

Malignant primary pulmonary paraganglioma

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ABSTRACT The histological, immunocytochemical, and electron microscopic findings in a case of malignant primary pulmonary paraganglioma are reported. The existence of this rare tumour is evidence for the presence of pulmonary chemoreceptors.

Extra-adrenal non-chromaffin paragangliomas are rare tumours that arise from chemoreceptor tissue located at key sites in the vascular tree, most commonly in the carotid body,¹ although they have arisen from many other sites, including the jugulotympanic body and the mediastinum.² Only nine cases of primary pulmonary paraganglioma, all benign, have been reported in English language publications³ and only one case of a malignant primary pulmonary paraganglioma has been documented worldwide.⁴

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Case report

A 49 year old nursing auxiliary, a non-smoker, presented with a three month history of pleuritic pain in the right shoulder and a cough with white sputum; she had noticed increased breathlessness during this period. On examination there were diminished breath sounds over the right upper lobe. A chest radiograph showed a shadow in the right upper lobe, which extended anteriorly to the pleura.

Right anterior mediastinotomy through the second intercostal space disclosed a group of enlarged lymph nodes overlying the main pulmonary artery and a separate large mass within the right upper lobe of the lung. At bronchoscopy the anterior segment of the right upper lobe bronchus was found to be obstructed. Endobronchial biopsy specimens showed no mucosal abnormality. As no other primary lesion was found the patient underwent a right pneumonectomy through the fifth intercostal space. A tumour occupied the greater part of the right upper lobe: a mass of enlarged subcarinal and paratracheal nodes surrounded the main bronchus and extended round the right pulmonary artery. The right lung and the enlarged nodes were excised and she made an uneventful recovery. Repeat computed tomography at three months showed no recurrence. She remains well with

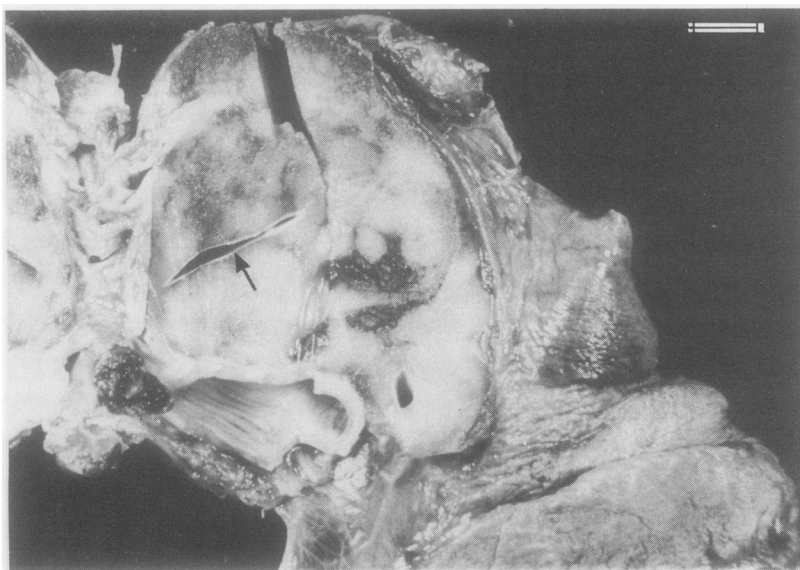


Fig 1 Gross appearance of the surgical specimen. The arrow indicates the pulmonary artery. The bar represents 1 cm.

