Partners in stridor: An uncommon cause for central airway obstruction

Sir,

Central airway stenosis is a reported complication and sequelae of tracheobronchial tuberculosis. Commonly, the affected segment is fibrostenotic, with symptoms and presence of stridor dependent on the extent of airway narrowing.

A 23-year-old female, who completed a 6-month course of conventional antituberculous therapy (ATT) for sputum smear-positive pulmonary tuberculosis a year ago, presented with progressive dyspnea of 3-month duration. Clinical examination revealed biphasic stridor. Room air saturation was normal. Routine blood investigations and blood gasses were normal. Chest X-ray [Figure 1a] revealed a right upper lobe collapse. Spirometry showed irreversible airflow limitation [Figure 2a]. Flexible bronchoscopy revealed a nonnegotiable mid-tracheal stenosis with an irregularly shaped crescentic lumen 6 cm below the vocal cords [Figure 3a]. Computed tomogram of the chest with coronal image reconstruction and virtual bronchoscopy [Figure 1b and c] revealed a short stenotic segment having an ultra-short left posterolateral wall and a slightly longer right anterolateral wall, resembling a tracheal web and possibly granulation tissue, respectively. We proceeded with a rigid bronchoscopy under general anesthesia.

On intubating and advancing till the carina with an 8 size ventilating rigid tracheobronchoscope, the tracheal web was released. Flexible bronchoscopy was performed through the rigid barrel, and both bronchial trees were inspected. All segments were normal except for the right upper lobe lumen which could not be visualized. The rigid barrel was then withdrawn till its distal tip was just proximal to the stenotic segment [Figure 3b]. The tracheal web was seen folded on itself, lying medially along what seemed like a fibrous band, and the stenotic lumen was seen bounded by the latter and the combined web with granulation tissue anterolaterally. Using electrocautery, the remnants of the tracheal web and the fibrous band were removed, and near-complete luminal patency was achieved [Figure 3c and d]. She was extubated and was discharged 2 days later.

Histopathological examination of the tissue removed revealed the tracheal web to consist of a layer of respiratory mucosa, the fibrous band to consist of respiratory mucosa

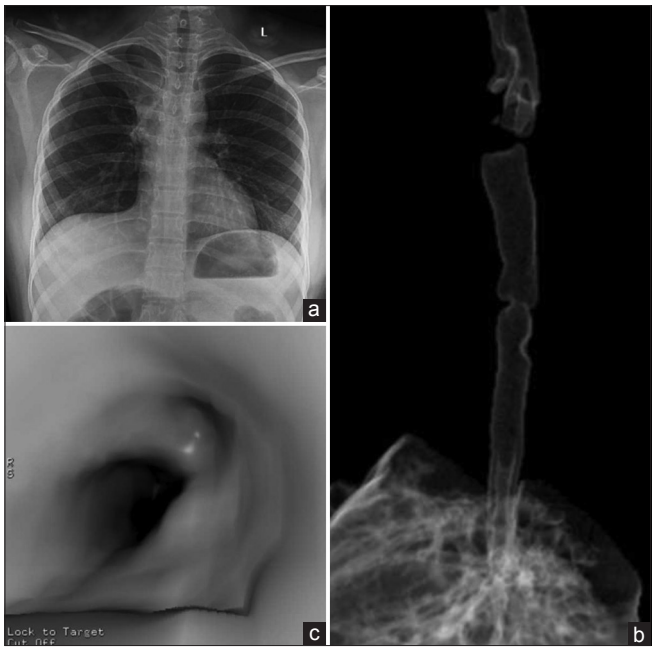

Figure 1: From above through clockwise: (a) Chest X-ray posteroanterior view showing the right upper zone homogeneous opacity suggestive of the right upper lobe collapse, (b) computed tomogram coronal reconstruction showing a short stenotic segment having an ultra-short left posterolateral wall and a slightly longer right anterolateral wall, and (c) virtual bronchoscopic image of the stenotic segment as seen above from the carina

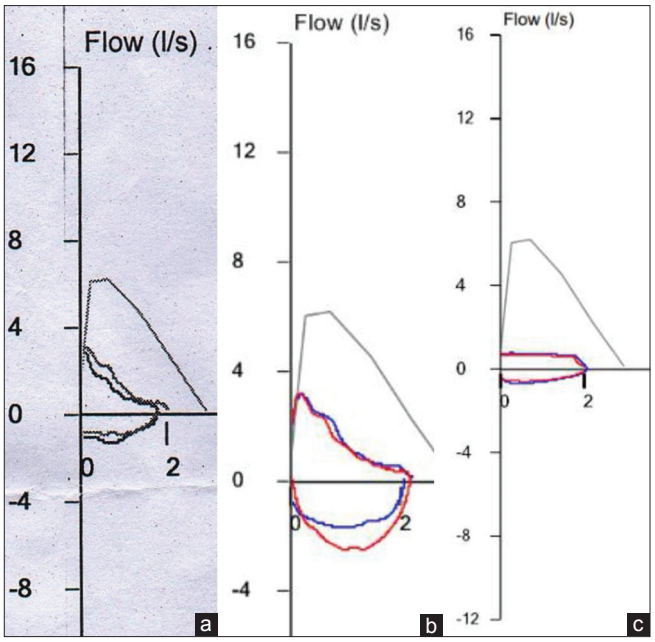

Figure 2: From left to right: (a) Flow-volume loop showing both expiratory and inspiratory flow limitations before procedure, (b) showing improvement in both expiratory and inspiratory flows postintervention, and (c) fixed airway obstruction documented 9 months later suggestive of recurrence of mid-tracheal stenosis

