

Locally Infiltrative Glomus Tumor of the Bronchus: A Case Report

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We report a glomus tumor of the bronchus that showed invasion of the neural area and extrabronchial extension without significant histological malignancy. The patient was a male in his late 30s with the chief complaint being hemoptum. CT revealed a nodal shadow 15 mm in diameter in the right bronchus intermedius. An irregularly protruding lesion on the tumor surface was observed by bronchoscopy immediately under the second carina in the right truncus intermedius, but could not be diagnosed because of bleeding. Sleeve lobectomy of the right upper lobe was performed, since carcinoid tumor was suspected in open chest biopsy and intraoperative frozen section diagnosis. A solid growth of spherical and cubic uniform cells with a clear eosinophilic cytoplasm and spherical nuclei was observed. Immunohistochemistry was positive for α -smooth muscle actin and type IV collagen, weakly positive for synaptophysin, and negative for keratin, neural cell adhesion molecule, chromogranin A, desmin, CD34, and S100, leading to a diagnosis of glomus tumor. Neuroinvasion and extrabronchial tumor extension were observed, but an atypical cytology, bleeding, or necrosis was found histologically. This is the first description of infiltrative glomus tumor of the bronchus. (*Ann Thorac Cardiovasc Surg* 2010; 16: 113–117)

Key words: glomus tumor, bronchus, infiltrative, synaptophysin, carcinoid

Introduction

Glomus tumor is usually a benign tumor that often develops in the nail bed. Bronchial glomus tumor is rather rare and morphologically similar to carcinoid tumor; thus discrimination by immunostaining is required.¹⁾ Malignant glomus tumor derived from the lung and bronchus is extremely

rare, with only 4 reported cases.²⁾ In a classification of atypical glomus tumors proposed by Gould et al. in 1990, those without malignant histological findings were considered to be locally infiltrative glomus tumors.³⁾ In the case reported here, there were no histologically malignant findings, but neural invasion and extrabronchial extension were observed.

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Case

The patient was a male in his late 30s who had experienced hemoptum three times in about half a year. In the first two episodes, the symptom had improved after a few days. Chest CT revealed a nodal shadow 15 mm in diameter in the right truncus intermedius and irregular thickness in the bronchial wall, such that infiltration of a tumor outside the wall was suspected (Fig. 1). Bronchoscopy revealed an

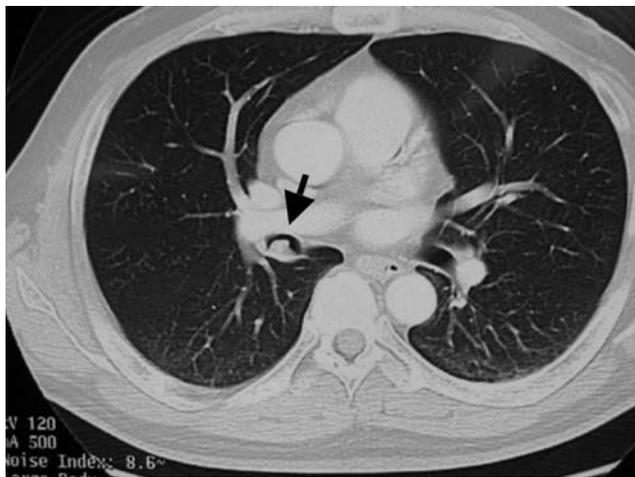


Fig. 1. Chest computed tomography showed a tumorous shadow 15 mm in diameter in the truncus intermedius (arrow). Because the outer wall of the bronchus was thickened, tumor infiltration into the outside of the wall was suspected.

