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Case Report

Acute Lethal Hepato-Bronchial Fistula: Emergency Perioperative Management Using Two Single-Lumen Endotracheal Tubes for Lung Isolation

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Abstract

Background: Hepato-bronchial fistula (HBF) is a rare complication of hepatic abscess. The usual atypical presentation poses diagnostic and management challenges to clinicians.

Case Presentation: This is a case report of acute lethal HBF in an adult who underwent successful surgical management at a hospital in Nigeria. Anaesthetic management was complicated by the lack of appropriate double-lumen endotracheal tubes or bronchial blockers for lung isolation. Therefore, two small cuffed ID=5mm endotracheal tubes (ETT) were used for lung isolation, with a good outcome.

Conclusion: This report highlights the safe option of using two small ETTs for perioperative lung isolation, especially in resource-limited settings. The report describes the challenging and meticulous perioperative management of HBF.

Keywords: Hepato-bronchial fistula, Hepato-pleural fistula, Broncho-biliary fistula, Hepatic abscess, Single lumen endobronchial tube, Lung isolation

Introduction

Hepato-bronchial fistula (HBF) is a rare complication of pyogenic hepatic infection.[1] Hepatic abscess can complicate some gastrointestinal infections.[2] Some risk factors for developing this abscess include liver transplantation, diabetes mellitus, malignancy and abdominal surgery.[1,2,3] The abscess may erode into the lung, causing HBF. The diagnosis of HBF may be challenging; because of atypical presenting features such as fever, weight loss, abdominal pain, chest pain, dyspnea, cough, haemoptysis and purulent sputum.[1] Perioperative management of HBF presents challenges to surgeons and anesthesiologists.

These challenges include lung contamination, aspiration, oxygen desaturation, respiratory insufficiency, reduced inhalational anaesthesia efficiency, altered hepatic drug metabolism and haemorrhage.[1] The difficulties with anaesthesia are worse during emergency HBF surgery, and there is inadequate literature regarding this delicate dilemma. This is a case report of emergency perioperative management of acute lethal HBF.

Case Presentation

A 49-year-old male presented at the University College Hospital, Ibadan, Nigeria, with acute abdominal pain, fever, cough and purulent sputum. The cough and sputum expectoration were severe in the supine posture. He also had obstructive sleep apnea (OSA) and obesity. Examination showed height 173cm, weight 95kg, BMI 32kg/m^2, airway score Mallampati-3, oxygen saturation 92% on air, tachycardia, tachypnea and abdominal tenderness. Blood tests showed white blood cell count 12x10^9/L, red cell volume 38%, platelet count 193x10^9/L, erythrocyte sedimentation rate 11mm/hour, prothrombin time 15secs, clotting time 4.6secs, and random blood glucose 119mg/dl. Radiography showed right pleural effusion, right lung opacity and hepatomegaly. Abdominal ultrasonography revealed hepatomegaly with right lobe echogenicity suggestive of an abscess. Computerized tomography confirmed liver abscess and HBF. The patient was informed about his diagnosis of pyogenic HBF, his questions were answered, informed consent was obtained for emergency laparotomy and consent was obtained for case reporting. Preoperative resuscitation included intravenous fluids, intravenous antibiotics, physiotherapy, and 8-hour fasting. Post-resuscitation clinical status showed oxygen saturation of 92% on air, respiratory rate 24/minute, pulse rate 108/minute, blood pressure 100/60mmHg, temperature 38^{0}C, and Glasgow coma score 15.

