Journal of Korean Medical Science
Vol 4, No. 4, P 179-183, December 1989

So-called Sclerosing Hemangioma of the Lung

—Two Cases Report with Ultrastructural Study—

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Sclerosing hemangiomas of the lung are benign neoplasms of uncertain histogenesis. We analysed two cases of sclerosing hemangiomas of the lung with histochemistry and electron microscopy. They had a variegated histologic appearance characterized by an admixture of solid, hemorrhagic, papillary and sclerotic lesions. Characteristic uniform round cells, unique to this tumor, were found within the stroma in all lesions. In the electron microscopic examination, we found Weibel-Palade bodies like small bodies in the tumor cells. We suspect hypothesis originating in the endothelial cell can not be completely excluded yet. Sclerosing hemangioma is a distinct clinicopathologic entity and should be distinguished from other benign neoplasms or inflammatory lesions of the lung.

Key Words: *Sclerosing hemangioma, lung, Weibel-Palade body, endothelial cell.*

INTRODUCTION

Since the first report in 1959 by Liebow and Hubbell (Liebow and Hubbell 1959), sclerosing hemangioma of the lung has been considered to be a benign pulmonary lesion. Despite divergent histologic features, some authors continue to classify these lesions as variants of a single entity (Dubilier et al., 1968; Arean and Wheat, 1962; Rosai, 1989). These tumors are variously termed "postinflammatory pseudotumor" (Kuzela, 1975), "histiocytoma" (Liebow and Hubbell, 1959), "fibroxanthoma "(Liebow and Hubbell, 1959), or "sclerosing hemangioma" (Liebow and Hubbell, 1959; Arean and Wheat, 1962; Dubilier et al., 1968; Rosai, 1989), a confusing array of names which reflects uncertainty both about the cell of origin and even about the neoplastic nature of the lesion. There are several hypotheses as to its histogenesis, including pulmonary epithelial (Hill and Eggleston, 1972; Kennedy, 1973; Koide, 1979; Palacios et al., 1979; Singh et al., 1984; Nagata et al., 1985), mesothelial (Katzenstein et al., 1983), and endothelial origin (Rubin et al., 1958; Liebow and Hubbell, 1959; Haas et al., 1972; Kay et al., 1977). Generally, the tumors are solitary. We experienced two cases of sclerosing hemangiomas of the lung and examined the histological features in detail using electron microscopy to observe their histogenesis including the cell of origin.

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CASE REPORT

Case 1.

This 47 year old male was admitted with migratory chest pain of 5 months duration. At that time, a routine chest X-ray revealed a well circumscribed coin lesion of the right lower lobe. Chest computerized tomography (CT) revealed a well circumscribed mass measuring 4 cm in largest diameter. Right lower lobectomy was performed. The cut surface of the mass showed a yellow tan solid tumor (Fig. 1). Microscopic features of the representative area showed sclerotic and papillary growth lined with single or multi-layered cuboidal cells and scattered foamy histiocytes. In some areas, there were sclerotic lesion with irregular hemangioma like spaces lined with polygonal or cuboidal cells (Fig. 2, 3). The ultrastructural study of the lesion revealed polygonal cells showing interdigitating plasma membranes. In areas, they formed uniform infoldings of membranes called plasmalem-

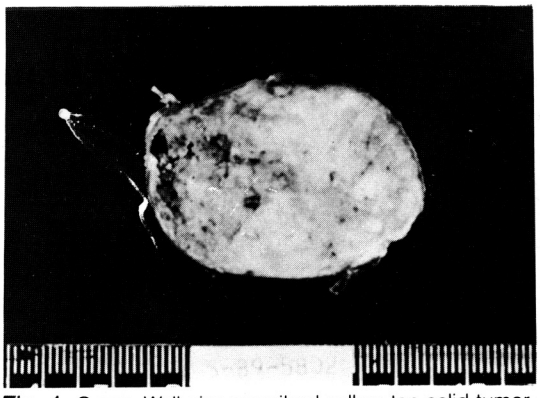

Fig. 1. Gross: Well circumscribed yellow tan solid tumor (case 1).

