

# Fine needle aspiration cytology diagnosis of a case of carotid body tumour

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**ABSTRACT** Carotid body tumour (CBT) is a paraganglioma arising from the chief cells of the carotid body, which is situated at the bifurcation of the common carotid artery. We describe the fine needle aspiration cytology findings of one such tumour in a 27-year-old man. The aspirate was haemorrhagic with clusters of round to oval cells showing moderate anisokaryosis. Delicate fibrous strands with spindle cells were observed within these clusters. Based on these cytologic findings and the location of the swelling, a diagnosis of CBT was made. The mass was excised and the diagnosis was confirmed on histopathological examination. Our case report adds to the existing literature on cytologic diagnosis of CBT, further attesting to its safety and accuracy.

*Keywords:* carotid body tumour, fine needle aspiration, paraganglioma  
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## INTRODUCTION

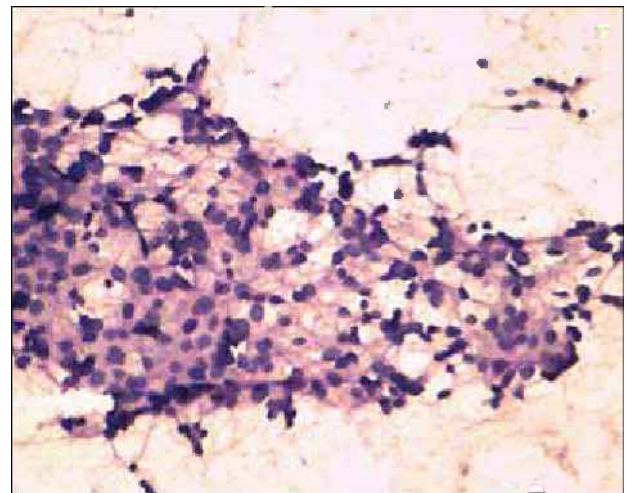
Carotid body is a vascular structure with a chemoreceptor function, located within the adventitia at the bifurcation of the common carotid artery. Rarely, paragangliomas arise from these structures and are variously termed as chemodectoma, carotid body tumour (CBT) and potato tumour.

## CASE REPORT

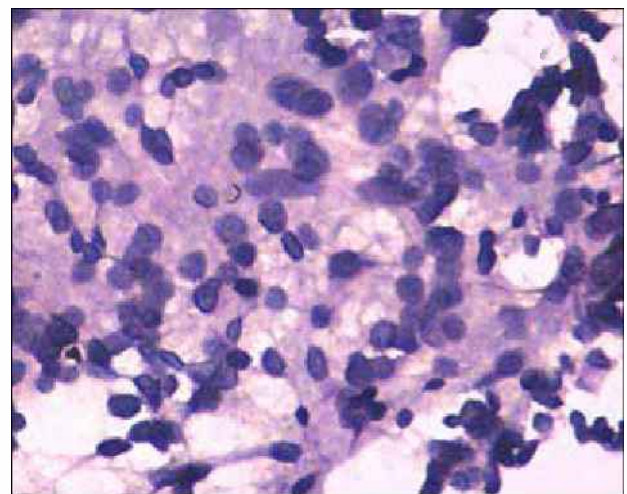
A 27-year-old Indian man was referred to our institution for evaluation of a slow-growing nodule in the right side of his neck. Previously, he had been given antituberculous therapy based on a clinical diagnosis of tuberculous lymphadenitis, but the nodule persisted. Thus, the patient was referred to the pathology department with a request for fine needle aspiration cytology (FNAC).

On examination, a single 2 cm × 1 cm × 1 cm firm, painless nodule was felt on the right side of the patient's neck. It was slightly pulsatile and did not move with deglutition. There was no other palpable neck swelling or enlarged lymph node. Noting that the nodule was strategically located adjacent to the carotid artery, FNAC was attempted using a 23 gauge needle and non-aspiration technique.<sup>(1)</sup> Two needle passes were made, and material was obtained for cytologic study. The procedure was uneventful, with no complications on follow-up. Both air-dried (May-Grünwald Giemsa stain) and wet-fixed (Haematoxylin and eosin stain) films were prepared.

