Case Report

Management of bronchial carcinoid: An anaesthetic challenge

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ABSTRACT

Carcinoid tumours pose a great challenge to anaesthesiologist, especially if carcinoid syndrome is present. We report peri-operative management of a patient with carcinoid syndrome who underwent upper lobectomy. Pre-operative optimisation for 10 days before surgery with injection octreotide and administration on the day of surgery as per guidelines was followed (North American Neuroendocrine Tumour Society guidelines). Our main goals were to prevent mediator release, avoidance of triggering factors and management of peri-operative carcinoid crisis. During tumour handling patient developed carcinoid crisis which was effectively treated with intravenous bolus octreotide and increasing rate of infusion.

Key words: Bronchial carcinoid, carcinoid syndrome, octreotide

INTRODUCTION

Carcinoid tumors with carcinoid syndrome are difficult and interesting to manage for an anaesthesiologist. We are highlighting the management of a patient who underwent upper lobectomy.

CASE REPORT

A 55-year-old man weighing 50 kg and 160 cm tall, non-smoker, presented with cough with expectoration and shortness of breath on exertion since 3 years. He also gave a history of intermittent diarrhoea and flushing of the face and upper body since 3 months, precipitated by alcohol intake. He was a known hypertensive on tablet amlodipine 10 mg OD since 10 years.

Clinical examination revealed decreased air entry over left upper lung zone. Chest radiograph showed a mass in left suprahilar region. Computerised tomographic scan (CT scan) of the chest revealed a large, lobulated, heterogeneous enhancing mass lesion measuring 8.6 cm × 5.5 cm in left suprahilar region extending to left upper lobe bronchus [Figure 1].

CT guided biopsy on histopathology showed a typical lung carcinoid. Blood chemistry, electrocardiogram (ECG) and echocardiogram were normal. His pulmonary function testing, arterial blood gas (ABG) analysis and breath holding time showed a predicted post-operative forced expiratory volume in 1 s of 54%, PaO_2 of 93 mmHg, $PaCO_2$ of 40 mmHg and breath holding time of 24 s. Urinary 5-hydroxy-3-indole acetic acid was 50 mg/day ($n \leq 10$ mg/day). A diagnosis of left upper lobe bronchial carcinoid with carcinoid syndrome was made. Pre-operative preparation with subcutaneous (SC) octreotide 100 μg TDS relieved symptoms of flushing and diarrhoea. After 10 days, patient was scheduled for left upper lobectomy.

Premedication included tablet midazolam 7.5 mg and tablet ranitidine 150 mg at night and 1 h before surgery. On the morning of surgery, inj.octreotide 250 μg was given as an intravenous (IV) bolus followed by continuous infusion of 100 μg/h. An epidural catheter was sited at T7-T8 interspace and after test dose of 3 ml 2% lignocaine, 50 μg fentanyl in 6 ml saline was administered. Under local anaesthesia a radial artery catheter and right internal jugular line was inserted. Drugs for emergency use, octreotide, phenylephrine,

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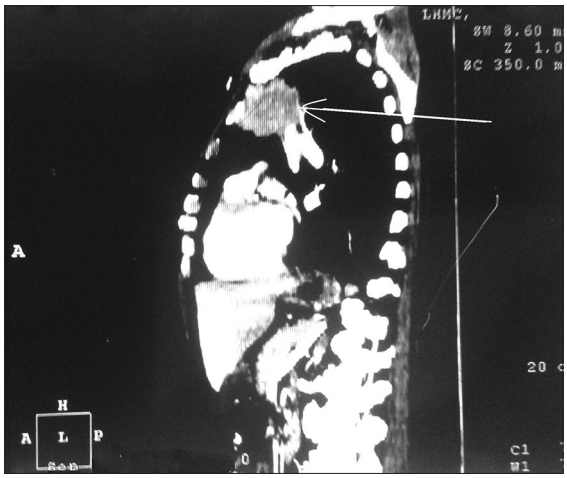

Figure 1: Computerised tomographic scan chest showing tumour

glyceryl trinitrate, esmolol, corticosteroids and antihistaminics were kept handy. Anaesthesia was induced with fentanyl 100 μg, propofol 75 mg with preadministration of Inj. lignocaine 60 mg. Using vecuronium, Portex® right sided double lumen tube (DLT) 37 FG was inserted and position was confirmed by fibreoptic bronchoscope. Oxygen saturation (SpO_2), end tidal CO_2 ($EtCO_2$), invasive blood pressure, ECG, central venous pressure, temperature and airway pressures were monitored throughout the procedure.

Anaesthesia was maintained with vecuronium and sevoflurane 1-1.2% in O_2/N_2O mixture. During surgical manipulation of tumour, there was sudden rise in peak airway pressure (P peak) from 20 to 35 cm H_2O then to 42 cm of H_2O and $EtCO_2$, from 36 to 47 mmHg, then to 50 mmHg, accompanied by fall in SpO_2 from 97% to 80%. On auscultation, there was marked reduction in breath sounds, with rhonchi. Flushing was observed all over the chest and face. Acute carcinoid induced bronchospasm was suspected. Surgical manipulation was stopped and N_2O was discontinued. Octreotide 250 μg IV bolus was given and infusion rate was increased to 200 μg/h and inj. hydrocortisone 200 mg and chlorpheniramine 25 mg were administered IV.