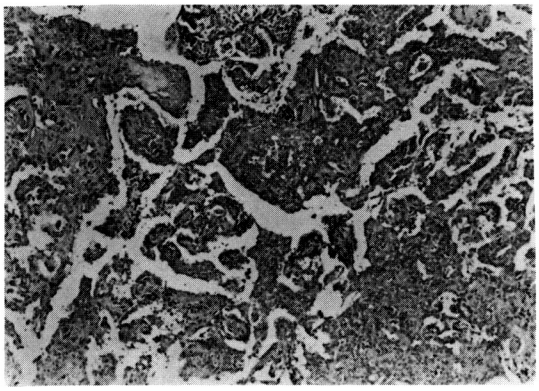

Fig. 2. Photomicrography of case 1. Sclerotic and papillary growth and irregular hemangioma like spaces (H-E, ×100).

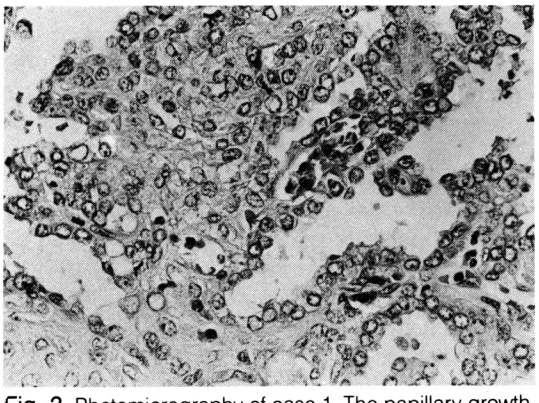

Fig. 3. Photomicrography of case 1. The papillary growth is lined by single layered cuboidal or polygonal cells (H-E, ×400).

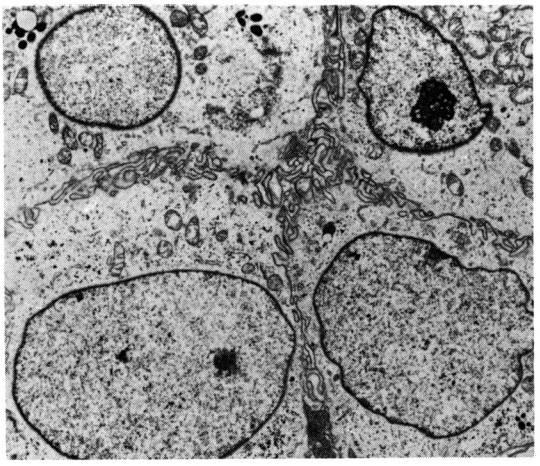

Fig. 4. Ultrastructure of case 1. Polygonal cells show interdigitating plasma membranes and relatively small numbers of organelles (EM, ×4,000).

mal vesicles. Basal lamina was well developed along the plasma membrane. It was fine microfibrillar structure. In the cytoplasm, there was some amounts of pinocytotic vesicles at the peripheral side of the cytoplasm. There were some moderate amounts of intermediate filaments which were finely dispersed throughout the whole cytoplasm. There were some amounts of glycogen granules, rough endoplasmic reticulums and free ribosomes. In areas, numerous rod-shaped tubular bodies were present. These organelles were scattered randomly in the cytoplasm. This was a single-membrane-bound cylindrical rod-like body which contained a number of microtubules set in an electron-dense matrix. The matrix varied from moderately to highly electron-dense and appeared granular in nature. The microtubules generally pursured a straight parallel course along the long axis of the organelle. Nuclei were ovoid with finely dispersed chromatin (Fig. 4, 5, 6).

Case 2.

This 37 year old housewife was admitted with symptoms of fever and chills over a period of three days. A routine chest X-ray revealed a well demarcated lesion in the right middle lobe measuring 5×5.5 cm in largest diameter. Chest CT showed there was a spherical mass in the right middle lobe medial segment measuring 4 cm in diameter. The cut surface of the tumor tissue showed well circumscribed nodular solid tissue (Fig. 7). Light microscopic findings of the tumor showed predominantly papillary growth having fibrovascular cores, lined by polygonal or cuboidal

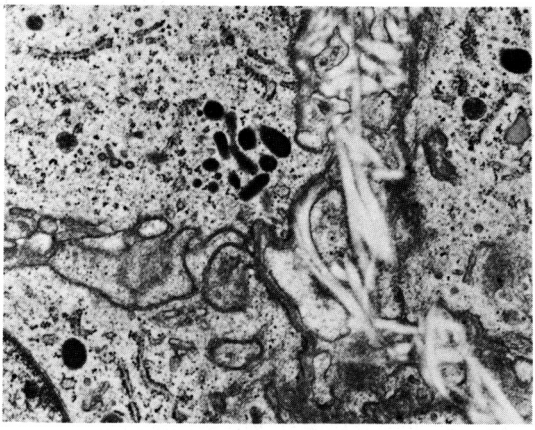

Fig. 5. Ultrastructure of case 1. There are some ovoid or rod shaped bodies simulating Weibel-Palade bodies (EM, ×12,000).

