OPEN

Bronchogenic Gangliocytic Paraganglioma

Yasunori Kaminuma, MD,
Masayuki Tanahashi, MD, PhD,
Naoko Yoshii, MD, PhD,
and Hiroshi Niwa, MD, PhD

Key Words: gangliocytic paraganglioma, bronchoscopy, high-frequency snare for an endoscope, Nd: YAG laser

(*J Bronchol Intervent Pulmonol* 2020;27:212–215)

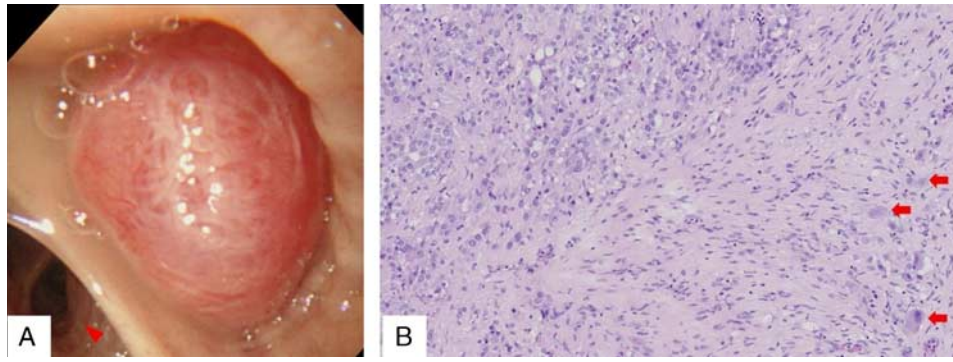

FIGURE A. Bronchoscopy revealed a smooth, glossy, pink, polypoid tumor at the entrance of the basal segmental bronchus of the right lung. The base of the tumor was found on the medial lobe side (red arrowhead indicates right B7) (A). Hematoxylin-Eosin staining showed 3 tumor components: epithelioid cells, ganglion-like cells (red arrows), and spindle cells (B).

Gangliocytic paraganglioma, which is a rare neuroendocrine tumor, typically occurs in the descending part of the duodenum.[1] In addition, bronchogenic gangliocytic paraganglioma is very rare, with only 5 cases reported in the English literature, including our case.[2–5] The tumor has distinctive features, consisting of 3 components: epithelioid cells, ganglion-like cells, and spindle cells. The most common treatment for the tumor is lobectomy, but bronchoscopic resection with a high-frequency snare and Nd: YAG laser ablation can be a viable alternative and may provide good disease control over the long term.

CASE REPORT

A 55-year-old Japanese man with morbid obesity (174 cm in height, 138 kg in weight, and body mass index of 45.6) presented with slowly progressive respiratory distress. Dyspnea had appeared about a year earlier, and he sometimes noticed

Received for publication September 26, 2019; accepted February 18, 2020.
From the Seirei Mikatahara General Hospital, Respiratory Disease Center, Division of Thoracic Surgery, Shizuoka, Japan.
This study was approved by the ethics committee of our institution (authorization number 19-22).
Disclosure: There is no conflict of interest or other disclosures.
Reprints: Yasunori Kaminuma, MD, Seirei Mikatahara General Hospital, Respiratory Disease Center, Division of Thoracic Surgery, 3453, Mikatahara-cho, Kita-ku Hamamatsu, Shizuoka 433-8558, Japan (e-mail: kouhan.work@gmail.com).

DOI: 10.1097/LBR.0000000000000667

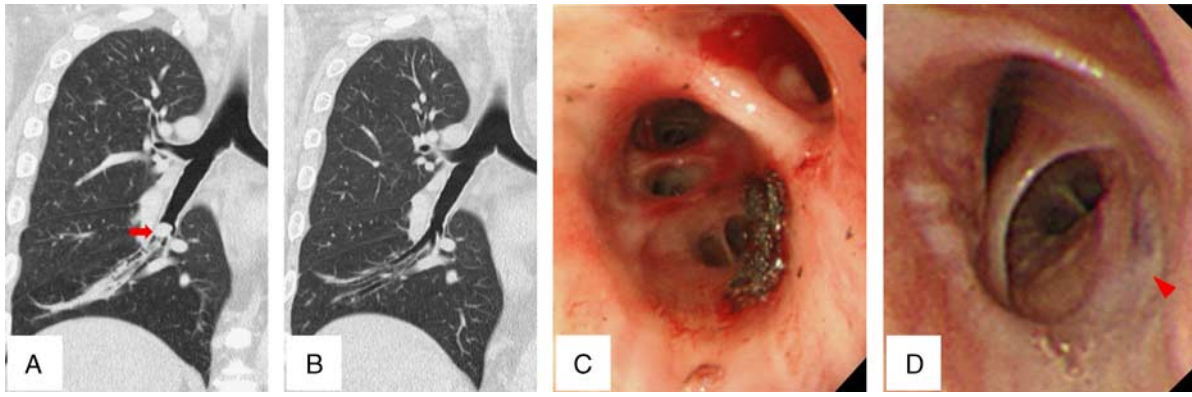

FIGURE 1. An 8-mm polypoid nodule was obstructing the entrance of basal segmental bronchus of the right lung. (red arrow) Localized atelectasis and intrabronchial mucus accumulation were found at the periphery of the nodule (A). Localized atelectasis and mucinous accumulation disappeared and there was no recurrence at 2 years after the bronchoscopic resection (B). The lesion was well cauterized and turned black immediately after Nd:YAG laser irradiation (C). Findings at 2 years after the resection. The lesions only left scars (red arrowhead), and there were no recurrent findings (D).

