

Bolesław Papla¹, Sergiusz Demczuk¹, Eugeniusz Malinowski²

Benign Clear-Cell "Sugar" Tumor of the Lung - A Case Report

¹Chair and Department of Clinical and Experimental Pathology, Collegium Medicum, Jagiellonian University, Kraków,

²Thoracic Surgery Ward, Specialistic Center of Lung Diseases, Bystra Śląska

The authors present a rare case of a surgically treated so-called "sugar" tumor of the lung in a 68-year old male patient.

Introduction

The so-called clear-cell "sugar" tumor of the lung is a very rare, benign pulmonary neoplasm that occurs in various age groups, but is most often seen in the elderly. Equally often affecting both sexes, the tumor is an isolated, asymptomatic lesion situated in the peripheral part of the lung and is most frequently detected accidentally in chest X-ray. Liebow and Castleman were the first to describe this tumor in 1963 [7, 8] and since that time several score of cases have been presented in the literature worldwide, mostly as isolated case reports [3]. In the Polish literature, only single cases have been described [9, 11, 12], yet in view of the rare character of these tumors we believe that our patient is worthy of presenting.

A Case Description

G.K., a 68-year old male patient, manifesting no clinical symptoms of any respiratory disease, was treated twice for colonic adenomatous polyps removed colonoscopically in 2000. He was referred to a surgical ward due to a round lesion situated in the superior segment of the right inferior pulmonary lobe (SVI) that was detected in an A-P chest X-ray and confirmed by CT (Fig. 1). In the course of the surgery, a wedge resection was performed of a fragment of pulmonary tissue containing a tumor, 12mm in diameter. The postoperative course was uneventful.

The entire resected material was referred to histopathology (No 1502904). The specimen consisted of a formalin-fixed lung fragment containing a grayish-white tumor 12mm in diameter; the whole material was embedded in paraffin, cut and subsequently stained with HE, paS, paS following

diastase digestion, Mayer's mucicarmin and Gomori silver method. For immunohistochemistry were used sera obtained from DAKO (Denmark) employing standard methods and the controls to detect the presence of cytokeratins, HMB45, NSE, TTF-1, S-100, alfa-1-antichymotrypsin, Ki-67, CD56, CD117, chromogranin and vimentin.

Histologically, the tumor was predominantly solid, but it manifested relatively numerous clefts and small cysts layered with cuboidal epithelium typical for the small bronchi. The tumor cells were pleomorphic, large, round or polygonal, with distinct boundaries, centrally located oval nuclei and clear, empty cytoplasm, at some regions containing numerous vacuoles or fine, pink granules. Neither mitotic figures nor necrosis were found. Focally among the tumor cells, eosinophilic hyaline masses were seen. Within the lesion a relatively large number of blood vessels were noted, which in some areas showed sinusoid dilatations (Fig. 2). The tumor was not encapsulated but it was relatively easy



Fig. 1. A CT scan showing a round, well-delineated tumor in the right lung.

