Anesthesia for carotid body tumour resection- A case report.

KAVIYA
Department of Anaesthesiology,
STANLEY MEDICAL COLLEGE AND HOSPITAL

Abstract: Tumors of the carotid body are rare paragangliomas originating from sympathetic fibres of the carotid bifurcation. Growth is slow and they frequently become symptomatic through local mechanical compression of neighbouring vascular and neural structures. Anesthesia for the removal of carotid body tumour poses numerous challenges to the anaesthesiologist with an increased risk of perioperative morbidity and mortality.

Keyword: Paraganglionoma, Carotid body tumour, Anaesthesia

CASE REPORT:
A 59-year-old man weighing 60 kg was admitted to our hospital with a mass in the right side of the neck for 6 months duration. He also had complaints of several episodes of dizziness in erect position relieved on lying position. On physical examination, a mobile painless, non pulsatile, 5*4*4-cm mass was found in the Right jugular-carotid region. Routine laboratory investigations were within normal limits. Initially suspected to be a lymph node, later owing to increased warmth and compressibility of the mass suspected to be a vascular swelling.

Fig 1: CT Neck Lateral view
Hence computed tomography was done which demonstrated a homogeneous 5*4*4-cm mass located in the region extending from the postero inferior part of the right parapharyngeal space to the area between the internal and external carotid arteries near the bifurcation of the internal carotid artery and the submandibular gland inferiorly.
Angiography of the carotid arteries revealed a hypervascular mass perfused by feeding branches from the external carotid artery. Finding was considered to be consistent with a diagnosis of Carotid body tumor and excision under general anesthesia was planned. His Chest X ray showed fibrosis of Right apical region probably due to pulmonary tuberculosis. Sputum examination was normal. Twelve lead ECG was within normal limits. Urinary vanillyl mandillic acid level was insignificant hence serum catecholamine levels were not done. Patient was assessed under ASA PS III and his airway classification was mallampatti class II with no restriction in neck movements.

The patient was premedicated with Tab. Diazepam 5mg , Tab .Ranitidine the previous night and in the morning of the surgery. The patient was shifted to the operation theatre and connected to standard monitors like pulse oximetry, non invasive blood pressure, electrocardiogram. Iv access achieved with a 18 G venflon over the right forearm. Two units of cross matched blood was made available. Inj Glycopyrrolate 0.2 mg iv, Inj pethidine 60 mg iv , Inj midazolam 2mg iv were given. Induction was done with Inj propofol 120mg iv and paralysed with Inj Vecuronium 6 mg iv. Intubation was done with a 8.5 mm cuffed ETT nasally as the surgeons suspected an intraoral extension. After intubation the Left radial artery was cannulated and connected to a flotrac transducer. This flotrac trasducer was connected to the vigileo monitor (Edward Lifescience) Which then computes from the arterial pressure tracing the cardiac output continuously along with stroke volume . The Right femoral vein was cannulated with a 7 Fr Triple lumen catheter and secured. Patient was maintained on N2O / O2 mixture and Isoflurane 2%-1%.Inj dexamethasone 8 mg iv was given intraoperatively.

The carotid region was reached with a transcervical incision. During surgical exploration, a smooth homogeneous 5*4-cm mass was observed. It was classified as a grade-2 tumor according to the Shamblin classification system. The common, external and internal carotid arteries were isolated. The hypoglossal nerve was located. The tumour was isolated with subadventitial dissections, and resected with distal and proximal clamps on the external carotid artery, due to attachment of the tumour to this artery.

A after total excision of the tumour and closure of the surgical wound, residual neuromuscular blockade reversed with Inj Neostigmine 2.5 mg iv and Inj Glycopyrrolate 0.4 mg iv. Extubated and shifted to intensive care unit for observation. The surgery lasted for over 3 hours during which over 2.5 litres of crystalloids, 500 ml of colloid and one unit of Whole blood were given. Intra operative blood loss was about 900 ml .The vitals remained stable throughout intra operative course except for three episodes of hypotension during handling of the mass which was treated with Inj Ephedrine 6mg iv bolus. No episodes of bradycardia were seen. Post operative pain relief was
treated with Inj Ephedrine 6mg iv bolus. No episodes of bradycardia were seen. Post operative pain relief was obtained with Inj Tramadol 100 mg im 8 th hourly. Post operative course was uneventful. The patient was discharged from the intensive care unit on postoperative day 1. The patient was discharged from the hospital on day 8.