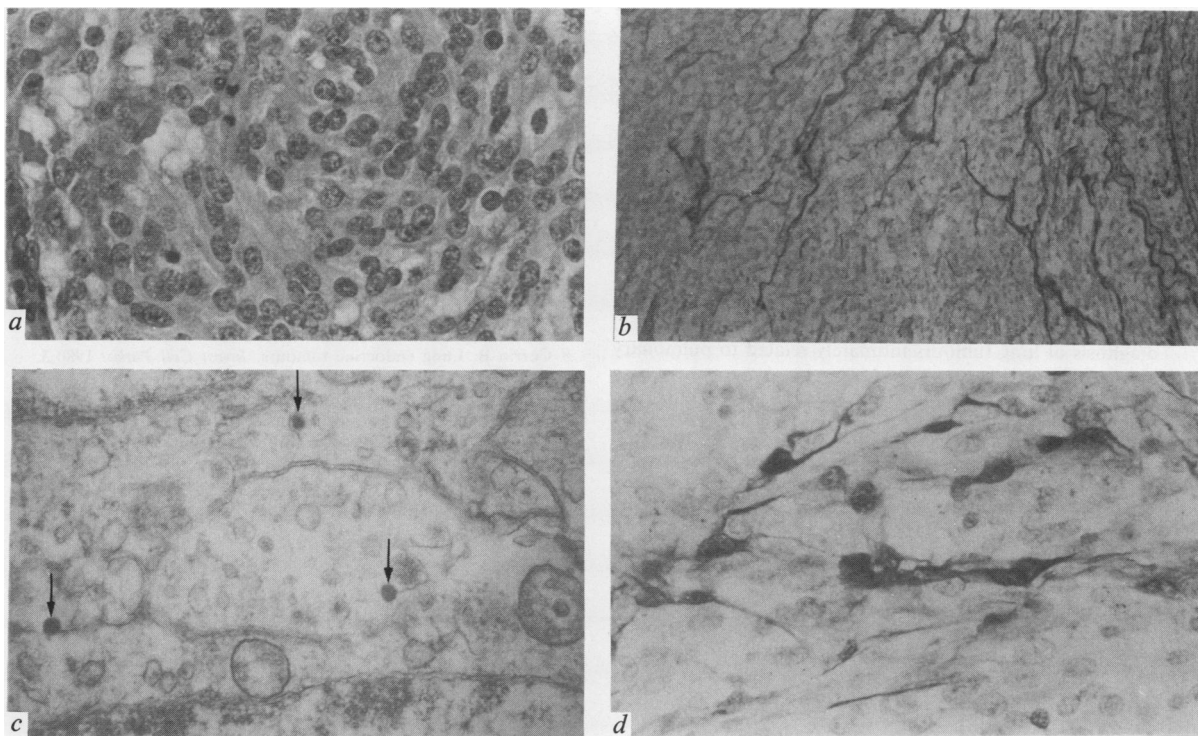


Fig 2 (a) Photomicrograph ($\times 100$) showing a Zellballen. (b) Photomicrograph (reticulin stain, $\times 25$). (c) Electronmicrograph ($\times 20\,000$) showing sparse, dense core granules (arrowed). (d) Photomicrograph ($\times 100$) showing S100 protein immunocytochemical staining of sustentacular cells at the edge of a Zellballen.

no clinical evidence of an alternative primary site 20 months after surgery.

The pneumonectomy specimen contained a smooth and round firm, pale tumour (70 mm maximum diameter) in the medial aspect of the upper lobe. Tumour completely surrounded and compressed the pulmonary artery (fig 1) and was separate from the right main bronchus. There was no evidence of an endobronchial origin. Metastatic tumour deposits were present in the subcarinal, mediastinal, and paratracheal nodes.

Microscopy showed that the tumour was composed of cells with round to ovoid nuclei and scanty eosinophilic cytoplasm arranged in whorls and nests (Zellballen), separated by a vascular stroma (fig 2, a and b). Mitoses were infrequent. These cells were moderately argyrophilic. Ultrastructurally, occasional electron dense core (neurosecretory) granules were present (fig 2c). Spindle shaped cells with loose, delicate cytoplasmic processes surrounded the "Zellballen" and immunohistochemical staining showed them to contain S100 protein (fig 2d). The nodal deposits were similar to the main tumour.

Discussion

Primary pulmonary paraganglioma was first reported in 1958 by Heppleston.⁵ Singh *et al* published a further case³ in 1977

and found eight others published in English, including Heppleston's case. In all of these nine cases the lesion behaved in a benign manner. There were seven women and two men aged 43–69 years. In eight the tumour was in the right lung, although there was no preference for a particular lobe. Six of the patients were symptomless. One had chest pain; one mild exertional dyspnoea; and one (a miner with mild pneumoconiosis) cough, dyspnoea, and chest pain. The correct diagnosis was not made preoperatively in any patient.

In the lung metastatic paraganglioma is more common than primary pulmonary paraganglioma.³ Malignant primary pulmonary paraganglioma is distinctly uncommon, only one case, in a 49 year old woman, having been reported.⁴ She had lymph node metastases, as did our patient; but there was no evidence of distant metastases or any extrapulmonary primary lesion.

Primary paraganglioma of the lung is distinct from the so called multiple minute chemodectoma⁶ in site, growth pattern, and ultrastructure.⁷ On occasion it may be difficult to differentiate paraganglioma from carcinoid tumour⁸ and from other lesions, including haemangiopericytoma.⁹ The architecture, as emphasised by the reticulin stain (fig 2b) is typical of a "chemodectoma" and is not that of haemangiopericytoma or a nerve sheath tumour. Although the presence of neurosecretory granules does not permit a distinction between paraganglioma and bronchial carcinoid tumour, the

trabeculae and acinar pattern of the latter are lacking. The presence of sustentacular cells strongly suggests paraganglioma.⁹ The close proximity of the tumour to the pulmonary artery and the lack of an endobronchial origin also strongly support this conclusion. Sustentacular cells in various adrenal and extra-adrenal paragangliomas have been shown to stain for S100 protein.¹⁰ Although the presence of lymph node metastases by definition indicates the malignant nature of this tumour, insufficient information has been published to predict its likely behaviour.

Our findings confirm the existence of malignant primary pulmonary paraganglioma as an entity and provide indirect evidence for the existence of pulmonary chemoreceptors. Paraganglioma should be considered in the differential diagnosis of lung tumours intimately related to pulmonary arteries.

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