

## Carotid body tumour excision: Anaesthetic challenges and review of literature

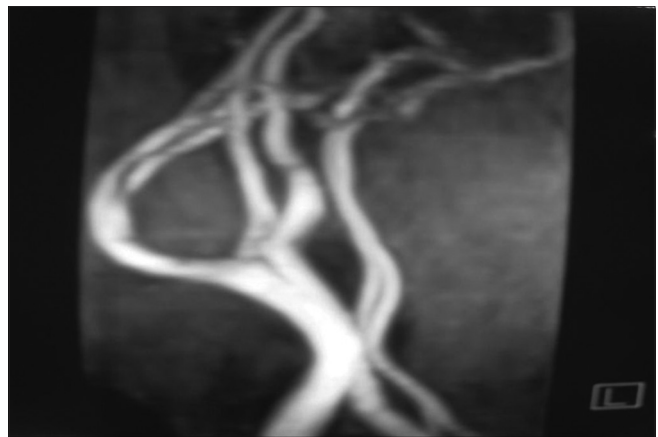
### INTRODUCTION

Carotid body tumours (CBTs) are extremely rare arising from chemoreceptor cells at bifurcation of carotid artery. Reported incidence is 1-2 per 100,000.<sup>[1]</sup> Frequently these tumours turn out to be malignant, hence operative intervention is the rule. Removal of tumour poses several anaesthetic challenges and is associated with perioperative morbidity of 20-40%.<sup>[2]</sup> This brief communication is to highlight the anaesthetic management and the problems encountered during CBT excision.

### CASE REPORT

A 38-year-old female weighing 47 kg presented with history of swelling on the right side of neck near the angle of jaw since 4 years. The lump was slow growing, painless, soft and non-pulsatile, of 6 × 3 × 4.5 cm in size. The patient visited our hospital as she developed weakness of tongue on the right side, after attempted biopsy. There were no other pathological findings. She was normotensive; her indirect laryngoscopy showed normal vocal cord movements, and there was no extension of tumour in hypopharynx. Computed tomography (CT) scan of neck showed well-defined oval soft-tissue mass pushing the right-sided carotid vessels slightly medially and anteriorly. Magnetic resonance imaging (MRI) angiography showed a large well-defined soft-tissue lesion just above the right carotid artery bifurcation splaying internal and external carotid arteries and being fed by branches of these vessels [Figure 1]. A diagnosis of Shamblin type II CBT was made and excision under general anaesthesia was planned.

Her preoperative biochemical investigations, urinary vanillyl mandelic acid (VMA), ECG and X-ray chest were within normal limits. Preoperatively vascular and neurosurgeon were consulted, cerebral protection therapy was discussed, and synthetic graft material was made available. In the operation theatre, patient was connected to multi-para monitor IV midazolam 1 mg, fentanyl 60 µg was given, and radial artery cannulation was done. Conventional general anaesthesia with controlled ventilation technique was used. Intraoperative induced hypotension was achieved



**Figure 1:** Magnetic resonance imaging angiography showing splaying of carotid vessels

with infusion of nitroglycerine (NTG) 0.5 mcg/kg/min and clonidine 2 mcg/kg/h and adjusted to maintain the mean blood pressure (BP) 80-90 mmHg and pulse 70-80 beats/min. Operation theatre temperature was kept at 22°C with patient temperature 34-35°C for mild hypothermia. At the time of tumour dissection, there was an episode of bradycardia that was treated with IV atropine 0.6 mg and local infiltration of lignocaine 2%. While separating the mass from carotid artery, there was injury to the external carotid artery with torrential blood loss of 1500 ml with hypotension. NTG and clonidine were immediately stopped and 1000 ml of colloid was infused. The artery was clamped, and sutured with Gortex graft. Bypass shunt was used to maintain circulation across the cross clamp. Four units of packed cells were infused to maintain the blood volume and mean arterial BP 80-90 mmHg for adequate cerebral perfusion. A single dose of thiopentone 300 mg was given IV. As there was a catastrophic event of blood loss and the risk of neurological involvement, patient was electively ventilated in the intensive care unit with electroencephalograph (EEG) monitoring. Thiopentone infusion was started 3-5 mg/kg/h. Mean arterial BP was maintained in the range of 80-90 mmHg by adjusting the infusion rate. Patient was weaned off after confirming cerebation and extubated after 24 h. There were no additional cranial nerve palsies, and her vocal cord movements were normal with a good deglutition reflex. Patient was discharged on 10<sup>th</sup> postoperative day without additional neurological deficit though her tongue weakness persisted.

### DISCUSSION

The cells from which CBTs arise normally act as chemoreceptors detecting changes in tension of

arterial oxygen.<sup>[3]</sup> Classically these tumours may be displaced in the lateral plane, but cannot be mobilised in the vertical axis. History of uncontrolled or recently diagnosed hypertension, tachycardia, facial flushing, and excessive sweating suggests the possibility of catecholamine secreting tumour.<sup>[4]</sup> This warrants appropriate values of serum and urine catecholamine and breakdown products. If a neck mass is thought to be a CBT on the basis of history and physical examination, biopsy should not be attempted as it can turn out to be catastrophic.<sup>[5]</sup> Diagnosis can be suggested by CT scan and more convincing diagnosis can be made by MRI angiography. Temporary balloon occlusion of carotid artery to assess the adequacy of collateral circulation across the circle of Willis can be done at the time of carotid angiography; however, we did not use this. We used shunt to bypass the cross clamping.<sup>[6]</sup>