The smears were moderately cellular with abundant background haemorrhages (Fig.1). There were clusters and singly distributed cells with ill-defined borders and abundant eosinophilic cytoplasm (Figs. 2 & 3). The nuclei were round-to-oval-shaped, with marked variation in size and an evenly distributed chromatin pattern. Occasional bizarre nuclei and giant cells were also observed. Fine fibrous strands containing spindled cells were

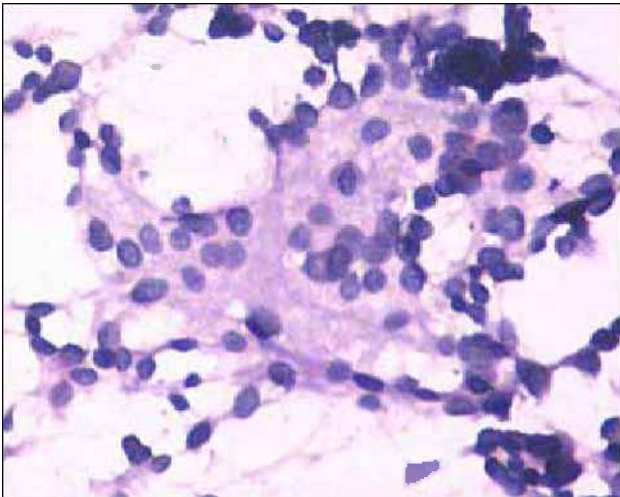


**Fig. 1** Photomicrograph shows cellular smear against a haemorrhagic background (Haematoxylin & eosin, × 200).

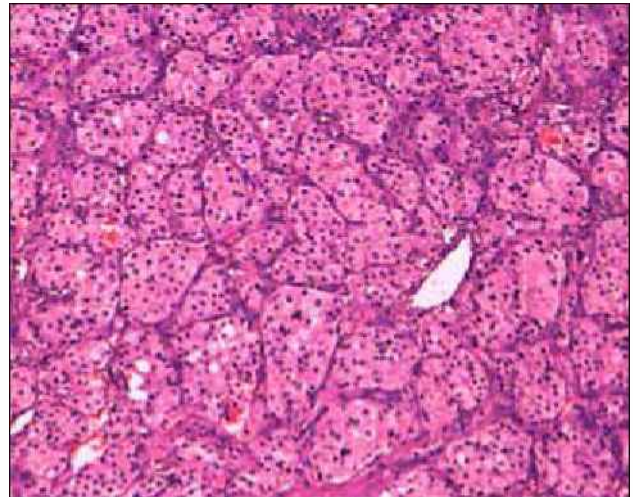


**Fig. 2** Photomicrograph shows cells with indistinct borders, eosinophilic cytoplasm and evenly distributed chromatin (Haematoxylin & eosin, × 400).

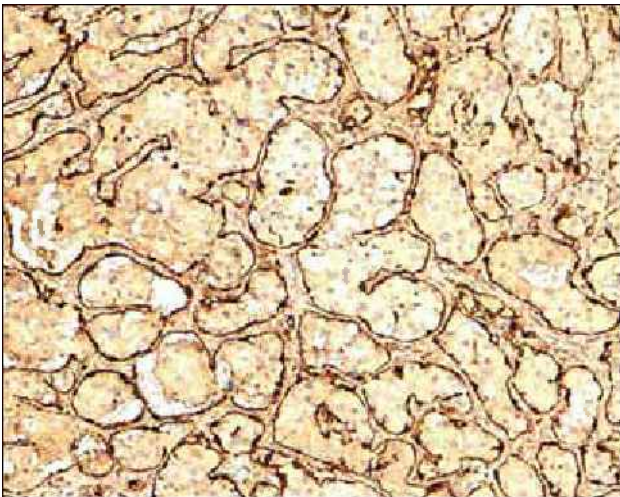
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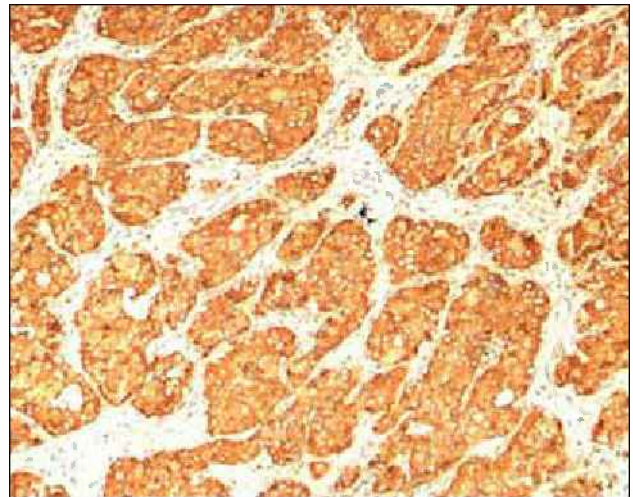
**Fig. 3** Photomicrograph shows cells with spindling, representing sustentacular cells (Haematoxylin & eosin, x 400).



