Surgical treatment of a primary tracheal angiosarcoma

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Angiosarcomas of the pulmonary system are extremely rare and usually represent metastatic diseases.¹ Only one case of primary tracheal angiosarcoma has been reported after autopsy.² The pathogenesis of primary pulmonary angiosarcoma and the association with chemicals are not confirmed. No successful treatment of primary tracheal angiosarcoma has been reported, and the prognosis of this rare disease after surgical resection is unknown. We report a case of a patient with primary tracheal angiosarcoma with an 18-year history of occupational exposure to aerosols of paint pigments. The distinct clinical features of repeated hemoptysis caused by a single, small fleshy tumor at the lower end of the trachea and successful treatment by means of surgical intervention are believed to be the first of their kind.

Clinical Summary

A 44-year-old Chinese man was admitted to another hospital because of repeated hemoptysis for 3 months. He was a nonsmoker. He had been working as a spray painter, using a pneumatic spray gun, for 18 years in an environment filled with aerosols of paint pigments. Physical examination revealed a well-developed and well-nourished man in no apparent distress. Routine laboratory investigations and electrocardiograms showed no remarkable findings. The lungs were clear on the basis of chest radiography. At bronchoscopic examination, a 7-mm red fleshy nodule with blood coating and easy-touch bleeding was identified at the right membrane-cartilage junction of the lower trachea, about 1 cm above the level of the carina (Figure 1). Transbronchial biopsy revealed a poorly differentiated carcinoma or sarcoma-like tumor. The diagnosis was not confirmed because of having an inadequate specimen. He was transferred to our hospital for further management.

Bronchoscopic examination repeated at our hospital disclosed that the tumor was slightly flatter and smaller after biopsy. Chest computed tomographic scanning showed clear lung fields with no mediastinal lymphadenopathy. Ultrasonographic examination of the heart, whole-body bone scanning, and computed tomographic scanning of the head and abdomen failed to disclose any tumor in other locations. The patient underwent a right standard thoracotomy through the fourth intercostal space. After circumferential mobilization of the lower trachea and both main bronchi, the involved trachea was segmentally resected, with resection margins of 1 cm in both the upper and lower directions. No obvious lymphadenopathy was noted in the surrounding mediastinum. Both ends of the trachea were then anastomosed with interrupted sutures.

On microscopic examination, the tumor had eroded the tracheal wall through the cartilage with mostly denuded mucosa. The resection margins were free of tumor. Sections of the tumor demonstrated sheets of highly pleomorphic malignant endothelial cells filling thin-walled vascular channels and exhibiting prominent mitotic activity (Figure 2). Immunohistochemically, the tumor cells were positively stained for vimentin diffusely and for CD31 (Figure 3) and CD34 focally. The factor VIII-related antigen, cytokeratin, S-100 protein, and smooth muscle actin staining results were all negative. After the operation, 3 stitches were placed between the chin and chest to hold the patient's head in flexion. The stitches were cut on the seventh postoperative day. The postoperative course was uneventful. The patient has been followed up for 12 months without any evidence of recurrence.

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Figure 1. At bronchoscopy, a 7-mm red fleshy nodule was noted at the lower trachea near the takeoff of the right main bronchus.

Figure 2. Angiosarcoma composed of highly pleomorphic tumor cells with rudimentary lumen formation. (Hematoxylin and eosin, original magnification 66 $\times$.)

Discussion

The presence of angiosarcoma in the pulmonary system is usually a consequence of metastasis from a primary site in the skin, breast, liver, bone, spleen, or heart.¹ Primary angiosarcomas of the pulmonary system are extremely rare, with no more than 20 cases in the medical literature.¹⁻⁴ Most of these tumors are multiple, arising in the periphery of pulmonary parenchymal tissue with bilateral involvement, thereby making the question of primary location uncertain. Only 2 patients were reported with a solitary nodule in the main airway. One was an 81-year-old man with a tumor of 20 mm in the lower trachea near the takeoff of the right main bronchus, almost in the same position as for this patient.² The other was a 59-year-old man with a tumor of 15 mm in the right upper bronchus.³ Both patients died as a result of massive and intractable hemoptysis caused by the tumor. No definite diagnosis or effective treatment could be made before the patients' deaths.

Figure 3. Immunostaining for CD31 shows intense staining of some angiosarcoma cells. (ABC method, original magnification 132 $\times$.)

Factors contributing to the development of primary pulmonary angiosarcoma are unclear. Although exposure to heavy metals, such as arsenic, in paint pigments is associated with the pathogenesis of hepatic angiosarcoma,⁵ this relationship has not been established in primary pulmonary angiosarcoma. Only one patient with a history of industrial exposure in copper mines has been reported.¹ This patient is a spray painter, and 18 years of occupational exposure to paint-pigment aerosols containing heavy metals seems to be a possible risk factor in the development of this kind of tumor. However, the association between the tracheal angiosarcoma and paint pigments is almost impossible to determine because of a long latent period and the rarity of the disease. Nevertheless, the question of toxic exposure with the development of a related malignancy must be raised.