Position of DLT was rechecked and ABG sample was taken. Clinical improvement was seen within 60 s of octreotide bolus and within 5 min respiratory parameters were normal. During this episode patient remained haemodynamically stable and decision was made to proceed with surgery.

Extubation was uneventful and post-operative analgesia was provided with bupivacaine and fentanyl. In the recovery room patient's SpO_2 remained 97% on room air with no evidence of wheezing. Inj. octreotide infusion was tapered off over next 24 h. Histological examination of resected specimen confirmed diagnosis of carcinoid tumour.

DISCUSSION

Carcinoids are neuroendocrine tumours derived from enterochromaffin cells and are capable of secreting bioactive substances, most importantly serotonin, histamine and kinin peptides.[1] In 1907 Obendorfer first described this tumour as "karzinoid" because it "resembled carcinoma" but was noted to be slow growing.[2]

Bronchial carcinoids are foregut tumours and approximately 70% are located in major bronchi and accounting for 0.5-2.5% of all lung malignancies.[3,4] These occur more frequently in the right lung especially middle lobe. The annual incidence has been reported to be 0.6/100000 population.[5] Approximately 2-5% of bronchial carcinoid tumours exhibit symptoms of carcinoid syndrome.[6]

Carcinoid syndrome occur secondary to the systemic release of mediators either as a result of metastasis in the liver or from lung. Bronchial carcinoid can liberate mediators directly into circulation. Most common features of carcinoid syndrome are diarrhoea and flushing. It is the respiratory and cardiovascular effects with which an anaesthesiologist should be familiar with because of their severity. Bronchoconstriction which may present as wheezing and paroxysmal coughing can be life-threatening and requires prophylactic treatment.[7]

Dyspnoea may be present but underlying cardiac problem should be ruled out.[8,9] Carcinoid heart disease occurs in more than 50% patients with carcinoid syndrome. Anaesthetic considerations in patients with carcinoid syndrome include prevention of mediator release, avoiding triggering factors and preparation for the management of peri-operative carcinoid crisis.[10] There is no clearcut correlation between the mediators and symptoms. Hence, inhibition of tumour activity rather than antagonism of released peptides/amines are the mainstay of management, using octreotide.

Octreotide described as "endocrine cyanide" has the ability to prevent peptides/amine release from gastroenteropancreatic system.[11]

Our patient was clinically, biochemically and histologically proven case of functional carcinoid tumour. The protocol from North American Neuroendocrine Tumour Society consensus guidelines for the diagnosis and management of neuroendocrine tumours of the thorax are widely used. For any functional carcinoid tumour the patient should be started on octreotide. For major procedures, a pre-operative IV bolus of 250-500 μg, followed by a continuous infusion of 100-500 μg/h during the procedure, has been suggested. The infusion is then weaned by 50% daily for a few days until it can be safely discontinued and is sometimes supplemented by a dose of long-acting depot somatostatin analogue.[12] Additional pre-operative preparation include administering corticosteroids and antihistamines. Based on available evidences, we decided to start octreotide 100 μg SC thrice daily for 10 days pre-operatively in the present case.[13]

Avoidance of triggering factors is another important consideration. These factors may be grouped as physiological (stress, anxiety, light plane of anaesthesia, hypercapnia, hypothermia, hypertension or hypotension), mechanical (tracheal intubation/extubation, tumour handling), or pharmacological (catecholamine and histamine releasing drugs). Therefore, general anaesthesia should be induced cautiously using slow, titrated dose of drugs that have minimal haemodynamic effect.[14]

A carcinoid crisis caused by excessive tumour mediator release may occur anytime peri-operatively and it may manifest as hypotension or hypertension, flushing, tachycardia or bradycardia, bronchospasm and complete vasomotor collapse.[13] Therefore, vigilant monitoring is a must and drugs for its management should be kept ready before induction.

Bronchospasm during carcinoid crisis should never be treated with conventional drugs such as β2 adrenergic agonists, theophylline and epinephrine as they may further stimulate tumour mediator release.[14] Octreotide, corticosteroids, inhaled ipratropium bromide and antihistamines can be used safely, as during the current report. Quinlivan and Roberts, reported ineffectiveness of aerosolized albuterol in countering carcinoid induced bronchospasm. Patient developed vasomotor collapse which was completely reversed after the administration of IV octreotide.[15]

There is risk of neuraxial anaesthesia induced hypotension triggering mediator release and carcinoid crisis.[16] However, successful administration of both epidural and spinal anaesthesia in carcinoid syndrome has been reported.[17] The use of epidural analgesia is only advised in carcinoid patients who have been optimized pre-operatively with octreotide and provided that local anaesthesia is administered in a graded manner with careful haemodynamic monitoring.[18] In our patient epidural analgesia was adequate with no adverse haemodynamic effect.

Continuation of octreotide in the post-operative period depends on resectability and metastasis of tumour. Although tumour was completely resected, we continued it in the post-operative period for 24 h as a prophylactic measure.

CONCLUSION

Pre-operative optimisation with octreotide should be carried out in diagnosed cases of carcinoid syndrome. Receptor antagonists which inhibit vasoactive amines i.e., octreotide, and H1 and H2 receptor blockers are required inspite of the fact that octreotide provides only prophylaxis against carcinoid crisis and may not prevent overwhelming release of mediators during tumour handling. However, the dose and duration of pre-operative octreotide therapy needs to be well-defined to prevent peri-operative complications.

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