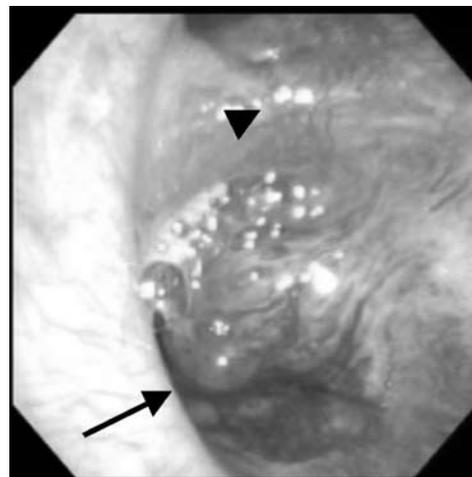


Fig. 2. Findings from bronchoscopy. The upper part of the figure shows the right upper lobe, and the lower part shows a tumor in the bronchus intermedius (arrow). Redness of the second carina can be seen (arrowhead).

irregularly protruding lesion on the tumor surface immediately under the second carina in the right bronchus intermedius, which obstructed about 80% of the lumen (Fig. 2). Redness was also observed in the second carina, and one biopsy was discontinued because of massive bleeding. Tissue diagnosis showed no tumorous tissue, and cytology did not indicate a significant number of tumorous cells. Based on these observations, the following surgical procedures and tumor biopsies were performed.

Thoracotomy with preservation of the pectoralis was conducted via a skin incision of 13 cm. The intralobar pulmonary artery was taped, and the bronchus intermedius was then exposed. Two thirds of the bronchus intermedius was resected on the peripheral side of the tumor, and a portion was biopsied for rapid intraoperative diagnosis (Fig. 3). The results strongly indicated carcinoid tumor, since the diagnosis indicated a low-grade malignancy or a benign tumor. Because the tumor protruded extrabronchially and was suspected to be malignant, and infiltration into the second carina was also suspected based on bronchoscopy, sleeve resection of the upper lobe was conducted.

Macroscopic findings included a 15 × 13 mm protruded lesion ranging from half of the membranelike area to one quarter of the cartilage. An extrabronchial protrusion of the tumor from a gap in the cartilage was also found. Pathologically, solid growth of spherical to cubic uniform cells with a clear eosinophilic cytoplasm and spherical nuclei was observed (Fig. 4). Elastic fiber staining revealed growth of a tumor between the mucosa and the bronchial

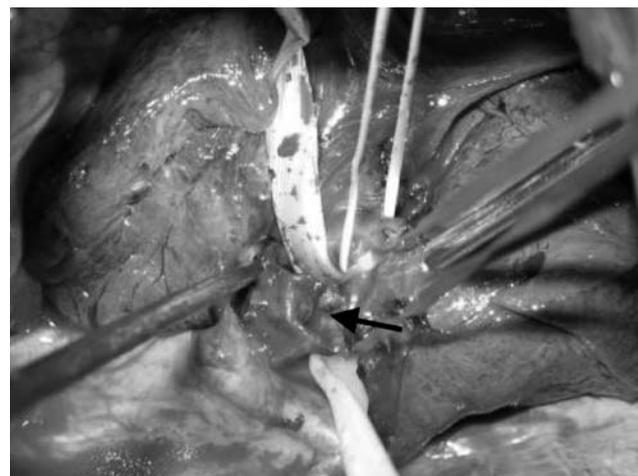


Fig. 3. Intraoperative images. The image on the right shows the cranial side, and the lower image shows the dorsal side. The truncus intermedius and interlobar pulmonary artery are taped. The truncus intermedius was cut on the peripheral side of the tumor so that the tumor can be seen (arrow).

glands, with the tumor protruding extrabronchially from a gap in the cartilage (Fig. 5). Infiltration into the area surrounding the nerve was observed. The surgical margin was negative and the second carina, which was suspected to have been infiltrated by the tumor, was actually tumor-free. Immunohistochemistry (Figs. 6–9) was positive for α -smooth muscle actin (α -SMA), a type IV collagen, and partly positive for synaptophysin. It was negative for neural