More extensive surgery is often required for shambling II and III type tumour.<sup>[7]</sup> Blood loss during resection and reconstruction may be considerable and dissection is often difficult. To reduce intraoperative blood loss, we used hypotensive anaesthesia with NTG and clonidine infusion. This was stopped when there was accidental carotid injury requiring rapid transfusion with grafting of the vessel. It demands keeping graft material ready with minimum four units of blood cross-matched. Measures for cerebral protection, monitoring for adequacy of cerebral blood flow with EEG and somatosensory-evoked potential, measurement of blood flow using transcranial Doppler must be considered.<sup>[8]</sup> Mild hypothermia (34-35°C) has been shown to have protective effect.<sup>[9]</sup> A single dose of thiopentone causes cerebral metabolic rate of oxygen CMRO<sub>2</sub> suppression for 10 min and infusion of 3-5 mg/kg/h have shown neuroprotection.<sup>[10,11]</sup>

There are other points to consider in anaesthetic management. Involvement of cranial nerves may predispose to airway obstruction or aspiration which may occur in one of the several ways: Tumour invasion preoperatively, nerve injury intraoperatively, or tissue oedema causing nerve palsy postoperatively. Ninth, tenth and twelfth cranial nerve dysfunction can predispose to airway compromise either by aspiration or obstruction.<sup>[12]</sup> Postoperatively, the dynamic nature of oedema around cranial nerves mandates prophylactic ventilatory support with frequent observation for stridor and wheezing after extubation.

## CONCLUSION

CBT excision requires utmost vigilance by the anaesthesiologist. The diagnosis of CBT should be made on the basis of patient's clinical history, physical examination and MRI. Biopsy to confirm the diagnosis might turn out to be catastrophic. Intraoperative techniques to reduce blood loss and arrhythmias must be used, and cerebral protection therapy needs to be considered in the event of brain ischaemia. The surgical expertise must be available for neurovascular preservation to ensure safe, yet complete removal of neoplasm. Postoperative care must be taken to check cranial nerve involvement and institute prophylactic ventilation to ensure safe outcome.

**Sheetal R Jagtap, Rochana G Bakhshi, Sonal S Khatavkar, Sourabh J Phadtare, Shubha N Mohite**

Department of Anaesthesiology, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Nerul, Navi Mumbai, Maharashtra, India

### Address for correspondence:

Dr. Sheetal R Jagtap,  
Department of Anaesthesiology, Dr. D. Y. Patil Medical College,  
Hospital and Research Centre, Nerul, Navi Mumbai,  
Maharashtra, India.  
E-mail: drsheetaljagtap@gmail.com

## REFERENCES

1. Sevilla Garcia MA, Llorente Pendas JL, Rodrigo Tapia JP, Garcia Rostan G, Suarez Fente V, Coca Pelaz A. Head and neck paragangliomas: Revision of 89 cases in 73 patients. *Acta Otorrinolaringol Esp* 2007;58:94-100.
2. Hallett JW, Nora JD, Hollier LH, Cherry KJ, Pairolero PC. Trends in neurovascular complication of surgical management for carotid body and cervical paragangliomas: A fifty year experience with 153 tumours. *J Vasc Surg* 1988;7:284-91.
3. Guyton AC. Nervous regulation of circulation and rapid control of arterial pressure. *Textbook of medical physiology*. 11<sup>th</sup> ed. Philadelphia: Saunders; 2006. p. 211-2.
4. Clarke AD, Matheson H, Boddie HG. Removal of catecholamine secreting chemodectoma management. *Anaesthesia* 1976;31:1225-30.
5. Rosa M, Sahoo S. Bilateral carotid body tumour: The role of fine needle aspiration biopsy in the preoperative diagnosis. *Diagn Cytopathol* 2008;36:178-80.
6. Little VR, Reilly LM, Ramos TK. Preoperative embolization of carotid body tumours: When is it appropriate? *Ann Vasc Surg* 1996;10:464-8.
7. Arya S, Rao V, Juvekar S, Dcruz AK. Carotid body tumors: Objective criteria to predict the Shamblin group on MR imaging. *AJNR Am J Neuroradiol* 2008;29:1349-54.
8. Gonzalez M. Vascular disease in Stoelting's anaesthesia and co-existing disease. 5<sup>th</sup>ed. Philadelphia: Churchill Livingstone; 2008. p. 154.
9. Tamai H, Kuribayashi T, Sawamura S, Sumida T, Chinzei M, Hanaoka K. Perioperative treatment for carotid endarterectomy with induced mild hypothermia: A case report. *Masui* 2002;31:1132-6.
10. McConkey PP, Kien ND. Cerebral protection with thiopentone

during combined carotid endarterectomy and clipping of intracranial aneurysm. *Anaesth Intensive Care* 2002;30:219-22.

11. Shibuta S, Varathan S, Mashimo S. Ketamine and thiopentone sodium: Individual and neuroprotective effects on cortical cultures exposed to NMDA or Nitric oxide. *Br J Anaesth* 2006;97:517-24.
12. Wee DT, Goh CH. Current concepts in the management of carotid body tumors. *Med J Malaysia* 2010;65:268-71.

Access this article online	
Quick response code	Website: <a href="http://www.ijaweb.org">www.ijaweb.org</a>
	DOI: 10.4103/0019-5049.108576