In the operating room, monitoring was applied using pulse oximetry, electrocardiography, and non-invasive blood pressure measurements. The patient was preoxygenated for 10 minutes in the semi-sitting posture and intubated in this posture. After the preoperative safety checklist, general anaesthesia was induced using intravenous ketamine 150mg and succinylcholine 100mg. Appropriate double-lumen tracheal tubes (DLT) or bronchial blockers were unavailable. Therefore, two cuffed ID=5mm endotracheal tubes (ETT) were used instead. The first ETT went into the right bronchus, 28cm from the teeth: adequate position and lung isolation was confirmed by pus aspiration, breath sounds in the right lung and absent breath sounds in the left lung. The second ETT was inserted into the trachea, 23cm from the teeth: the adequate position was confirmed by breath sounds in the left lung, absent breath sounds in the right lung and absent pus aspiration. Both lungs underwent independent mechanical ventilation with 35-50% oxygen in air, to maintain oxygen saturation >95%. General anaesthesia was maintained with intravenous ketamine infusion of 1-2 mg/minute, atracurium and morphine. Surgery was performed with the patient in a supine posture. Right subcostal laparotomy revealed a ruptured liver abscess and hepato-diaphragmatic adhesion. The abscess was drained, hepato-diaphragmatic adhesion was lysed, and the abdomen was lavaged. The abdomen was closed; with drains placed in the peritoneal and abscess cavities. A right chest drain was inserted. The intraoperative course was uneventful. At surgery completion, the patient was put in a semi-sitting posture, intravenous anaesthesia was discontinued, and residual neuromuscular blockade was reversed with neostigmine plus atropine. After ensuring satisfactory consciousness, spontaneous respiration, cardiovascular stability, reversal of neuromuscular blockade and semi-siting posture, both endotracheal tubes were removed uneventfully. Postoperative management included antibiotics, fluids, nutrition, analgesics, and physiotherapy. The culture of the pus yielded no growth. The patient recovered promptly and was discharged home on the seventh postoperative day.

Discussion

Unilateral thoracic pathology or surgery, such as HBF, requires one-lung isolation and ventilation.[1,4,5] One-lung ventilation is complicated by reduced pulmonary capacity and reduced inhalational anaesthesia efficiency.[5] Therefore, total intravenous anaesthesia provides more reliable anaesthesia as utilized in this case report. The patient in this report underwent anaesthesia induction and maintenance using ketamine. Ketamine provides predictable dose-dependent anaesthesia, analgesia, amnesia, cardiorespiratory stability, bronchodilation, and preserved airway reflexes.[6] Ketamine has anti-hyperalgesic, anti-inflammatory and antidepressant effects.[6]

The patient in this report had OSA, and perioperative risks of respiratory, and airway complications.[7,8] These factors presented challenges to anaesthesia management.[7,8,9,10] The patient presented a unique combination of the complex problems of HBF, OSA, orthopnea and a difficult airway. These multiple unusual challenges necessitated anaesthesia induction and the emergence in the semi-sitting posture, as a creative and safe solution. The semi-sitting posture is also beneficial during endotracheal intubation and extubation of patients with OSA or difficult airway.[7,8,9,10]

Perioperative lung isolation is usually performed using appropriate DLT or bronchial blockers.[1,4,5] The anaesthetic management dilemma in this patient was compounded by the unavailability of DLT, bronchial blocker or fiberoptic bronchoscope; which necessitated lung isolation using two small ETTs. This was an innovative, safe, and effective solution or modality. Although there is a paucity of literature regarding the use of single-lumen ETT for lung isolation; this case report highlights that it can be used effectively, easily, and safely. This is a unique, inexpensive, and reasonable technique of lung isolation; especially in resource-poor hospitals. Fiberoptic bronchoscopy is useful to confirm lung isolation but was not available for the patient described in this case report. However, lung isolation may be safely confirmed based on clinical features, observations and measurements, such as those used in this case report.[4,5] Good clinical judgement and meticulous airway skills may ensure safe endobronchial intubation and lung isolation, and this may be an option in resource-limited settings without a fiberoptic bronchoscope.[4,5]

Conclusions

HBF patients usually present significant perioperative risks and challenges, which require meticulous management. The challenges are complex, especially in resource-poor settings. This case report emphasizes the peculiar challenges of HBF and the judicious perioperative care that is required for an uneventful outcome such as intubation in the semi-sitting posture. This complex case was successfully managed with the use of two small ETTs for lung isolation. This demonstrates that the use of two small ETTs should be considered for lung isolation, as an alternative to DLT or bronchial blockers.

Conflicts of Interest

All the authors declare no conflicts of interest.

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All the authors testify that all persons designated as authors qualify for authorship and have checked the article for plagiarism. All the authors were involved in the writing of initial and final drafts, proofreading, critical review, and approval of the final article draft.

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