Previous reports indicate that preoperative diagnosis of primary angiosarcoma of the main airway was not made,^{2,4} as occurred in this patient. Hemorrhagic diathesis of the tumor, inadequate biopsy of bronchoscopic examination, and the rarity of the disease make definite diagnosis almost impossible. Even after the operation or on the basis of postmortem examination, the diagnosis of neoplasms of the blood vessels also presents many difficulties in distinction between benign and malignant, as well as primary and secondary, lesions.

Stout's diagnostic criteria of angiosarcoma include the formation of atypical endothelial cells in greater numbers than are required to line the vessels with a simple endothelial membrane and the formation of vascular tubes with a delicate network of reticulin fibers and a marked tendency for their lumens to anastomose.⁶ The findings in this case are consistent with these criteria. The other diagnostic consideration in this patient is poorly differentiated carcinoma.⁷ The positive immunohistochemical staining of the neoplasm with vimentin, CD31, and CD34 supports the endothelial origin of the tumor in our patient and also helps correct the diagnosis in ambiguous cases. Staining for the factor VIII-related antigen was negative in this patient, but this is not uncommon in very anaplastic tumors of endothelial origin.¹ Moreover, negative staining for cytokeratin, S-100 protein, and smooth muscle actin confirms that the neoplasm is not of epithelial, neurogenic, or myogenic origin.

The prognosis of primary angiosarcoma of the pulmonary system is generally poor, irrespective of whether the location is in the pulmonary parenchyma or the main airway. Angiosarcoma of the pulmonary parenchyma is invariably fatal within months because metastases are usually present at the time of detection, and chemotherapy thus far has not proved effective. The clinical course of solitary angiosarcoma of the main airway is also dismal in previous reports.^{2,4} However, mortality of these patients was mainly caused by massive and intractable hemoptysis of the small resectable tumor rather than by the invasiveness of the disease. From the experience of successful treatment of this patient, angiosarcoma should be considered in the differential diagnosis of a primary tracheal tumor. Furthermore, prompt surgical intervention with adequate resection margins is recommended in the management of these patients when the disease is localized at detection.

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Primary choriocarcinoma of the lung

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Choriocarcinoma is a malignant proliferation of the Langerhans cell and of syncytial cells of trophoblastic origin that is normally situated in the female genital tract after a gestational event such as molar pregnancy, term pregnancy, abortion, or ectopic pregnancy.¹ Rarely it occurs in either sex as a midline lesion in the retroperitoneum, mediastinum, and the region of the pineal gland. Less frequently it is found in the bladder, liver, stomach, and colon, where it is seen in combination with adenocarcinoma.²⁻⁴ In men, choriocarcinoma occurs in the testis in combination with such tumors as seminoma, teratoma, and embryonal carcinoma.¹ The literature contains few cases of lung localization of choriocarcinoma. The prognosis of this tumor is extremely poor, despite surgical and chemotherapeutic treatment.⁵ We report a surgically treated case of choriocarcinoma in a 37-year-old woman who came to our attention because of a lung tumor with radiologic characteristics similar to those of a solitary fibrous tumor of the pleura.

Clinical Summary

During surgical evaluation for cholecystectomy for cholelithiasis in a 37-year-old woman, the chest radiograph showed an opacity in the right inferior pulmonary lobe (Figure 1). Computed tomographic scans demonstrated a well-demarcated mass similar to solitary fibrous tumor of the pleura (Figure 2). On physical examination, the woman appeared healthy with stable vital signs. The patient referred in her history to an operation for vesicular mole that had occurred 7 years previously.

A needle biopsy was performed, and the result of cytologic examination of the cells was compatible with the hypothesis of fibrous tumor. A right thoracotomy was performed. The lung appeared to be infiltrated by a tumor not compatible with the hypothesis of a solitary fibrous tumor of the pleura. An inferior lobectomy was performed. The postoperative recovery was uneventful, and the patient was discharged in 8 postoperative days. A definitive histologic examination demonstrated a choriocarcinoma (Figure 3, *a-e*). β -Human chorionic gonadotropin (β -HCG) was measured in the serum at that time, and the level was high (597 IU/L, whereas the normal level is 0-10 IU/L).

Computed tomographic scan of the ovary and the genital apparatus was performed to research a possible primary localization, but nothing was found. Hysteroscopy was also performed, and results were negative. The previous specimen of the vesicular mole was reexamined, but no cells of choriocarcinoma were found.

Chemotherapy was started 2 months after thoracic surgery and consisted of bleomycin, etoposide, and cisplatin. Before the start of chemotherapy, the level of β -HCG was measured; it was 8 U/L 40 days after surgery. At 1-year follow-up the patient is alive in good condition. The β -HCG level is actually normal.

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