

# **Cytology and Surgical Pathology Correlations: Pitfalls and Shortcomings**

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## **Introduction**

The thoracic cavity is a complex anatomic area as it can be the host of primary as well as metastatic neoplasms. In addition, due to the variability of its organs (lungs, pleura, thymus, heart, and esophagus) the gamut of entities that can be present in this anatomic area is wide. Thus, one needs to be concerned not only with epithelial tumors proper to those structures but also about other tumors of different lineages such as lymphomas and sarcomas.

In addition, depending on the anatomic area involved, the methodology employed to determine a particular diagnosis may also vary from core biopsy to open biopsy, to fine needle aspirates. Thus, the importance of proper correlations between those procedures should be highlighted. Even though as stated above, the thoracic cavity is the host of different organ system, in this presentation esophagus and heart will not be discussed as they belong to different subspecialties. At the same time, we cannot be that inclusive and for this presentation, a set of four cases will be presented to account for some common pitfalls and shortcomings when attempting to correlate cytology with tissue diagnosis.

## **CASE # 1**

### **Clinical History**

32-year-old man presented with symptoms of shortness of breath, cough, and chest pain of several weeks duration. Diagnostic imaging revealed the presence of an anterior mediastinal mass. Aspiration cytology was obtained and interpreted as thymoma. Surgical resection of the mass was performed.

### **Macroscopic Findings**

The tumor obtained was a large ovoid irregular mass measuring approximately 6 cm in greatest dimension. At cut surface, the tumor was light brown in color, slightly lobulated and did not show any areas of necrosis or hemorrhage.

### **Microscopic Findings**

The low power magnification shows the presence of a tumor with a dual cell population of intermixed lymphocytes and epithelial cells. In some areas the tumor shows the typical lobulation with the characteristic fibrous bands. At higher magnification, in some areas the dual cellular population is characterized by mature lymphocytes admixed with round to ovals cells without nuclear atypia. However, in some other areas, the tumor cells appear larger, with round to oval nuclei, and some of them with chromocenters attached to the nuclear membrane; prominent nucleoli was present in some cells. In these particular areas, it is also important to note that these cells are also sprinkle with mature lymphocytes.

### **Immunohistochemical Features**

A battery of immunohistochemical stains was performed including keratin, CD-5, EMA, PAX-8, and PLAP. The tumor cells show invariably positive staining with keratin and PAX-8 with focal staining for CD-5 while negative for EMA. Furthermore, PLAP, SALL-4, OCT 3/4, and TCL-1 show strong positive reaction in the large cells with more atypia.

## **CASE #2**

### **Clinical History**

43-year-old man presented with symptoms of shortness of breath, chest pain, and cough of several weeks duration. Imaging showed the presence of intrapulmonary mass. FNA of the mass was performed and interpreted as poorly differentiated carcinoma. A lobectomy was performed and the patient was referred for confirmation of the diagnosis and treatment.

### **Histological Findings**

The lung parenchyma is replaced by a neoplastic cellular proliferation composed of rather small cells with scant cytoplasm growing in sheets. In addition, among these small cells there are intermixed large cells with round nucleus and some of them with prominent nucleoli. These cells have ample eosinophilic cytoplasm. Both of these components are embedded in a rather eosinophilic fibrillary stroma. Areas of necrosis or hemorrhage are not present while there is not increase mitotic activity.

### **Immunohistochemical Features**

Numerous immunohistochemical stains were performed showing tumor cells negative for keratin, keratin 7, EMA, CD-56, and chromogranin. However, the tumor cells show focal positive staining for synaptophysin and for PGP9.5.

In addition, tissue was available for ultrastructural studies, which disclose the presence of focal areas of myelin, which were more in keeping with a neural neoplasm.

## **CASE 3**

### **Clinical History**

38-year-old woman presents with symptoms of chest pain, shortness of breath, and hemoptysis. Imaging shows areas of pleural nodularity. FNA is performed and interpreted as inflammation. The patient undergoes an open lung biopsy, which is interpreted as epithelioid hemangioendothelioma. The patient is referred for confirmation of the diagnosis and treatment.

Due to a lack of confirming the original diagnosis with keratin positive cells and CD-34 and CD31 negative, a decision is made for a second open biopsy.

### **Histopathological Features**

The material available for review shows the presence of solid and cystic areas. In the cystic areas the lesion is characterized by the presence of an edematous stroma with clusters of epithelial cells while the cystic lining is made of low cuboidal cells. In other areas the stroma is composed of bland spindle cells admixed with small caliber vessels. In other areas, the lesion is composed of

glandular areas embedded in a bland spindle cell stroma. The glands are made of cuboidal epithelium and the presence of scattered mitotic figures.

### **Immunohistochemical Features**

The histological features were so characteristic that there was no need to perform any additional immunohistochemical stains.

## **CASE # 4**

### **Clinical History**

58-year-old man presented with symptoms of shortness of breath, pleuritic pain, cough, and general malaise. Imaging shows the presence of pleural thickening. FNA was performed and interpreted as sarcomatoid carcinoma. An open biopsy was performed and interpreted as sarcomatoid mesothelioma. The patient was referred for treatment and confirmation of the diagnosis.

### **Histological Features**

The main features of this neoplasm were those of a high grade malignant neoplasm composed of spindle cells with scant cytoplasm, oval nuclei and some cells with prominent nuclei. The tumor showed high marked pleomorphism and mitotic figures were not prominent. Focal areas of necrosis and fibrin deposition were also present.

### **Immunohistochemical Features**

A wide panel of immunohistochemical stains was performed showing tumor cells negative for keratin, EMA, smooth muscle actin, and desmin. However, the tumor shows positive reaction in tumor cells for CD-34 and CD-31.