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ANAESTHETIC MANAGEMENT OF CAROTID BODY TUMOUR EXCISION USING DUAL ARTERIAL MONITORING: A CASE REPORT

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ABSTRACT

Background: Carotid body tumours (CBTs) are rare, highly vascular paragangliomas arising from chemoreceptor tissue at the carotid bifurcation. Surgical excision remains the treatment of choice but is associated with significant anaesthetic challenges due to the risk of haemodynamic instability, major blood loss, and neurological complications. Continuous invasive monitoring and meticulous perioperative planning are essential for safe management. **Case Presentation:** We report the successful anaesthetic management of a 41-year-old female with a left-sided carotid body tumour located at the carotid bifurcation, causing splaying of the internal and external carotid arteries. The patient underwent elective tumour excision under general anaesthesia with invasive haemodynamic monitoring. Careful perioperative planning and meticulous monitoring facilitated stable intraoperative haemodynamics despite the vascular nature of the tumour. The patient was electively ventilated postoperatively and recovered uneventfully without neurological or haemodynamic complications. This case highlights the importance of comprehensive preoperative assessment, vigilant intraoperative monitoring, and multidisciplinary management in ensuring favourable outcomes during carotid body tumour resection.

KEYWORDS : Carotid Body Tumour, Paraganglioma, General Anaesthesia, Dual Arterial Monitoring, Central Venous Catheter, Haemodynamic Stability, Vascular Surgery.

INTRODUCTION

Carotid body tumours are uncommon neuroendocrine neoplasms arising from paraganglionic tissue located at the carotid bifurcation. They account for less than 0.5% of all head and neck tumours and are the most common head and neck paragangliomas. These tumours originate from neural crest-derived chemoreceptor cells that function in the regulation of respiratory and cardiovascular responses to changes in arterial oxygen tension.

Although generally benign and slow growing, carotid body tumours are highly vascular and are closely associated with the carotid arteries and lower cranial nerves. Surgical excision remains the definitive treatment but poses considerable challenges due to the risk of excessive blood loss, carotid sinus-mediated haemodynamic instability, cranial nerve injury, and cerebral hypoperfusion.

Patients commonly present with a painless lateral neck mass located near the angle of the mandible. Larger tumours may cause dysphagia, hoarseness, neck discomfort, or cranial nerve deficits. Diagnosis is established using Doppler ultrasonography, computed tomography angiography, magnetic resonance imaging, and digital subtraction angiography.

The anaesthetic goals during carotid body tumour excision include maintenance of cerebral perfusion, prevention of major haemodynamic fluctuations, preparedness for significant blood loss, and early detection of neurological complications. Continuous invasive monitoring and meticulous perioperative planning are therefore crucial.

We report a case of successful excision of a carotid body tumour under general anaesthesia utilizing dual arterial pressure monitoring and central venous access.

Case Presentation

A 41-year-old female presented with a gradually enlarging painless swelling on the left side of the neck. There was no history of dysphagia, dyspnoea, hoarseness of voice, palpitations, headache, excessive sweating, or episodic hypertension suggestive of a functional paraganglioma.

On clinical examination, a firm, non-tender swelling was palpable in the left upper cervical region. Cardiovascular and respiratory examinations were normal. The patient had no significant comorbidities and was classified as ASA physical status I.

Investigations

Laboratory investigations revealed haemoglobin 11.7 g/dL, haematocrit 35.3%, total leukocyte count 5.79 × $10^3/\mu L$, and platelet count 200 × $10^3/\mu L$. Renal function tests were normal with serum creatinine 0.64 mg/dL. Serum electrolytes showed sodium 131 mmol/L, potassium 3.9 mmol/L, and chloride 102 mmol/L.

Liver function tests were within normal limits with total bilirubin 0.6 mg/dL, direct bilirubin 0.2 mg/dL, AST (SGOT) 24 U/L, ALT (SGPT) 17 U/L, and alkaline phosphatase 63 U/L. Viral markers were non-reactive. Blood group was O positive.

Chest radiography was normal. Electrocardiography showed no significant abnormalities. Two-dimensional echocardiography demonstrated preserved left ventricular systolic function with an ejection fraction of 60%, mild mitral regurgitation, pulmonary artery systolic pressure of 20 mmHg, and a collapsible inferior vena cava measuring approximately 6 mm.

Ultrasonography of the neck demonstrated a vascular lesion measuring approximately 3.4 × 3.7 × 7.2 cm within the left carotid sheath at the bifurcation of the left common carotid artery with increased vascularity on colour Doppler examination. Findings were suggestive of a carotid body tumour.

Contrast-enhanced computed tomography of the neck revealed an intensely enhancing lesion measuring approximately 5.9 × 3.6 × 3.5 cm located in the left perivertebral and carotid spaces. The lesion demonstrated characteristic splaying of the internal and external carotid arteries (Lyre sign), highly suggestive of carotid body paraganglioma. Mild enlargement of the left submandibular gland was noted. Multiple subcentimetric non-necrotic lymph nodes were identified bilaterally in cervical levels I, II, and III.

