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Mini Review

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Peripheral blood smear pathologist tool

Abstract

Microscopic evaluation of a peripheral blood smear is one of the most valuable test for the diagnosis and differential diagnosis of disease inclusive of clinical history and physical examination. Despite advances in haematology automation and application of molecular techniquesits diagnostic relevance is enormous.

Keywords: peripheral blood smear(PBS), ethylene diamine tetra-acetic Acid (EDTA)

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Peripheral blood smear examination is an invaluable investigation for the diagnosis of various clinical diseases, it includes cellular description of various blood cells seen on slide**.** The identification of various morphological abnormalities may lead to a definitive or differential diagnosis and provide clue for further investigations. For diagnosis of any pathology, there must be the triad of clinical history, physical examination and laboratory investigations. Approximately 70% of clinical diagnosis and treatment decisions are assisted by laboratory medicine.[1]

To ensure accurate and reliable results of peripheral blood smear pre-analytical aspects must be taken care and followed, this includes patient identification, preparation, blood drawn in specific order, sample transport and its preservation. Blood for peripheral smear is obtained from peripheral veins in Ethylene diamine tetra-acetic Acid [EDTA] vacutainer in majority cases. EDTA is considered as the anticoagulant of choice for peripheral blood smear because it preserves cellular components and blood cells morphology .Proportion of anticoagulant to blood should also be maintained as excess of EDTA causes shrinkage and degenerative changes in red and white blood cells. It also causes swelling and fragmentation of platelets. Capillary blood is rarely used for peripheral smear as it contains tissue fluid thus as compared to venous blood hemoglobin, hematocrit and red cell count are slightly higher. Formation of rouleaux on smear is seen by blood taken from skin puncture also platelets adhere to the puncture site, thus platelets count is low. The peripheral blood film must be prepared from a freshly collected blood sample, well prepared and well stained. Samples should be transported to the laboratory as soon as possible and must be analyzed within two hours of blood collection .Blood stored for more than four hours in anticoagulant before the preparation of blood smear can result in artifacts as red cell crenation and refractile border, also it may lead to degeneration of cellular elements of blood and may result in a pseudo-thrombocytopenia.[2]

Quality of the smear produced depends on proper smearing technique and quality of the staining process in appropriate environmental conditions.Routinely the blood smears are stained by one of the Romanowsky stains. For the better quality of stain to be achieved, the stain requires an adequate PH and contact time to avoid over or under staining, as the staining reaction is PH dependent. These stains have the tendency towards precipitation thereby filtered before use. For checking the quality controlof the stain, its quality should be compared with a well prepared normal, cover-slipped slide on day to day basis to detect deterioration in stain quality which is virtually inevitable over time with use and storage. The surrounding temperature and humidity also affects the staining of smear.Thus before reporting of smear pathologist must be vigilant of all these requirements.

Now during reporting, the reporting format begins with patient's bio-data, name of treating physician, date and time of request, date and time of authenticating and print report along with clinical summary of the patient. The reporting must include specification of each of the major cell lines as erythrocytes, leucocytes, platelets, hemoparasite and immature precursors of bloodcells. This is followed by any advice for further testing based on differential or confirmatory diagnosis.

However, at present scenario the automated blood cell analyzers can provide fast and accurate measurements of cellular sizes and differential white blood cell counts with increasing workload, so routine manual PBS examination is no longer practiced in most modern laboratories.[2,3] Considering the benefits of automation we still have opinion of PBS examination is must at the first level. The laboratory initiated slide review by triggeringthe abnormal results on blood cell counts or alarm flags on morphologic changes or turbidity defects showed by semi or fully automatedanalyzers. The International Society for Laboratory Haematology (ISLH) has proposed criteria for which manual Peripheral blood examination is required,4 when certain numerical indices shows a significant deviation from the normal or when abnormal flags are raised. Thus an in house policy for individual laboratories either stand alone or attached with the hospital must make a consensus guidelines with these rules and modify them according to the characteristics of local patients.[5] The quality of review of peripheral blood smear depends on the laboratory physician as all results and description of cells during reporting cannot be interpreted with analyzers because the peripheral blood smear is manually examined by the pathologist who reported the smear based on a combined clinical and laboratory indications[6] thus these findings are considered as gold standard.

Conclusion

Thus despite enormous advances has been done in automation and also emerging of newer molecular techniques, the Peripheral blood smear remains very important diagnostic test to the pathologists as well as clinicians because it characterize the morphology and distribution of individual blood cells, which ensures its place in the diagnosis of various primary and secondary blood and blood related diseases. Thereby the diagnostic relevance of peripheral blood smear hasnot been lessened by advances in haematology automation and molecular techniques.

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Conflicts of interest

The author declares no conflicts of interest.

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