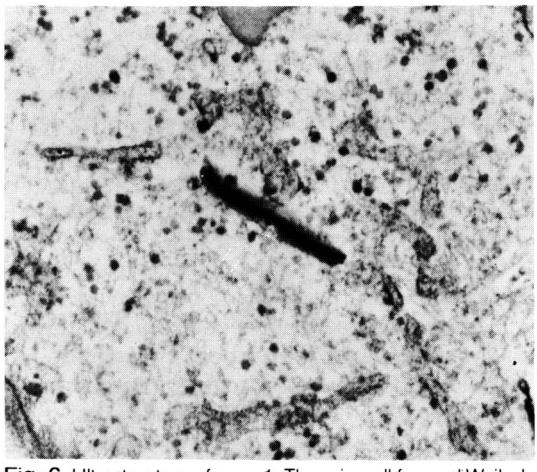

Fig. 6. Ultrastructure of case 1. There is well formed Weibel-Palade like body, scattered intermediate filaments and peripheral basal lamina (EM, ×35,000).

cells. Electron microscopic findings were similar to those of case 1, but the rod shaped granules were not noted.

DISCUSSION

Pulmonary sclerosing hemangiomas, first described by Liebow and Hubbell in 1956 (Liebow and Hubbell, 1959), are distinct benign neoplasms with characteristic clinicopathologic features. Generally the tumors are solitary, and multifocal sclerosing hemangiomas have been very rare (Katzenstein et al., 1980; Noguchi et al., 1986). They have a variegated histologic appearance characterized by an admixture of solid, hemorrhagic, papillary, and sclerotic

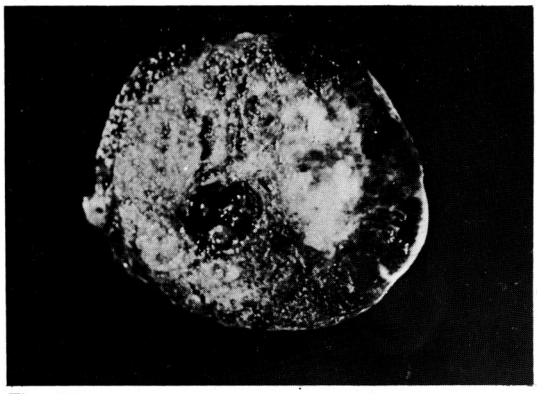

Fig. 7. Gross: Well circumscribed nodular solid tumor tissue with central hemorrhage and cystic changes (case 2)

areas in differing porportions (Katzenstein et al., 1980). They can be distinguished from those tumors known as "histiocytoma", "fibroxanthoma", "plasma cell granuloma", and "post-inflammatory pseudotumor" (histiocytoma group) both clinically and histologically. The marked female predominance of sclerosing hemangiomas is not a feature of the histiocytoma group of neoplasms, whereas the predilection of plasma cell granulomas for children is not characterisic of sclerosing hemangiomas (Bahadori and Liebow, 1973). One of our cases was a female patient. Others have reported male patient (Chung et el., 1987). Alhough sclerosing hemangiomas may have various other histologic features, including foam cells and chronic inflammatory cells, the constant finding of the distinct round cells distinguishes them from the histiocytoma group of tumors in which the stroma contains characteristic spindle cells (Bahadori and Liebow, 1973; Nair et al., 1974; Kuzela, 1975). Moreover the congested vascular spaces and dilated blood lakes, the papillary projections, and the solid sheets of round cells often admixed with mast cells are characteristic features of sclerosing hemangiomas and are not seen in the histiocytoma group (Katzenstein et al., 1980). In our two cases, the histologic features show characteristic sclerosing hemangiomas such as congested vascular spaces, dilated blood lakes, papillary projections, and solid sheets of round cells. Another benign tumor which may enter the differential diagnosis with sclerosing hemangiomas is the clear cell ("sugar") tumor (Becker and Soifer, 1971; Liebow and Castelman, 1971; Katzenstein et al., 1980) which is composed of bland round cells and prominent vascular spaces. It differs, however, in that the cells are uniformly clear, contain large amounts of glycogen, and lack the variegation of sclerosing hemangiomas. Moreover, the vascular