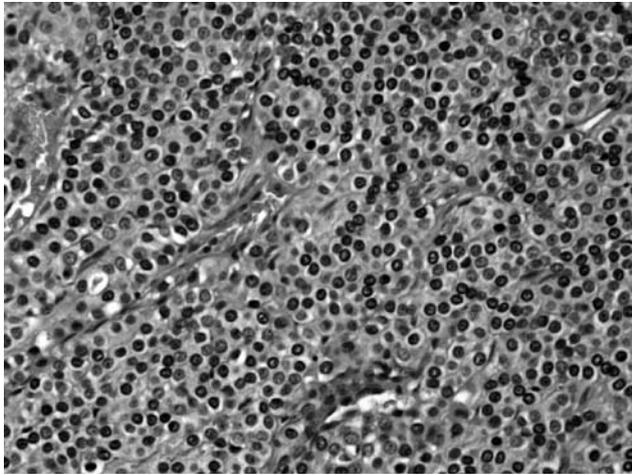


Fig. 4. Hematoxylin and eosin-stained specimen of the tumor.
A solid arrangement of cuboidal to spherical cells was observed.

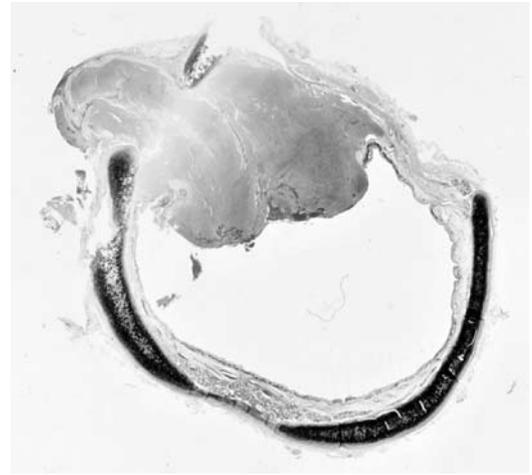


Fig. 5. A loupe-magnified image. (Elastica Masson Goldner staining)
The tumor showed extrabronchial extension.

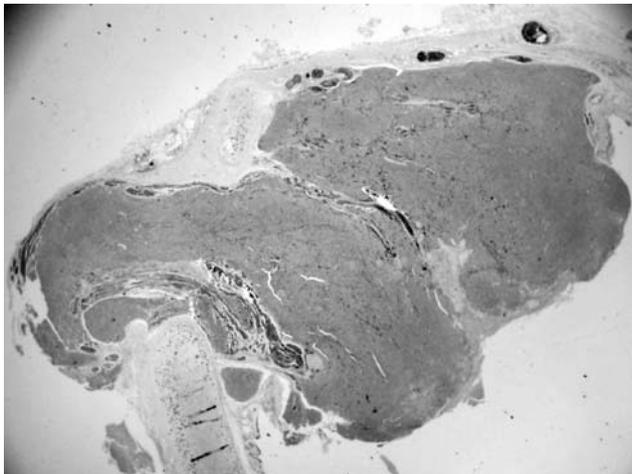


Fig. 6. Immunohistochemistry for S-100.
The brown area corresponds to a peripheral nerve around which the tumor was located.

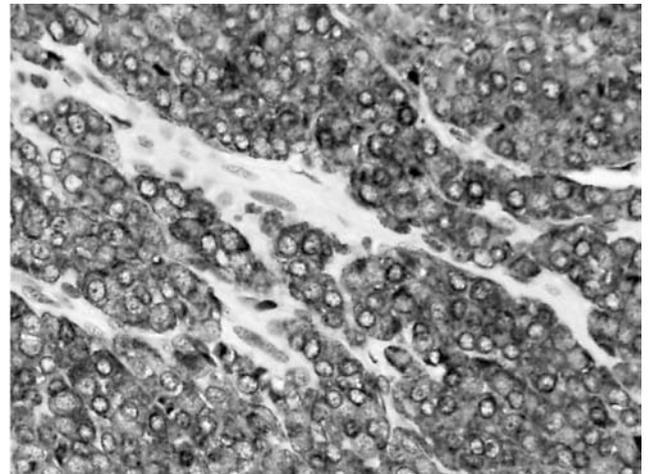


Fig. 7. Immunohistochemistry for α -SMA.
The tumor cells were positive for α -SMA.