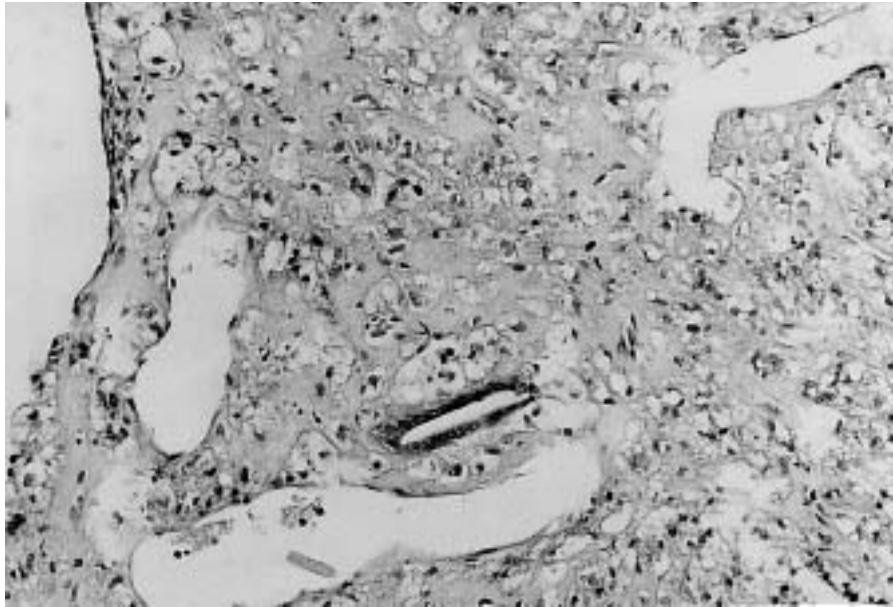


Fig. 2. A solid tumor composed of cells with clear cytoplasm. Note a cleft layered by epithelium typical for small bronchi and numerous sinusoid, thin-walled blood vessels layered with endothelial cells. See foci of in-

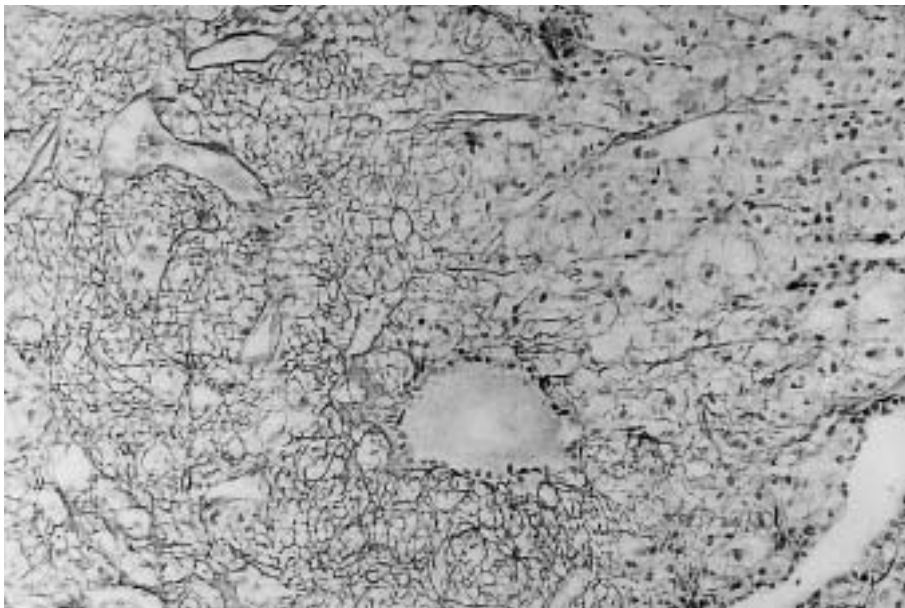


Fig. 3. Argyrophilic fibers surrounding isolated cells or cell groups. Gomori silver stain.

