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Case Report

Clear Cell "Sugar" Tumor of the Lung: Benign or Malignant?

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Clear cell "sugar" tumors of the lung are rare pulmonary tumors. This case study illustrates a patient who was found to have a persistent nodule in the left-upper lobe of the lung. Positron emission tomographic scanning showed mild-moderate 18-fluoro-deoxyglucose uptake. Based on these findings, a video-assisted resection of the tumor was undertaken. The mass was identified histologically, as a clear cell "sugar" tumor of the lung. This case report discusses the benign versus malignant nature of this rare tumor.

Key words: Clear cell sugar tumor – Rare tumor – Lung tumor – Incidentaloma

Lung cancer is one of the leading causes of cancer death in industrialized countries. Early discovery is an important factor for survivability. With only a limited number of cases reported,[1] clear cell (sugar) lung tumors are extraordinarily rare. These particular lung tumors have been described as benign neoplasms that have a considerable amount of intracellular glycogen among other diagnostic features. The characteristic presence of such a high amount of glycogen has led to these tumors as often being referred to as simply, sugar tumors of the lung.[2]

The purpose of this report is to add to other reported cases of this rare pulmonary lesion, through a comprehensive literature review. The goals are to inform physicians of this rare entity, and to discuss how these tumors can be confused with malignant tumors.

Case

A 39-year-old, well-developed female presented with evidence of a persistent nodule located in the left-upper lobe of the lung. A whole body positron emission tomographic/computed tomography (PET/CT) showed the nodule measuring approximately 1.1 cm × 1.0 cm in size along with persistent ground glass type infiltrate. The 18-fluorodeoxyglucose uptake was positive. The nodule was also shown to be changing with serial films, with an increase in size. The structural exam was normal

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except for paravertebral tissue fullness around T2 to T5. It was recommended that she undergo video-assisted thoracoscopic resection of the lesion. A wedge resection was carried out and the lesion was successfully removed alongside normal surrounding parenchyma. Frozen sections showed evidence of inflammatory cells surrounding the nodule, but no evidence of malignancy. During the operation, both the lesion and the lung parenchyma were opened and aerobic, anaerobic, and acid-fast cultures were obtained. The rest of the lung appeared healthy with no pleural effusions or any other abnormalities. The operation was well-tolerated and the patient recovered completely and continued to do well on postsurgical cardiothoracic surgical clinic visits. Final pathology was consistent with benign sugar tumor (Fig. 1).

Postoperative osteopathic manipulative treatment was performed to improve respiratory breathing mechanics. Gentle manipulations of the paravertebral myofascial tissues including localized lymphatic pump techniques were performed to improve lymphatic flow away from congested tissues as well.

Discussion

In a search of the English literature, we found only 40 cases of sugar cell tumors.[3] Usually, sugar tumors are discovered inadvertently via radiologic films as solitary, round, pulmonary nodules[4] with no lobar preference.[5] Sugar tumors of the lung almost exclusively reside in the parenchyma, yet actual cellular origin remains unknown.[2] The neoplasm is made up of uniform, round, clear cells with well-defined borders. The neoplasm has thin-walled vasculature that imparts an alveolar appearance.[8] These tumors appear to affect both sexes equally. They also seem to mostly affect the elderly.[5] However, there has been a report of an 8-year-old with the tumor.[6] Unfortunately, not enough cases have been reported to establish specific risk factors. Since other types of small cell lung cancers tend to be very aggressive, the need for diagnosis is paramount.

The only definitive method of diagnosing this particular type of tumor is immunoreactivity. These tumor cells showed immunoreactivity for human melanoma black (HMB-45) and S-100, with no reactivity for cytokeratin 7 or epithelial membrane antigen.[7,8] They are also positive for tyrosinase, melan-A, microphthalmia transcription factor, and NKI/C3. The most sensitive markers being HMB-45, melan-A, and microphthalmia transcription factor.[12] This immunoreactivity shows that these cells display a melanocytic differentiation and thus separating itself from other types of clear cell tumors. Immunoreactivity is the only sure method of separating this benign tumor from other malignant tumors but, because of how invasive this process would be just to determine the potential malignancy, the best course of action is surgical resection of the mass.