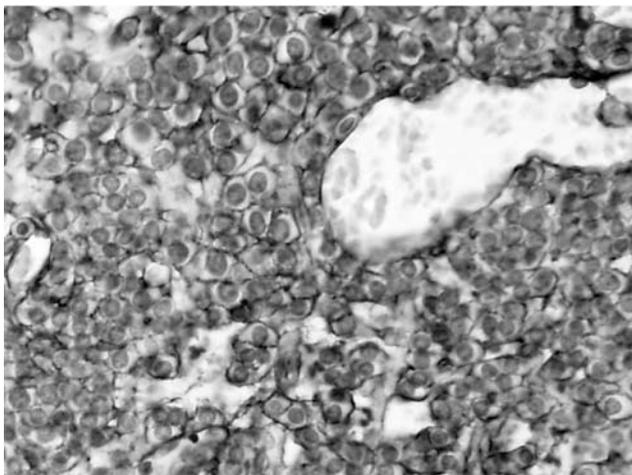


Fig. 8. Immunohistochemistry for type IV collagen.
The basal lamina surrounding the tumor cells can be seen.

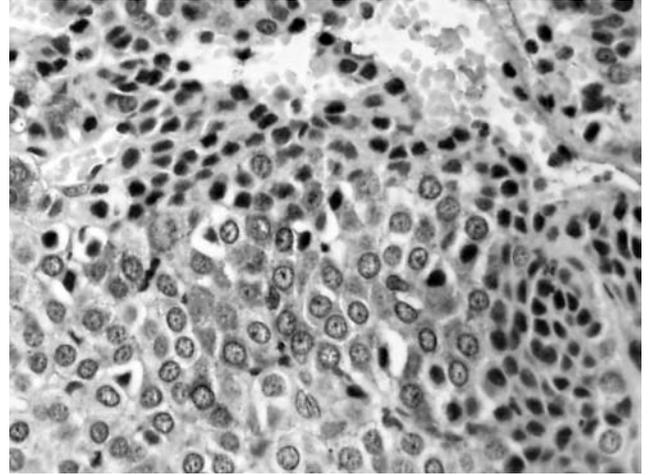


Fig. 9. Immunohistochemistry for synaptophysin.
Some of the tumor cells stained positively for synaptophysin.

Table 1. Classification of glomus tumor with atypical features, from Folpe et al.¹³⁾

Malignant glomus tumor	Glomus tumor of uncertain potential
Large size (> 2 cm) and deep location, <i>or</i> Atypical mitotic figures, <i>or</i> Marked atypia with mitotic activity (> 5/50 HPF)	Superficial location with high mitotic activity, <i>or</i> Large size only, <i>or</i> Deep location only
Symplastic glomus tumor	Glomangiomas
Lacks criteria for malignant glomus tumor <i>and</i> Marked nuclear atypia only	Lacks criteria for malignant glomus tumor or glomus tumor of uncertain malignant potential <i>and</i> Diffuse growth, resembling angiomatosis with excessive glomus cells

cell adhesion molecule (NCAM, CD56), chromogranin A, desmin, keratin, CD34, and S100. Based on these results, the case was diagnosed as glomus tumor. There were no findings indicating malignancy, such as bleeding, necrosis, atypical nuclear morphology, nuclear atypia, or p53 expression, and the ki-67-positive cells totaled less than 10% of the total cells (MIB-1 index < 10%).

The postoperative course was uneventful, and the patient was discharged on the 8th day of hospitalization. There has been no recurrence during the 10 months after surgery.

