Chapter 5
Interpretation and Integrated Reporting of Bone Marrow Diagnosis

ABSTRACT

The role of today's hematopathologist and laboratory hematologist extends beyond reporting test results. Focusing on best patient care, the pathologist should overview the diagnostic process, from the laboratory order to the clinician's diagnostic decision and patient management plan, with continued communication. In addition, awareness and training in advanced laboratory technology, standardization, quality assurance measures, and comprehensive reporting are evolving needs of modern pathology. Knowledge and skills in all aspects of the laboratory workflow and processes, including the logistics, information system, diagnostic decision-making, and potential sources of error, are essential training competencies.

INTRODUCTION

In today's medical landscape, pathologists are integral partners in patient care, actively shaping diagnostic decisions and treatment plans. Hematopathologists play a pivotal role in ensuring accurate disease classification, ultimately guiding treatment decisions and improving patient care.

As neoplastic disorders become more complex, an integrated testing approach is essential. Hematopathologists collaborate with clinicians, contributing invaluable insights to challenging cases. While morphology analysis remains critical, it alone is insufficient for a comprehensive diagnosis. Hematopathologists must navigate advanced laboratory technology, standardization, and quality assurance measures. (Gardner, 2022). They consider logistics, available resources, and workflow when devising diagnostic strategies.

The diagnostic journey begins before sample collection and continues through test interpretation and reporting. Hematopathologists correlate findings from various tests (including ancillary tests) with patient demographics, clinical data, and other investigations. Tumor stage, treatment history, and previous bone marrow assessments also influence decisions.

Making rational diagnostic choices requires experience and specialized training. Inadequate information processing can lead to diagnostic errors, impacting patient outcomes. (Beer et al., 2017).

This chapter emphasizes four crucial facets of bone marrow diagnosis:

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1. Standard Interpretation and Reporting of Bone Marrow Examination
2. Role of Laboratory Information Systems and Information Processing
3. Reasoning in Diagnostic Decision-Making
4. Addressing Diagnostic Discordance

STANDARD INTERPRETATION AND REPORTING OF BONE MARROW EXAMINATION

Accurate diagnosis builds on sound clinical and laboratory practices, including information retrieval, technical preparation, access to diagnostic resources, good communication, and in-depth knowledge and experience of the pathologist.

Although the morphologic examination remains a gold standard for hematology diagnosis, the overlap between benign and neoplastic lesions, the spectrum of differential diagnoses in many cases, and the need for a refined subclassification are inherent limitations. In addition, the broad spectrum of pre-analytic variables, such as artifacts of sampling, fixation, processing, and cognitive bias, may contribute to inaccurate diagnosis.

Today's hematopathology diagnosis requires integrating several technological applications and a vast array of measurements for diagnosis, prognosis, and treatment; which is challenging the traditional laboratory diagnostic pathway. Therefore, the risk of diagnostic errors and the need for expert review are exceptionally high in hematopathology, especially in small centers lacking resources and expertise. Central-based specialist review and quality assurance programs are cost-effective measures to reduce diagnostic errors in hematopathology (NICE, 2014). The pathologist should recognize complex cases requiring a referral to a centralized laboratory. (Agarwal & Juneja, 2013**).**

Furthermore, an essential quality measure is the assessment of diagnostic concordance among pathologists or between pathologists and cytogeneticists. (Foucar, 2001). However, discordance may sometimes be due to a limitation of the laboratory testing process and not a technical error. (Pitkus, 2010)

Standard Reporting of the Bone Marrow

Following morphologic examination and receiving results of ancillary tests by the pathologist, a standardized reporting of all elements and their integration into a comprehensive, clinically relevant form is necessary. Table 1 outlines the essential knowledge and skills for an integrated bone marrow diagnosis. (Wilkins, 2011).

Table 1. The essential requirements for an integrated bone marrow reporting (Wilkins, 2011)

Adequate sampling, related patient care, and possible errors
Detailed clinical information and additional test results: blood counts, blood and bone marrow aspirate cytomorphology, flow cytometry, cytogenetic analysis, and radiological imaging
Systematic assessment of bone marrow, including hemopoietic and stromal elements
Awareness of 'invisible' pathologies that can escape detection without immuno-staining

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