**Fig. 4** Histopathology shows nests of tumour cells (zellballen) surrounded by sustentacular cells (Haematoxylin & eosin, x 100)



**Fig. 5** Photomicrograph shows sustentacular cells (S100 Immunostain, x 100).



**Fig. 6** Photomicrograph shows synaptophysin positivity in tumour cells (Synaptophysin immunostain, x 100).

seen admixed with some clusters (Fig. 2). Lymphoid cells, mitotic figures, prominent nucleoli and necrotic debris were notably absent. These cytomorphological features were strongly suggestive of a paraganglioma. In view of the typical location and cytologic findings, a diagnosis of CBT was made.

The patient underwent surgery. Intraoperatively, the mass was found to be adherent to the bifurcation of the carotid artery. The adhesions were removed, and the mass was excised completely. The histopathological examination revealed a classic zellballen pattern (Fig. 4) in the lesion, thus confirming the cytodiagnosis of CBT. S100 immunohistochemical stain revealed sustentacular cells wrapping the packets of tumour cells (Fig. 5). These tumour cells were found to be positive for synaptophysin (Fig. 6) and chromogranin. Thyroid Transcription Factor (TTF-1) immunostain was negative, thus ruling out the possibility of thyroid carcinoma.

## DISCUSSION

CBTs are rarely subjected to FNAC due to the perceived high risk for procedure-related bleeding.<sup>(2,3)</sup> However, with the proper technique, appropriate needle calibre and a minimal number of

needle passes (one or two), the risk of haemorrhage could be markedly reduced. A prior Doppler ultrasonography investigation is very useful for alerting the cytopathologist to the possibility of CBT when dealing with a lateral neck mass.<sup>(4,5)</sup>

The smears tend to be invariably haemorrhagic, and special techniques may be necessary to concentrate the cellular elements.<sup>(6)</sup> Interpretation is also tricky, and the diagnosis may be easily missed if the lesion is not suspected on clinical examination. The usual differential diagnoses<sup>(3)</sup> on cytology include metastatic carcinoma, lymphoma, thyroid and parathyroid tumours. Metastatic carcinoma was ruled out on the basis of the chromatin pattern and the absence of prominent nucleoli. In particular, the cells of metastatic renal cell carcinoma have clear or eosinophilic vacuolated cytoplasm and are associated with delicate blood vessels. There were no lymphoglandular bodies, mitosis or apoptosis to favour lymphoma. In medullary carcinoma of the thyroid, the cells are distributed predominantly in singles, showing spindled, round or plasmacytoid forms, red cytoplasmic granularity and occasional small clumps of amyloid-like material. Serum calcitonin and immunocytochemistry may be helpful in difficult cases. Follicular neoplasms of the thyroid show either repetitive

microfollicles or sheets of cells with scanty or absent colloid. The aspirates of parathyroid adenoma contain monomorphic cells with round hyperchromatic nuclei and abundant cytoplasm.

The FNAC findings of CBT have been described in the literature mainly as case reports.<sup>(2-4,7,8)</sup> Most of them<sup>(2,4,7,8)</sup> not only agree on the difficulty of cytodiagnosis of CBT but also stress the usefulness of FNAC as a tool in the preoperative diagnosis of this rare lesion. FNAC diagnosis of CBT can be safely attempted if adequate care and precautions are taken during the procedure.<sup>(1,7)</sup> Familiarity with the cytomorphology of CBT, clinical correlation and a high index of suspicion help in ensuring accurate diagnosis.<sup>(9)</sup>

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