Discussion

A glomus tumor is derived from the glomus apparatus and accounts for 1.6% of all soft tissue tumors. The glomus apparatus is positioned in the area surrounding the blood vessels and is important in arteriovenous communication through the control of blood flow with changes in temperature. The nail bed is a common site for glomus tumor, with the extremities accounting for more than 70% of cases, followed by the cerebrocervical region and trunk (about 20%) and the stomach, colon, mediastinum, and bronchus (about 10%). These data indicate that glomus tumor can be found over almost all of the body.¹⁾ In the thoracic region, there have been 16 cases of trachea, and 4 cases arising in the bronchus have been reported.⁴⁻⁹⁾

Differential diagnoses for glomus tumor include carcinoid tumor, hemangiopericytoma, smooth muscle neoplasm, and primitive neuroectodermal tumor. Because the lung and bronchus are common sites of carcinoid tumor, many cases of glomus tumor are diagnosed preoperatively as carcinoid tumor, which makes differential diagnosis by immunostaining essential in these regions.^{6,8,10)} In glomus tumor, immunohistochemistry for α -SMA and type IV

collagen is positive, whereas for neuroendocrine markers, such as synaptophysin, chromogranin A, and NCAM, as well as for cytokeratin, S100, CD34, and desmin, it is typically negative.¹⁾ In our case, carcinoid tumor was suspected in intraoperative frozen section diagnosis, and it also seemed to be the most likely diagnosis based on the synaptophysin-positive result in a permanent sample. However, carcinoid tumor usually shows strong positive results for neuroendocrine markers, but our case was only weakly positive for these markers. This led us to consider another diagnosis, and it is important to note that a few reported cases of glomus tumor have been shown to be weakly positive for synaptophysin.¹¹⁾

Glomus tumor is usually benign, and malignant cases are extremely rare. Typical glomus tumors are subcategorized as “solid glomus tumor,” “glomangioma,” and “glomangiomyoma,” depending on the relative prominence of glomus cells, vascular structures, and smooth muscle.¹²⁾ These three tumors are considered to be subtypes of typical glomus tumors in the World Health Organization (WHO) classification, and the solid type accounts for about 75% of cases. A classification of atypical glomus tumors was proposed by Gould et al. in 1990, with locally infiltrative tumors categorized into the following three groups: (1) locally infiltrative glomus tumor, which is cytologically bland with a frequent glomangioma appearance and possible recurrence; (2) glomangiosarcoma in benign glomus tumor; and (3) *de novo* glomangiosarcoma.³⁾ A second classification was proposed by Folpe et al. in 2001, in which atypical glomus tumors were categorized into malignant, uncertain malignant potential, symplastic, and glomangiomas tumors (Table 1). In this classification, the key points indicating malignancy were “large size,” “deep location,” “atypical mitotic figure,” and “mitotic activity,”

but “infiltrative growth” was considered to be unimportant.¹³⁾

Infiltration was present in our case, but there were no histological malignant findings. We categorized the tumor as a locally infiltrative glomus tumor based on Gould et al.³⁾ and as a glomus tumor of uncertain malignant potential based on Folpe et al. According to Gould et al., the common characteristic of locally infiltrative glomus tumors is that local recurrence is observed, but not distant metastasis.³⁾ Folpe et al. also reported 6 cases of glomus tumor of uncertain malignant potential, but none of these showed local recurrence or metastasis.^{12,13)} Four cases of malignant glomus tumor derived from the lung and tracheobronchus have been described, but no locally infiltrative case has been reported.²⁾ Regarding perineural infiltration, the peripheral nerve bundle was apparently visible in the tumor lesion, with an image indicating that the peripheral nerve bundle and the tumor tissue had grown together. In this respect, no such case has been described previously, and further characterization is needed.

Complete resection is the basic procedure for treatment of malignant and benign tumors alike. A glomus tumor is generally benign, but many recurrent cases have been reported because of its incomplete removal. Lobectomy, sleeve lobectomy, and wedge resection are used for treatment of tumors derived from the lung and bronchus based on the tumor size and site. Because in our case a carcinoid tumor was suspected in intraoperative frozen section diagnosis and infiltration into the entrance of the upper lobe was present, sleeve lobectomy was conducted and was subsequently considered to have been the correct treatment. Our case provides an example of glomus tumor of the bronchus that showed infiltrative development with no histological malignant findings. In differential diagnosis for carcinoid tumor, the tumor was weakly positive for synaptophysin, a neuroendocrine marker, and further careful diagnosis was important. Follow-up is also required because of the concern of local recurrence.

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