spaces are delicately thin-walled with a prominent endothelial lining and a distinctly sinusoidal appearance in contrast to the more heterogeneous blood filled spaces of sclerosing hemangiomas (Becker and Soifer, 1971; Liebow and Castleman, 1971; Katzenstein et al., 1980). In cases where the diagnosis is uncertain, electron microscopy should be diagnostic; clear cell tumors contain large amounts of characteristic membrane-bound glycogen which is not a feature of sclerosing hemangiomas (Becker and Soifer, 1971; Hoch et al., 1974).

The differentiation of sclerosing hemangiomas from certain malignant tumors may also cause difficulty. Sclerosing hemangiomas in which the papillary pattern is predominant have been confused with bronchioloalveolar carcinoma, mesothelioma and metastatic thyroid carcinoma (Katzenstein et al., 1980). The presence wthin the papillary stalks of the characteristic round cells which contrast with the smaller cuboidal cells lining the surface clearly distinguishes sclerosing hemangiomas from the other tumors (Katzenstein et al., 1980). Another malignant tumor occasionally in the differential diagnosis is metastatic renal cell carcinoma. Although both tumors may contain glycogen, the cytologic features of a malignant tumor, such as cellular pleomorphism and frequent mitotic figures, are not seen in sclerosing hemangiomas (Katzenstein et al., 1980). Carcinoid tumors may be difficult to distinguish from some sclerosing hemangiomas in which the solid pattern predominates. The distinct nesting of tumor cells and the frequent trabecular or rosette configurations characteristic of proximal carcinoids are not features of sclerosing hemangiomas, while the spindle shape of the peripheral carcinoid cells contrasts with the round cells of sclerosing hemangiomas (Katzenstein et al., 1980).

Despite several recent electron-microscopic studies (Hill and Eggleston, 1972; Kennedy, 1973; Kay et al., 1977; Heilman and Fechner, 1978; Koide, 1979; Palacios et al., 1979; haas et al., 1983; Katzenstein et al., 1983; Hong et al., 1986) the histogenesis of pulmonary sclerosing hemangiomas reamins uncertain. Interpretation of ultrastructural findings is divided between those authors favoring epithelial derivation (Hill and Eggleston, 1972; Kennedy, 1973; Heilman and Fechner, 1978; Koide, 1979; Palacios et al., 1979) and those favoring endothelial origin (Haas et al., 1972; Kay et al., 1977) and authors favoring mesothelial derivation (Katzenstein et al., 1983). Some authors (Haas et al., 1972; Kay et al., 1977) found, in their ultrastructural study, Weibel-Palade bodies and phagocytic pinocytotic vesicles. So they considered the sclerosing hemangiomas originated from endothelial cells. Others (Hill and Eggleston, 1972; Kennedy, 1973; Heilman and Fechner, 1978; Koride, 1979; Palacios et al., 1979; Hong et al., 1986; Chung et al., 1987) found lamellated bodies and interdigitation of plasma cell membranes. So they considered the sclerosing hemangiomas as primarily proliferation type II pneumocytes and secondarily vascular and stromal changes followed. Especially Kennedy (Kennedy, 1973) offered the term papillary pneumocytoma rather than sclerosing hemangioma. Recently katzenstein et al. (Katzenstein et al., 1983) using electron microscopic study, immunohistochemistry and glycosaminoglycan electrophoresis, had findings that suggested mesothelial origin. In one of our two cases of ultrastructural study, we found rod-shaped organelles and pinocytotic vesicles in the cytoplasm. These rod-shaped organelles had quite similar ultrastructures to those of Weibel-Palade bodies (Weibel and Palade, 1964; Ghadially, 1988; Weiss, 1988). We could not find multilamellated myelinosomes which were characteristic features of the type II pneumocytes. There were no microvillous structures and desmosomes which could be found at the mesothelial cells. Through these ultrastructural study we had findings that suggested endothelial origin.

Sclerosing hemangiomas of the lung should be recognized as a distinct clinicopathologic entity. It may be more common than generally appreciated since some cases may have been misdiagnosed as other benign or malignant tumors. The best name for this neoplasm ideally should reflect the cell of origin; but while the histogenesis remains obscure, the term sclerosing hemangioma at least retains a historical precedent.

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