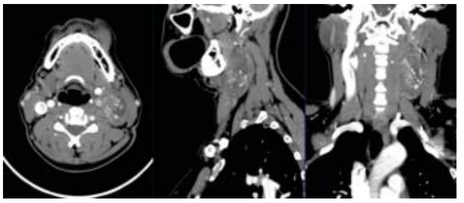

Figure 1 Shows CECT Findings-Carotid Body Paraganglioma Located in the Left Perivertebral and Carotid Spaces.

Based on the clinical and radiological findings, a diagnosis of left carotid body tumour was established, and elective surgical excision was planned.

Anaesthetic Management

After obtaining informed written consent, the patient was shifted to the operating theatre. Standard monitoring including electrocardiography, pulse oximetry, non-invasive blood pressure monitoring, capnography, and temperature monitoring was instituted.

Considering the possibility of significant haemodynamic fluctuations and blood loss during tumour dissection, invasive monitoring was established. A right internal jugular central venous catheter was inserted under aseptic precautions. In addition, both right radial and right femoral arterial catheters were placed for continuous arterial pressure monitoring.

Following preoxygenation, anaesthesia was induced with intravenous fentanyl, propofol, and vecuronium.

Endotracheal intubation with 7.0mmid cuffed ET tube was inserted using 3no blade macintosh laryngoscope and fixed at 20mark . Anaesthesia was maintained using sevoflurane in an oxygen-air mixture under controlled ventilation.

Throughout the procedure, haemodynamic parameters remained stable. Simultaneous monitoring from radial and femoral arterial sites provided continuous assessment of arterial pressure during carotid vessel manipulation. Estimated blood loss was approximately 700 mL and was managed with crystalloid administration. No blood transfusion was required.

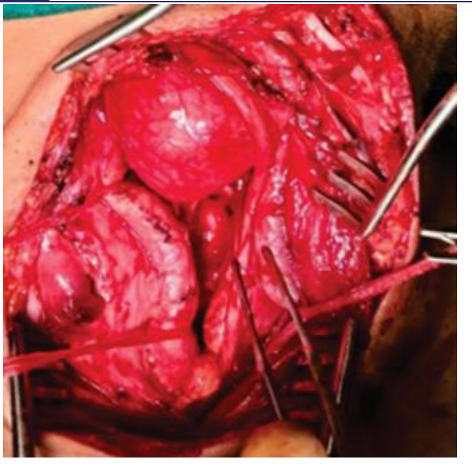

Figure 2 and 3

At the conclusion of surgery, the patient was electively ventilated and shifted to the intensive care unit for close postoperative observation. After confirming neurological integrity and haemodynamic stability, she was successfully extubated. No cranial nerve deficits, stroke, or haemodynamic instability were observed.

DISCUSSION

Carotid body tumours represent a unique challenge for anaesthesiologists because of their rarity, rich vascularity, and close anatomical relationship with major cervical neurovascular structures. Surgical manipulation of the carotid bifurcation may produce profound autonomic responses through carotid sinus stimulation, resulting in bradycardia, hypotension, hypertension, and cardiac arrhythmias.

Maintenance of adequate cerebral perfusion is a primary objective during tumour excision. Temporary reduction in carotid blood flow or excessive hypotension may predispose patients to neurological injury. Continuous invasive arterial pressure monitoring is therefore strongly recommended.

The radial arterial line provided continuous beat-to-beat blood pressure monitoring. However, given the possibility of carotid artery cross-clamping and vascular reconstruction during excision of the carotid body tumour, a femoral arterial line was additionally inserted to provide a more reliable estimate of central aortic pressure and allowing the detection of pressure gradients that could occur during carotid manipulation and major haemodynamic fluctuations. Furthermore, the femoral arterial line served as a backup monitoring route in the event of clamping or loss of waveform from the radial catheter during surgery.

Another major concern during carotid body tumour surgery is blood loss. Reported blood loss varies according to tumour size, vascularity.Although preoperative embolization may reduce blood loss in selected patients, it remains controversial because of the potential risk of stroke and cranial nerve injury.

Central venous catheterization provided reliable venous access for fluid administration and potential vasoactive drug therapy. Although haemodynamic stability was maintained throughout the procedure and vasopressor support was not required, preparedness for sudden cardiovascular instability remains essential.

Postoperative complications following carotid body tumour excision include airway oedema, haemodynamic instability, cranial nerve dysfunction, and cerebrovascular events. Elective postoperative ventilation and intensive care monitoring facilitated early detection of complications and contributed to an uneventful recovery in our patient.

This case highlights the importance of meticulous perioperative planning, invasive monitoring, and multidisciplinary teamwork in ensuring safe anaesthetic management of carotid body tumour excision.

CONCLUSION

Carotid body tumour excision poses significant anaesthetic challenges because of the risks of major blood loss, haemodynamic instability, and neurological complications. Thorough preoperative assessment, vigilant intraoperative monitoring, and structured postoperative care are essential for favourable outcomes.

The use of dual arterial monitoring in conjunction with central venous access provided reliable haemodynamic assessment and enhanced perioperative safety in this case. Such strategies may be beneficial in complex vascular procedures involving the carotid circulation.

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