Often these tumors can be easily confused with metastases of renal clear cell tumor, which makes renal clear cell carcinoma metastases as a leading differential. These metastases also show abundant glycogen, like sugar tumors, but will show reactivity to cytokeratin as well as epithelial membrane antigen.[5] Another leading differential is a clear cell pulmonary carcinoma.[7,8] This type will have abundant mitosis, necrosis, and reactivity to cytokeratin. However, benign sugar tumors of the lung, in general, have shown no evidence of reoccurrence, extensive tissue invasion, or metastasis, even after enucleation.[2] It is important to note that there have been a few reports where sugar cell tumors have shown some malignant characteristics in terms of vascularity and local invasion.[9] These tumors tend to have an ample blood supply made up of large and thin-walled blood vessels. This vascularity lends support to the tumor being primary in the lung and not a metastasis.[7]

The question about the tumor's malignancy brings up an interesting discussion about this tumor and its resultant PET scan. Studies with PET of lung tumors have shown that the prevalence of malignancy in solitary pulmonary nodules increases to about 64 to 82% for masses greater than 2 cm. Also, nodules that presented with pure ground-glass opacities were more likely to be malignant, in a rate of about 59 to 73%.[10] Since this case not only had a nodule that close to 2 cm and showed ground-glass opacities, the chance for malignancy was high. The established prognostic criteria for the diagnosis of malignancy in similar tumors include any combination of the following: infiltrative growth, marked hypercellularity nuclear enlargement and hyperchromasia, high mitotic activity, atypical mitotic figures, and coagulative necrosis.[13]

Our case shows how, on average, these rare tumors will have no clinical presentation. Most

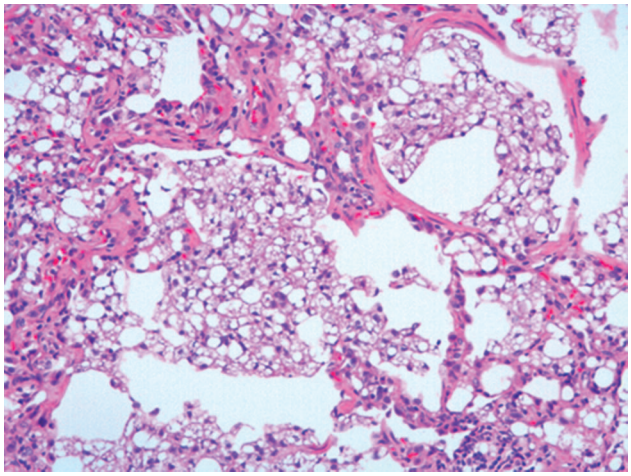

Fig. 1 Low-power hematoxylin and eosin stain, foamy cytoplasm consistent with sugar tumor.

discoveries of these tumors are incidental radiologic findings. This can be quite disturbing, due to the fact that similar tumors could possibly be malignant. There have been a few sporadic cases reporting significant morbidity including thrombocytosis and hemoptysis.[11] The overarching question of malignant potential upon an incidental discovery of a pulmonary nodule, even without any clinical presentations, leads to the fact that the best treatment is surgical removal.

Conclusion

In summary, our case describes a form of clear cell sugar tumor of the lung, a very rare type of benign mass that generally has no clinical presentations. They are benign due to no evidence of reoccurrence, invasion, or metastasis. Due to the difficulty in determining malignancy via PET scan and CT scan, and with a high chance of a solitary nodules being malignant according to evidence-based medicine, these tumors can be troublesome. The only way to actually determine if it is benign or malignant is through surgery. The tumor cells characteristically contain a large amount of intracellular glycogen, and have distinct immunoreactivity. However, only through pathology can the exact diagnosis be given. Due to the difficulty of differentiating the exact nature of clear cell lung tumors, the best treatment is to surgically remove the lesion, which is both diagnostic and curative.[5]

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