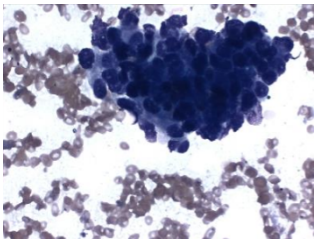
Yale Pathologist Identifies an Unsuspected Metastatic Carcinoma

Case reviewed by Mina LuQing Xu, MD, Director of Hematopathology, Yale School of Medicine

Abstract:
An 81-year-old male patient presented with severe pancytopenia, leading his oncologist to suspect a Myelodysplastic Syndrome (MDS). The oncologist obtained a bone marrow biopsy and ordered an Omnia™ Comprehensive Assessment from Precipio. Precipio conducted the technical workup and assigned the case to Dr. Xu, hematopathologist at Yale. Upon reviewing the morphology of the core and aspirate, Dr. Xu found that the marrow was highly depleted and replaced by poorly differentiated cells, likely a carcinoma, with no morphologic evidence of myelodysplasia found.
After further evaluation and testing, the poorly differentiated cells were confirmed to be a metastatic carcinoma, most consistent with a prostatic origin.

Methods:
Flow cytometry testing and morphology evaluation were performed to assess for MDS. Dr. Xu found no evidence of dysplasia in the aspirate and biopsy, but noted the presence of numerous non-hematopoietic elements. Coupled with negative flow cytometry testing, these results rule out the possibility of a myelodysplasia but raised the concern of a possible carcinoma due to the presence of non-hematopoietic elements in the marrow. As part of the Omnia™ assessment, Dr. Xu continued to investigate the unusual findings.



Malignant epithelioid cell cluster

With Dr. Xu's direction and request for additional testing, the tumor was found positive for pan-keratin (AE1/AE3) and negative for CD56 and no increase in CD34 or myeloperoxidase staining, confirming the absence of a possible myeloid malignancy.
Further immunohistochemical staining on the biopsy included PSA, TTF1, CK7, CK2 to classify the origin of the non-hematopoietic cells identified in the marrow. The tumor cells were found to be positive for PSAP, focally positive for PSA as well as strongly positive for CAM5.2. These findings confirmed Dr. Xu's suspicion and led to a final diagnosis of a metastatic carcinoma involving the bone marrow most consistent with a prostatic origin.

Key Highlights:
- Oncologist suspected MDS for patient with severe pancytopenia
- Pathologist coupled identification of unusual non-hematopoietic cells in bone marrow with negative flow testing to rule out MDS and raised an alternative suspicion of possible carcinoma
- Utilizing Omnia™, Precipio's comprehensive assessment and testing algorithm, pathologist requested additional immunostains to determine abnormal cells' origin
- All results correlated to reach a conclusive diagnosis of metastatic carcinoma with prostatic origin

Results:
The marrow biopsy submitted in this case was conclusively diagnosed as involving a **metastatic carcinoma of prostatic origin**. The pathologist also recommended that the result be correlated with a physical examination as well as a serum PSA test.
Absent the expert pathologist's ability to identify the unusual presence of non-hematopoietic cells and Precipio's holistic comprehensive approach, the metastatic prostate cancer would have likely been missed since the oncologist was suspicious of an MDS and requested testing for that entity.

Clinical Implications:
Ruling out the initial suspicion of myelodysplasia alone would not have explained the underlying cause of pancytopenia. Without the identification of the metastatic prostate cancer, the clinician would not be able to proceed with the androgen deprivation therapy (ADT) or chemotherapy necessary to treat this high-risk cancer.

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