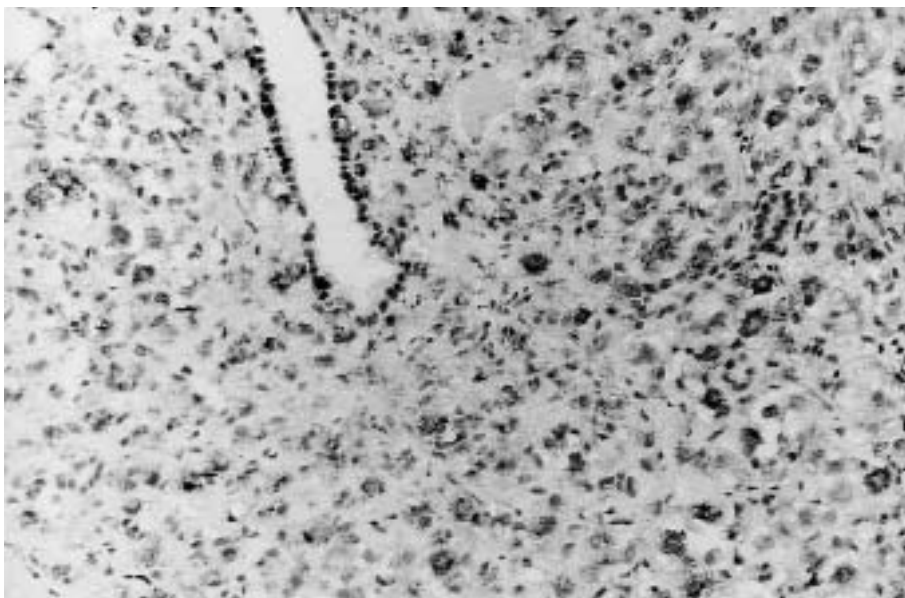


Fig. 4. A positive HMB45 antigen reaction in numerous tumor cells.

to separate from the surrounding, slightly atelectatic pulmonary parenchyma. The tumor cells contained paS-positive, granular material, which disappeared following diastase digestion, what strongly indicated a high glycogen content. The tumor was Mayer's mucicarmine-negative, a positive reaction was seen only in isolated glands of the mucosa of the adjacent bronchus; the cuboidal cells in the clefts and small cysts within the lesion also showed a negative reaction. The distribution of argyrophilic fibers, as shown by Gomori method, was uneven - with "empty" areas and foci where fibres surrounded even isolated tumor cells (Fig. 3).

The epithelial layer of clefts and cysts only expressed cytokeratins. Almost all tumor cells showed strong immunoreactivity for HMB45 (Fig. 4) and NSE-positive cytoplasm staining, some showed a positive reaction to S-100 and alfa-1-antichymotrypsin. Ki67 was detected in nuclei of single tumor cells. The tumor was TTF-1-negative. The CD56 antigen reaction was positive in single cells. Vimentin was detected in a few cells. The reactions to chromogranin and CD117 were negative.

Discussion

A clear-cell "sugar" tumor of the lung is very often misdiagnosed - especially in frozen sections during intraoperative examination - as a pulmonary metastasis of clear cell renal carcinoma [3, 5, 11, 12]. In some instances, melanoma metastasizing to the lung or a primary clear-cell carcinoma of the lung is also considered [3]. Precise clinical, morphological and immunohistochemical examinations allow for ruling out these possibilities, what is later confirmed by a successful long term follow-up.

To-date, the histogenesis of the tumor is unclear; an association has been suggested with smooth muscle cells or pericytes [7, 8], epithelium, especially with Clara cells [1], neuroendocrine cells [2] or melanocytes [6]. Immunohistochemical and ultrastructural investigations allow for rejecting such theories. Tumor cells are negative in immunoreactions for keratins, EMA, desmin, actin and chromogranin [5].

The immunoexpression of HMB45, as well as S-100 and NSE combined with negative reactions to epithelial markers may indicate an association with such neoplasms as melanoma, clear cell sarcoma of the tendon sheath, as well as angiomyolipoma or angioliipoma, which is related to the presence of melanosomes, but not necessarily points to an association with the melanocyte line [5, 6]. One should also remember that in the lungs, HMB45 labels some cells in lymphangioliomyomatosis and a report has been published describing a patient with tuberous sclerosis and concomitant clear-cell tumor of the lung and lymphangioliomyomatosis [4].

An original concept of metabolic abnormalities in tumor cells with accumulation of glycogen in the lysosomes, resembling glycogenosis (Pompe's disease) was postulated by Becker et al. [2], although not a single case has been reported of a patient with a "sugar" tumor and a genetically-transmitted storage disease [5].

The tumor is believed to be benign and may be located also in larynx, ovary or pancreas. Thus, local surgical treatment is sufficient and the patients do not require chemotherapy. However isolated cases have been described presenting with large, necrotic tumors metastasizing to the liver [3, 10].

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Address for correspondence and reprint requests to:

B. Papla M.D.
Department of Pathomorphology
Grzegórzecka 16, 31-531 Kraków