difficulty exhaling. The symptoms had gradually become exacerbated a few months earlier and became persistent. He had smoked 2 packs of cigarettes per day for 35 years and was currently still smoking. He had no remarkable medical history and was not taking any medications.

A chest examination revealed decreased breath sounds at the right lower lung field, and spirometry showed obstructive impairment, with a vital capacity of 2.97 L (90.0%), a forced expiratory volume in 1 second (%) of 67.1% and peak expiratory flow of 7.56 L/s (98.4%). His other physical examination and laboratory findings including tumor markers, were within normal ranges. Computed tomography (CT) of his chest revealed a polypoid nodule (8 mm) in the right lower bronchus and mucus retention in the peripheral bronchus (Fig. 1). A bronchoscopic examination showed a pale-red nodule at the entrance of the basal segmental bronchus of the right lung, with a smooth surface (Fig. A).

To perform a biopsy and relieve the occluded bronchus, we placed a high-frequency snare at the neck of the polypoid nodule and resected most of the nodule using a flexible bronchoscope under general anesthesia. We then performed irradiation with a Nd: YAG laser for the residual lesion to prevent relapse. (Medilas fibertom 8100; Dornier MedTech, Munich, Germany; pulse mode, 1 s, 20 W, total 914 J, total pulse 65, total 45 s).

On a microscopic examination, the nodule consisted of 3 components: epithelioid cells, ganglion-like cells, and spindle cells (Fig. A). On immunohistochemistry, all 3 components were positive for synaptophysin, while only epithelioid cells were positive for chromogranin A and cytokeratin (AE1/3), and only spindle cells were positive for S-100 (Fig. 2). Additional examinations, including gastrointestinal endoscopy, revealed no abnormal finding. Given these findings, we diagnosed him with bronchogenic gangliocytic paraganglioma.

His respiratory distress disappeared immediately after bronchoscopic resection, and no recurrence have been noted in the 2 years since bronchoscopic resection.

DISCUSSION

Gangliocytic paraganglioma is a rare neuroendocrine tumor that typically occurs in the descending part of the duodenum. The origin cell of the tumor remains unclear. To our knowledge, only 5 cases of bronchogenic gangliocytic paraganglioma, including the present case, have been reported in the English literature, and gangliocytic paraganglioma in the respiratory system accounts for 2.1% (6 cases) of all gangliocytic paraganglioma.[1] All 5 cases of bronchogenic gangliocytic paraganglioma were in man, and the lesions were located in the right lower lobe bronchus or thereabouts.[2–5] Lymph node and distant metastasis have been reported in case of duodenal gangliocytic paraganglioma, but the tumor is commonly regarded as a benign tumor because there have been no reports of cancer death.[6] In bronchogenic gangliocytic paraganglioma, there are no reports of even lymph node or distant metastasis. Bronchogenic gangliocytic paraganglioma may be found asymptomatically or due to chest pain, respiratory distress, and obstructive pneumonia. Previous reports have described no specific findings on laboratory findings or CT, so a histologic diagnosis is essential.

We diagnosed the present case as bronchogenic gangliocytic paraganglioma because the tumor

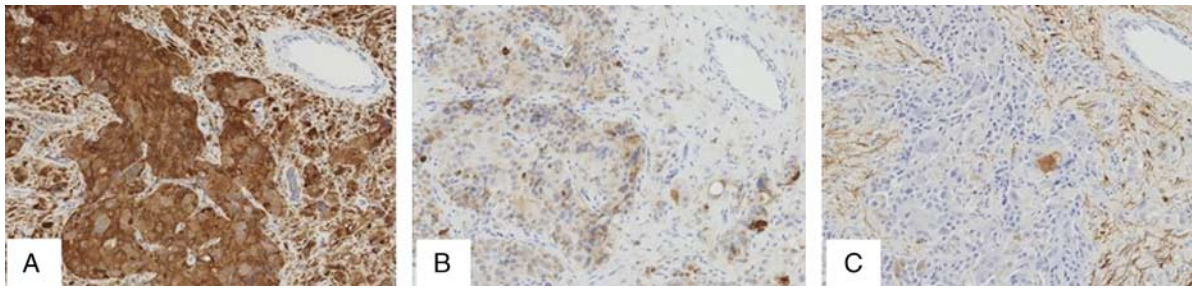

FIGURE 2. On immunohistological staining, synaptophysin was positive in all 3 components (A), chromogranin A was positive only in the epithelioid cell component (B), and S-100 protein was positive only in the spindle-shaped cell component (C).