**DISCUSSION:**
The carotid bodies are reddish brown, ellipsoid structures, lying embedded in the adventitia of the carotid artery bifurcation. Physiologically, they are known to be involved in the reflex control of heart rate, blood pressure and respiration via the chemical composition of blood and its temperature. Described first by Haller in 1743, they are derived from the epitheloid cells of neuroectodermal origin. Tumours of this tissue were originally described as chemodectomas by Mulligan; now they are considered as a part of the widely described group of tumours known as paragangliomas. Carotid body tumours are very rare neoplasms constituting less than 0.5% of all body tumours. An incidence of 0.012% of all surgical specimens has been reported by a hospital based study describing the paragangliomas of the head and neck region. Exact etiology of these tumours is not known. The only known risk factors are the presence of chronic hypoxic stimulation and the genetic predisposition. Carotid body tumours can be occasionally coupled with nonparaganglionic tumors in syndromes including MEN type II, von Hippel-Lindau syndrome, and neurofibromatosis type 1. Carotid body tumours are usually benign. Symptoms are generally due to local involvement of the nerves and vessels. The malignant potential with possible metastasis has been estimated to be around 2% to 9%; but as for most other neuroendocrine tumours, the usual histologic criteria for malignancy i.e., nuclear atypia and nuclear to cytoplasmic ratio, do not apply; Most of the carotid body tumours are asymptomatic in the early clinical phase. Eventually, at least 75% of the patients develop symptoms such as enlarging neck mass, neck pain, hoarseness or syncope. The physical examination usually reveals a pulsatile mass below the angle of mandible which can be moved laterally but not vertically (Fontaine's sign). Approximately 10% of the cases present with cranial nerve palsy with paralysis of the hypoglossal, glossopharyngeal, recurrent laryngeal, or spinal accessory nerve, or involvement of the sympathetic chain. Rarely the patients may exhibit other symptoms when the tumours are endocrinologically active. In cases of functional carotid body tumours, symptoms similar to those of pheochromocytoma, such as paroxysmal hypertension, palpitations, and diaphoresis, are seen. Urinary Vanillyl mandelic acid, urinary metanephrines and serum catecholamines levels has to be checked in patients who have any symptoms of a functional carotid body tumour. If catecholamine levels are elevated, an evaluation for adrenal pheochromocytomas should be performed. If detected these tumours should be removed prior to the carotid surgery. Carotid arterial angiography is the most valuable diagnostic technique. It can detect multiple lesions, tumour size and vascularity, and the major vascular tributaries perfusing the tumour. Pathognomically, a specific perfusion increase (Lir sign) at the carotid bifurcation can be seen due to the tumour. Arteriographic imaging should be carried out bilaterally because of the possibility of bilateral
tumours. Magnetic resonance imaging and contrast enhanced computed tomography scans are additional noninvasive diagnostic tools. With magnetic resonance imaging, paragangliomas smaller than 0.8 cm in diameter can be detected. Biopsy is contraindicated in cases of paraganglioma. Tumor classification (Shamblin) is based on the size and the difficulty of surgical resection. Grade-1 tumor is small and easily resected from vascular elements. Grade 2 is a medium-sized tumor closely associated with vascular structures, which can be resected by careful subadventitial dissection. Grade-3 tumor is large and enfolded by the carotid arteries; it can be resected only by partial or total vascular resection requiring vascular replacement.

Macroscopically, they have been referred to as the ‘potato tumour’ owing to their appearance when transected. However, they have a reddish brown coloration, are highly vascular and are easily compressible. Microscopically they are characterised by polygonal or spindle-shaped cells and enclosed in a box-like framework of connective tissue with an extensive sinusoidal blood supply.

