

Original Research Article

To assess advantages and limitations of peripheral blood smear and bone marrow examination.

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Abstract:

Background & Method: The aim of the study is to assess advantages and limitations of peripheral blood smear and bone marrow examination. The bone marrow aspirate of about 0.2 ml is discharged into the elevated part of the slide. Sufficient quantity was used to make direct smears. The slides were stained with Romanowsky stain (Leishman stain) and observed for the quality, fragments, stain, readability and results will be compared with peripheral blood smear.

Result: In aspirate smears 16.7% cases had cellularity <50%, 33.3% in 50-75% and 50.0% 75-95%, no case in the 95-100% cellularity. Majority of cases showed increased M:E ratio. 71 % cases fell in the range of 15:1 - 45:1. Storage (pseudo gaucher) histiocytes were present in 3 cases. Mild to marked reticulin fibrosis was seen in 5 cases.

Conclusion: Peripheral smear of ITP showed thrombocytopenia with few giant cells. RBCs were microcytic hypochromic. Bone marrow aspirate showed marked megakaryocytic hyperplasia with non-functioning megakaryocytes demonstrating smooth cytoplasmic borders. Peripheral smear gave only the rough idea of the diagnosis in cases of Megaloblastic anemia. Bone marrow aspirate was the most helpful in making the diagnosis. Morphology of megaloblasts was best appreciated in bone marrow aspirate. Bone marrow gave better idea of cellularity.

Keywords: peripheral blood smear and bone marrow.

Study Designed: Observational Study.

1. Introduction

In Anglo-American countries bone marrow diagnostics are completely in the hands of haematopathologists, whereas in continental Europe aspirate smears are often examined by haematologists, while trephine biopsies are handled by pathologists

The procedure known as trepanning or trephination of bone is the oldest surgical practice that continues to have clinical relevance in modern times.

The method dates as far back as the Neolithic period and initially entailed the drilling of cranial bones as a form of medical intervention for headaches and mental illnesses. However it was not until 1905, when the Italian physician Pianese reported bone marrow infiltration by the parasite *Leishmania*, that this procedure was applied towards clinical evaluation.

Examination of bone marrow by needle aspiration had been available since 1929, but it was of limited value in assessing cellularity, topography and focal disease.

In the present day, inspection of the bone marrow is considered one of the most valuable diagnostic tools to evaluate hematologic disorders. Indications have included the diagnosis, staging, and therapeutic monitoring for lymphoproliferative disorders, myeloproliferative disorders, and multiple myeloma and cytopenias.

2. Material & Method

The present study comprises of cases, from patients attending the haematology OPD/Ward of Tertiary Care Centre for 01 Years. The selection of cases were based on the clinical examination and peripheral blood picture of patients attending the haematology department in which the findings of peripheral blood smear were unexplained or inconclusive and bone marrow examination was warranted.

The bone marrow aspirate of about 0.2 ml is discharged into the elevated part of the slide. Sufficient quantity was used to make direct smears. The slides were stained with Romanowsky stain (Leishman stain) and observed for the quality, fragments, stain, readability and results will be compared with peripheral blood smear.

Method of Staining:

Cover the well dried, thin blood smear with undiluted Leishman Stain solution by counting the drops of Leishman stain. Let it stand for 2 minutes, the methanol present in the stain fixes the smear onto the glass slide. After 2 minutes, add twice the amount of distilled water or Phosphate buffer solution and mix the content by swirling or by blowing gently. Incubate the slides for at least 10 min at 37 °C. This will stain the blood cells. Rinse the slides thoroughly with Phosphate buffer solution up to 2 minutes or until it acquires a purple-pinkish tinge. Air dry the slides in a tilted position so that the water easily remove out of the slides. Now you can mount the smears with mounting media, which do not decolorizes the smear. Let it dry in air for few hours and then observe the slides under oil immersion objective lens of the microscope.

3. Results**Table No. 1: Table showing peripheral smear findings:**

S. No.	Morphologic features	No of patients	Percentage	
1	RBCs	Microcytic hypochromic	01	16.7
		Normocytic normochromic	05	83.3
		Macrocytic	00	00
2	WBCs	Blasts >20%	05	83.3
		Blasts <20%	01	16.7
3	Platelets	Thrombocytopenia	04	66.7
		Normal platelet count	02	33.3
		Thrombocytosis	00	00

Out of 6 cases, 5 cases (83.3%) had normocytic normochromic RBCs. In 83.3% cases blasts percentage was >20%. Only 1 case had <20% blasts. Majority of cases (66.7%) showed thrombocytopenia in their peripheral smear.

Table No. 2: Cellularity in bone marrow

Cellularity	No of person in BM aspirate	%
10-25	00	00
25-50	01	16.7
50-75	02	33.3
75-95	03	50
95-100	00	00
Total	06	100

In aspirate smears 16.7% cases had cellularity <50%, 33.3% in 50-75% and 50.0% 75-95%, no case in the 95-100% cellularity.

Table No. 3: Myeloid Erythroid (M:E) ratio in bone marrow

M:E Ratio	No of patients	%
<15:1	02	14.3
15:1 – 25:1	03	21.4
25:1 – 35:1	05	35.8
35:1 – 45:1	02	14.3

>45:1	01	7.1
Cannot be assessed	01	7.1
Total	14	100

Majority of cases showed increased M:E ratio. 71 % cases fell in the range of 15:1 - 45:1. Storage (pseudo gaucher) histiocytes were present in 3 cases. Mild to marked reticulin fibrosis was seen in 5 cases.

4. Discussion

This retrospective study sought out to describe practice patterns of PBS utilization for benign haematology referrals by HOCs an accredited H/O training program. We investigated the frequency in which the HOC ordered and actually documented their interpretation of the PBS within the EMR and the likelihood that this clinical skill led to further evaluation and/or diagnosis. A CBC was ordered in the majority of benign haematology referrals, and of these, a PBS was ordered in less than half of cases. HOC documentation of PBS findings occurred in less than half of cases that it was determined PBS review should be done. The HOC was significantly more likely to order a PBS for disorders relating to RBC, followed by WBC, PLTs, and "other" diagnosis, respectively. The likelihood of HOC documentation of PBS interpretation did not differ based on the haematologic diagnosis, and there were no significant differences in PBS ordering or documentation of PBS findings between staff and fellow providers.

Further diagnostic testing was ordered in nearly half cases (41.4%) in which the HOC documented PBS findings. A BMB was ordered in close to a third of these cases, and a definitive diagnosis was made in all BMBs obtained after PBS examination. However, when a BMB was performed without prior PBS review, definitive marrow findings were seen in less than 50% of cases. There was a higher likelihood that BMB was more likely to be performed and lead to a specific haematologic diagnosis after HOC PBS review than without PBS review.

5. Conclusion

Peripheral smear of ITP showed thrombocytopenia with few giant cells. RBCs were microcytic hypochromic. Bone marrow aspirate showed marked megakaryocytic hyperplasia with non-functioning megakaryocytes demonstrating smooth cytoplasmic borders. Peripheral smear gave only the rough idea of the diagnosis in cases of Megaloblastic anemia. Bone marrow aspirate was the most helpful in making the diagnosis. Morphology of megaloblasts was best appreciated in bone marrow aspirate. Bone marrow gave better idea of cellularity.

6. References

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