consisted of 3 distinctive components: epithelioid cells, ganglion-like cells, and spindle cells on a microscopic examination and the components being positive for immunohistochemical neuroendocrine markers. Each component is reported to have a different spectrum on immunohistochemical staining: the epithelioid cells stain positive for chromogranin A, synaptophysin, neuron-specific enolase, tyrosine hydroxylase, AE1/3, and CAM5.2; the ganglion-like cells stain positive for chromogranin A, synaptophysin, neuron-specific enolase, tyrosine hydroxylase, and neurofilament; and the spindle cells stain positive for S-100 and neurofilament.[2–5] Bronchial carcinoid, paraganglioma, and ganglioneuroma can be considered as the differential diagnoses of this tumor. The difference between gangliocytic paraganglioma and the other diseases are as follows: bronchial carcinoid and ganglioneuroma contain only an epithelioid cell component, and paraganglioma contains only ganglion-like and spindle cell components.[2] However, it is difficult to diagnose a case as gangliocytic paraganglioma based solely on a small biopsy, as all 3 components cannot always be confirmed.[5]

Lobectomy is the most common treatment for bronchogenic gangliocytic paraganglioma in existing case reports, and bronchoscopic resection with high-frequency snare was performed in only 1 case. In that case, laser ablation with bronchoscopy was performed after initial resection because local recurrence occurred 6 months later, and there was no recurrence after irradiation.[3] In our case, bronchoscopic resection with high-frequency snare and Nd:YAG laser ablation was performed simultaneously, and there has been no recurrence in the 2 years since bronchoscopic resection. In the 3 cases that underwent lobectomy, the tumor mainly increased in the subepithelial layer of the bronchial wall and did not involve the adjacent lung parenchyma.[1,4,5] The tissue penetration of the Nd:YAG laser is several millimeters to several centimeters, and the tissue destructive property is considered to be strong, so it is a useful cautery method for bronchial lesions deeper than the epithelium, such as gangliocytic paraganglioma. Nd:YAG laser generally performs ablation in a pulse mode of 10 to 40 W, and the output and ablation time are adjusted according to the lesion. Cauterizing a deeper layer than the bronchial cartilage delays healing of the bronchial mucosa and makes it difficult to maintain the bronchial lumen. Therefore, we used a relatively low-power pulse mode so as not to disturb the tissue any deeper than the cartilage layer and performed cauterization until the surface layer was carbonized. Layers shallower than the cartilage were thereby sufficiently cauterized. Alternatives to Nd:YAG laser include diode laser, argon plasma coagulation and photodynamic therapy. The latest diode laser has a high power and is small and light, so it can be used as a good alternative to Nd:YAG laser. However, argon plasma coagulation and photodynamic therapy are difficult to use as a replacement for Nd:YAG laser because of their low tissue penetration and the possibility of incompletely cauterizing the tumor.

Bronchoscopic resection may also provide reasonable disease control over the long term, but careful follow-up is necessary after resection. We performed bronchoscopy and CT as follow-up after resection at 1, 6, 12 and 24 months. Thereafter, an annual checkup will be conducted. If local recurrence is observed, it is necessary to perform reirradiation with Nd:YAG laser or lobectomy.

CONCLUSIONS

Bronchogenic gangliocytic paraganglioma is a very rare tumor. We diagnosed the present case as bronchogenic gangliocytic paraganglioma because the tumor consisted of epithelioid cells, ganglion-like cells, and spindle cells and was positive for immunohistochemical neuroendocrine markers. Although there have been many reports of lung lobectomy for the treatment

of bronchogenic gangliocytic paraganglioma, bronchoscopic resection with a high-frequency snare and Nd: YAG laser ablation may provide good disease control over the long term.

REFERENCES

1. Okubo Y, Wakayama M, Nemoto T, et al. Literature survey on epidemiology and pathology of gangliocytic paraganglioma. *BMC Cancer*. 2011;11:187.
2. Hironaka M, Fukayama M, Takayashiki N, et al. Pulmonary gangliocytic paraganglioma: case report and comparative immunohistochemical study of related neuroendocrine neoplasms. *Am J Surg Pathol*. 2001;25:688–693.
3. Kee AR, Forrest CH, Brennan BA, et al. Gangliocytic paraganglioma of the bronchus: a case report with follow-up and ultrastructural assessment. *Am J Surg Pathol*. 2003;27:1380–1385.
4. Lin D, Hu Y, Xing X, et al. Pulmonary gangliocytic paraganglioma: a case report and review of the literature. *Int J Clin Exp Pathol*. 2013;7:432–437.
5. Gucer H, Mete O. Endobronchial gangliocytic paraganglioma: not all keratin-positive endobronchial neuroendocrine neoplasms are pulmonary carcinoids. *Endocr Pathol*. 2014;25:356–358.
6. Okubo Y, Yokose T, Tuchiya M, et al. Duodenal gangliocytic paraganglioma showing lymph node metastasis: a rare case report. *Diagn Pathol*. 2010;5:27.