In patients who are suspected to have multiple small tumors, such as those with familial carotid body tumors, performing a physical examination and supplementing it with imaging studies (including a CT, MRI, or metaiodobenzylguanidine [MIBG] scintigraphy) is essential. MIBG scans are quicker to perform than MRI and are also used in patients who are claustrophobic. The only issue with this scan is that it can only be used in patients who have functional tumors. In cases in which the tumor is nonfunctional, a better test is a pentetreotide scan, which uses a radiolabeled somatostatin analogue.

Preoperative evaluation is extremely important to avoid major surgical complications. Some of these tumors may have parapharyngeal space extension and bulge into the oropharyngeal wall leading to a difficulty in intubation. Hence a careful airway examination is very important.

Preoperative embolization is still controversial, although it has been used to decrease the risk of intraoperative bleeding, particularly in larger tumors. During the intraoperative phase sudden torrential hemorrhage is expected especially when there is difficulty in dissecting the mass from the artery. Blood loss of up to 2000 ml can be seen. Hence it is prudent to have at least 2 units of crossmatched blood available. Hypotension or hypertension in a functional carotid tumor due to handling of the mass is to be anticipated. Hypotension is usually associated with bradycardia which can be treated with Inj. Atropine. Hypertension due to catecholamine secretion in functional tumors can be treated with alpha blockers preoperatively and with betablockers intraoperatively. In our case we had episodes of hypotension which responded to boluses of Inj ephedrine. During removal of the carotid body tumor, care should be taken once again to avoid injuring the nerves, especially the superior laryngeal nerve, which has been reported to be the most injured nerve during dissection.

In the immediate postoperative period, the patient should be carefully observed for any complication of the procedure, including postoperative hemorrhage or late stroke. The most commonly injured nerve is the superior laryngeal nerve. This nerve supplies the cricothyroid muscle and provides sensation to the supraglottic larynx. The patient postoperatively might suffer from some degree of aspiration and voice changes with an inability to create high-pitched sounds.
Injury to the recurrent laryngeal nerve results in vocal cord paralysis with resultant hoarseness and increased aspiration risk. When combined with a superior nerve paralysis, as in the case with a high vagal injury, aspiration is a significant problem because the larynx not only does not function well but is also anesthetic. This may be compensated by the contra lateral vocal cord over time. If the problem persisted, then vocal cord medialization procedures should be performed. Speech and swallowing problems result from a hypoglossal nerve injury. Postoperative shoulder pain and weakness is typically a result of an accessory nerve injury. This results in significant disability for the patient.

Injury to the recurrent laryngeal nerve results in vocal cord paralysis with resultant hoarseness and increased aspiration risk. When combined with a superior nerve paralysis, as in the case with a high vagal injury, aspiration is a significant problem because the larynx not only does not function well but is also anesthetic. This may be compensated by the contra lateral vocal cord over time. If the problem persisted, then vocal cord medialization procedures should be performed. Speech and swallowing problems result from a hypoglossal nerve injury. Postoperative shoulder pain and weakness is typically a result of an accessory nerve injury. This results in significant disability for the patient.

In cases of bilateral tumor excision with loss of the bilateral Hering nerves, patients experience labile blood pressure postoperatively, which is difficult to control medically. Concurrent excision of bilateral carotid body tumours should therefore be avoided, although staging the surgeries might help because of the compensation provided by the aortic receptors. Carotid bodies also act as peripheral chemoreceptors hence their excision leads to respiratory depression in the post operative period. Hence titrated doses of opioids to be given for postoperative pain relief. In our case the patient was provided with Inj tramadol 100mg Intra muscular 8 th hourly.

Carotid body tumours present multiple and challenging anesthetic risks. Clinical manifestations depend upon tumour location and associated mechanical compression. The treatment trend is increasingly surgical. Anesthetic risks includes catecholamine secretion producing symptoms of a pheochromocytoma, difficult airway scenarios, episodes of bradycardia, hypotension during handling of the tumour, substantial blood loss, postoperative respiratory depression aspiration following tumour resection and baroreceptor failure following excision.

REFERENCES:


