Primary Pulmonary Malignant Melanoma of Right Upper Lobe of Lung

Beni Zuckermann MD, Michael Papiashvilli MD and Ilan Bar MD

General Thoracic Surgery Unit, Assaf Harofeh Medical Center, Zerifin, affiliated with Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

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Malignant melanoma is a malignant tumor arising from the melanosomes (pigment-producing cells) of the deeper layers of the skin or the eye [1]. Primary pulmonary malignant melanoma is a very rare disease that generally occurs in the fifth decade of life and has a poor prognosis [2]. The symptoms and signs of PPMM are similar to those associated with bronchogenic carcinoma, and surgical resection with or without adjuvant chemoradiation remains the mainstay of therapy and offers patients the best chance of cure [3]. Approximately 30 PPMM cases are described in the literature, mostly case reports [3]. These cases suggest that melanoma can arise in the lung as a primary tumor, probably from residual melanoblasts. We present the case of a 68 year old man diagnosed preoperatively with PPMM who underwent curative right upper lobectomy.

PATIENT DESCRIPTION

A 68 year old non-smoking, healthy, asymptomatic man underwent a chest X-ray prior to a lens extraction due to a senile cataract. The X-ray revealed a space-occupying lesion in his right upper lobectomy [Figure 1]. The patient had no respiratory complaints or other physical symptoms and no personal history of lung disease. A computerized tomography scan of his chest showed a mass 5 cm in diameter in the RUL. Fiberoptic bronchoscopy did not reveal any endobronchial lesions. Transthoracic needle biopsy showed metastatic malignant melanoma. The evaluation also included a fluorodeoxyglucose positron emission tomography scan that showed increased fluorodeoxyglucose uptake only in the RUL mass.

Further meticulous metastatic workup of the skin, eyes, anorectal region, and upper and lower gastrointestinal tract did not reveal a primary origin for the disease. In the absence of further metastatic foci, we decided to resect the RUL. Preoperative pulmonary function testing revealed a forced expiratory volume in the first second of 2.68 L/min, 123% of the predicted value. The surgery was performed via a standard right thoracotomy incision.

On gross examination of the specimen, the tumor appeared grayish, and felt semi-solid and multilobulated without involvement of surgical margins. Microscopic examination showed significant atypia, prominent nucleoli, and marked mitotic activity [Figures B and C]. Immunohistochemical reactions supported the diagnosis with a positive melanoma cocktail of S-100 and Alpha-SMA. Dissected hilar and mediastinal lymph nodes were free of metastatic disease. The postoperative period was unremarkable and the patient was discharged seven days after surgery.

After a short recovery period, he received adjuvant chemotherapy with...
interferon. He was followed up by annual clinical checkups and CT scan evaluations and is currently (6 years post-surgery) in good health without evidence of local recurrence or metastatic disease.

**COMMENT**

PPMM is an aggressive, unpredictable tumor that accounts for less than 1% of all primary lung cancers [3]. Symptoms and signs are similar to those of broncho-vascular carcinoma. The tumor is frequently endobronchial and the patient generally presents with a cough, post-obstructive pneumonia, atelectasis, hemoptysis and lobar collapse. More rarely, as in this case, it is discovered in an asymptomatic healthy patient. Surgical resection is the treatment of choice as in cases of non-small cell lung carcinoma, but the role of postoperative adjuvant chemotherapy or radiotherapy is not fully known. Radiotherapy has been tried in mucosal melanoma of the head and neck [4] with disappointing results and chemotherapy has been used for palliation only [4]. The prognosis of PPMM is poor. Long-term survival was achieved in two cases in the past (10 years and 11 years after lobectomy and pneumonectomy, respectively) [5]. Our patient underwent RUL lobectomy, received adjuvant chemotherapy with interferon, and is currently 6 years post-surgery and remains healthy without local recurrence or metastatic disease.

In conclusion, PPMM represents a rare pathological entity. Careful preoperative investigation and postoperative confirmation of the diagnosis together with clinical findings may establish the diagnosis. Surgical intervention is appropriate and remains the cornerstone of treatment.

**Capsule**

**Toxic selection: bacteria replace phosphate with arsenic**

Arsenic is highly toxic to living organisms because it disrupts metabolic pathways, but, chemically, arsenate behaves in a similar way to phosphate, and it is theoretically possible for organisms to substitute one for the other under certain conditions. Wolfe-Simon et al. have found a living example of a bacterium that does not find arsenate poisonous. Isolates of a halomonad bacterium, originating from the toxic and briny Mono Lake, California, were selected by successive laboratory culture in which phosphate was gradually replaced by arsenate until the bacteria were growing in the absence of the usual salt. Further analysis indicated that arsenate had substituted for phosphate in the bacterium’s constituent molecules, even replacing phosphate in its DNA, as well as in its proteins and metabolites.

**References**


**Mitochondrial dysfunction causes a variety of pathologies observed in CAV1-deficient animals**

Caveolae are membrane invaginations found at the surface of mammalian cells that are enriched in cholesterol. Cholesterol-binding proteins known as caveolins play a key role in caveolar formation and are also involved in intracellular cholesterol transport. Mutation or disruption of caveolin genes has been linked to a variety of pathologies, including lipodystrophy, cardiovascular disease, diabetes, and cancer. Bosch et al. examined the cellular pathology associated with caveolin disruption in embryonic fibroblast cells from caveolin 1 (CAV1)-deficient mice. The cells exhibited reduced proliferation and survival when subjected to glucose restriction – a phenotype associated with compromised mitochondria. Indeed, mitochondrial membranes from the CAV1-deficient cells contained elevated levels of free cholesterol, which was associated with reduced resistance to antioxidants. The mitochondria thus accumulated reactive oxygen species, which promoted cell death. Thus, mitochondrial dysfunction appears to be the underlying cause of the variety of pathologies observed in CAV1-deficient animals.

**Corresponding author:**

Dr. I. Bar
Dept. of General Thoracic Surgery, Assaf Harofeh Medical Center, Zerifin 70300, Israel
Phone: (972-8) 997-9822
Fax: (972-8) 977-8149
email: fredricag@asaf.health.gov.il

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