Stridor in a Subject with Uncontrolled Diabetes: An Uncommon Adversary, Successfully Managed with Bronchoscopy.

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To the editor:

Invasive mucormycosis is a fatal opportunistic infection caused by the fungi from mucoraceae family. Uncontrolled diabetes mellitus and post organ transplant status are two of the strongest risk factors for development of invasive mucormycosis. Rhino-cerebral, renal and pulmonary involvement are most commonly seen.\(^1\) Isolated invasion to trachea and larynx are rare manifestations of invasive mucormycosis which can lead to life-threatening airway obstruction.\(^2\) Diagnosis is based on histopathology as culture positivity is uncommon and carries poor sensitivity. The recommended drug treatment is liposomal amphotericin B while posaconazole is used as salvage therapy. Due to vaso-invasive nature of the disease, surgery is recommended following drug treatment for the complete cure.\(^1\) In this manuscript, we report our experience in conservatively managing a patient, with isolated tracheal mucormycosis.

Case Presentation

A 41-year-old lady with uncontrolled type II diabetes mellitus reported to emergency room with stridor, dysphagia and progressive breathlessness for one month. On examination, she had biphasic stridor. Her hematological investigations were unremarkable except for the leukocytosis (13400/µl) and hyperglycemia (556 mg/dl) with positive urinary ketones. Her blood gas analysis was suggestive of high anion gap metabolic acidosis. Her HbA1C was 16.7%. Chest radiography was largely unremarkable. A syndromic diagnosis of diabetic ketoacidosis was made. She was managed with insulin infusion, and oxygen supplementation with intravenous fluids and antibiotics (piperacillin-tazobactam). For evaluation of stridor a contrast enhanced computed tomography (CECT) examination of neck and thorax was done which showed peripherally enhancing circumferential collection around trachea with specks of air pockets (figure 1A) and
size 4.3x2.4 cm, extending from C7 to T2 vertebral levels. Whereas rest of the lung parenchyma was normal. She underwent flexible-bronchoscopy examination which revealed presence of thick purulent looking circumferential membranous layer (figure 1C), adherent to the underlying unhealthy mucosa, causing 70-80% of luminal narrowing, extending from second tracheal ring to 3 centimeters above carina. In view of critical stenosis and thick adherent pseudo-membrane formation, removal with rigid bronchoscopy was planned. During rigid-bronchoscopy, after sedation, patient was intubated using size 12 tracheoscope by Karl Storz® with 4K Ultra-High-Definition camera system. After reaching up to the narrowing, the scope was negotiated into the lower end of the trachea. Once the ventilation was established, scope was pulled back up to the upper end of stenosis and pseudo-membrane were removed using alligator tooth optical forceps. Significant pull-strength was required to peal pseudo membranes from their bases. Circumferential rings of the thick-organized-pseudo-membrane were removed off in toto. After multiple attempts, entire visible pseudo-membrane was removed. Stenosis was reduced to 10-20%, which was due to edematous unhealthy mucosa. Post-procedure, patient was extubated on operation-table and shifted to intensive care unit. There was significant reduction in respiratory distress and audible stridor. The sample was sent for microbiological culture (bacterial, fungal and mycobacterial culture), histopathology and tubercular workup (staining and cartridge based nucleic acid amplification test).

Microbiological and tubercular workup were negative. Histopathological examination, however, showed presence of broad aseptate hyphae with acute-angle-branching and tissue-invasion suggestive of mucormycosis (figure 1D and E). As clinical and histopathological picture were consistent with mucormycosis, intravenous-liposomal-amphotericin-B at 5mg/kg infusion was started. Daily electrolytes and renal function test were monitored. During the course of
amphotericin B there were multiple episodes of hypokalemia which were corrected enterally as well as intravenously as and when recommended according to the guidelines. Blood sugar was controlled using insulin. After one week of therapy, she underwent flexible-bronchoscopy examination which showed minor residual membrane present on mid tracheal wall, it was removed using forceps. Retained secretions were removed using toileting with normal saline. After completion of 20 days of liposomal amphotericin B, CECT neck and thorax showed complete resolution of the peritracheal collection (Figure 1B). Subsequently amphotericin-B was stopped and posaconazole maintenance treatment was initiated for next 6 weeks. After 1-year of follow-up, patient is doing fine and has no recurrence which was confirmed with interval flexible-bronchoscopy examination (Figure 1F) showing near normal tracheobronchial tree.

**Discussion:**

Tracheal or upper airway mucormycosis is not a common entity. The usual presentation is in the form of respiratory distress and stridor requiring urgent tracheostomy or more invasive form of surgeries like tracheal resection. Imaging findings are present in most cases but not characteristic. For complete cure, multi-modality management is recommended which includes amphotericin infusions followed by curative resection.\(^2\)\(^-\)\(^6\) Conservative management with only amphotericin and bronchoscopic removal of slough has also been reported to be successful in the existing PubMed literature.\(^7\)\(^-\)\(^8\) In a systematic review on the subject, diabetes mellitus was found to be the most common risk factor, with majority receiving amphotericin B and an overall case fatality rate of 50%.\(^9\) Majority of deaths reported were due to massive hemoptysis or respiratory failure. Bronchoscopy with endobronchial biopsy histology established diagnosis in most cases. Better outcome was observed when bronchoscopy guided or surgical interventions were combined with amphotericin B.\(^8\) The probable mechanism behind uncontrolled diabetics to be at high risk of
developing invasive mucormycosis is neutrophilic dysfunction. Low threshold for suspicions in at-risk subjects, histopathological confirmation, and aggressive management with antifungals along with bronchoscopic debridement may improve outcome.

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**Conflict of Interest:** None to declare.

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**References:**


Figure 1:
A) Contrast-enhanced computed tomography (CECT) of the thorax showing hypoattenuating circumferential collection (arrowhead) around trachea with few air specks. B) Follow-up CECT thorax showing near complete resolution of the collection. C) Bronchoscopic image of the whitish creamy slough (star) causing critical narrowing of the trachea. D) Hematoxylin & eosin stain showing irregular thick fungal hyphae in the necrotic background (arrow). E) Gomori methamine stain (400x) revealing broad aseptate hyphae with acute angel branching (arrow). F) Bronchoscopic images showing near complete recovery following removal of the slough under rigid-bronchoscopy and complete course of liposomal amphotericin-B.