis, 2012.
2. Brown BA. Hematology: Principles and Procedures. 6th ed. Williams and Wilkins, Baltimore, 1993.
3. Constantino BT. Red Cell Histogram and The Dimorphic Red Cell Population. Lab Medicine 2011;42:300–8.

Merih T. Tesfazghi, *PhD Student, Biomedical Sciences, Florida State University*, *Former, Graduate Assistant, Department of Pathology, Orotta Schools of Medicine and Dentistry; and Clinical Laboratory Scientist at National Health Laboratory, Department of Hematology, Asmara, Eritrea.*, *Email: merih.tesfazghi@med.fsu.edu*

Downloaded from http://hwmaint.clsjournal.ascls.org/ on May 11 2024