with underlying stromal tissue without cartilage or glands, and the granulation tissue to consist of fibrocollagenous tissue. There was no evidence of active inflammation, granulomas, or malignancy. Flexible bronchoscopy performed 2 weeks later revealed a patent lumen with some remnant of the thickened mucosa over the right anterolateral wall of the stenotic segment [Figure 3e]. Spirometry repeated after 3 months showed increased expiratory and inspiratory flows [Figure 2b]. Spirometry performed at 9 months, however, showed a fixed airway obstruction [Figure 2c]. Subsequent flexible bronchoscopy showed recurrence of mid-tracheal stenosis [Figure 3f]. As she was asymptomatic, it was decided to continue monitoring her monthly.

Tracheobronchial tuberculosis is reported more commonly in females in their second or third decade of life, presents with varying clinical features, has a heterogeneous natural course of disease, and is managed with conventional ATT.[1] The development of airway stenosis as a sequela is unpredictable. Patients having edematous-hyperemic, fibrostenotic, and tumorous appearances on bronchoscopy have an increased propensity to develop airway stenosis within 3 months despite appropriate ATT.[2] The role of corticosteroids in preventing airway stenosis in endobronchial tuberculosis is controversial.[3-5] The airway stenosis is usually characterized by short-segment involvement, with either circumferential narrowing or fibrostenotic appearance, and is usually a simple stenosis without involvement of the underlying cartilages.[6,7]

Tracheal or bronchial webs are usually congenital, thin membrane-like diaphragms that partially or completely occlude the airway.[8] Fibrous bands or adhesions have been reported as an isolated congenital anomaly as well as sequelae of various inflammatory diseases and infections.[8,9] We believed that this is the first case report of tracheal web and fibrous band formation as a sequela of endotracheal tuberculosis. We believed that the fibrous band would have been the first to form, following which an infolding of mucosa would have developed from the left posterolateral tracheal wall toward the fibrous band giving form to a tracheal web. On the opposite right anterolateral wall, granulation tissue developed and gradually grew inwards toward the fibrous band with the remaining distance covered by a mucosal web leading to near-complete occlusion of whatever lumen was left lying in between the latter and the fibrous band. The inability to visualize the right upper lobe lumen may also be due to its occlusion by a combination of adhesion bands and mucosal web.

Management of central airway stenosis usually involves an initial attempt by bronchoscopy (both flexible and rigid) assisted by various techniques such as balloon dilatation, electrocautery, or neodymium-doped yttrium aluminum garnet laser with or without airway stenting.[6,7,10-12] Patients after bronchoscopic interventions ideally should be followed up regularly in the initial 2 years to assess for recurrence of stenosis. Patients with complex lesions and failure of initial bronchoscopic assisted techniques should be taken up for surgical correction.[7] Our patient,

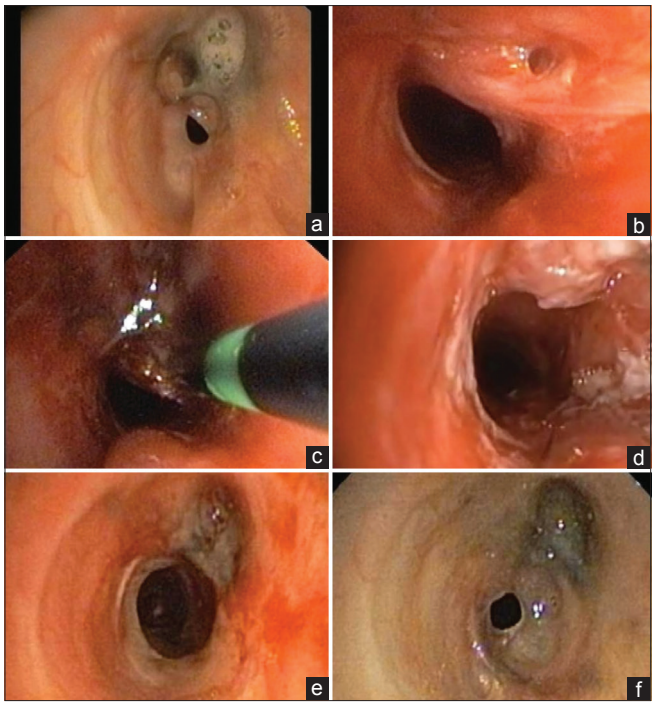

Figure 3: Flexible video bronchoscopic images: (a) Top row left showing mid-tracheal stenosis. The left and right walls appear to be web-like and granulation-like tissue, respectively, (b) top row right – postrigid bronchoscopy and "release" of the tracheal web. The original stenotic lumen is seen on the other side of the fibrous band, (c) middle row left – fibrous band dissection by electrosurgical knife, (d) middle row right – luminal patency achieved, (e) bottom row left – lumen patent at 2 weeks, and (f) bottom row right – recurrence of stenosis at 9 months

though has developed restenosis, continues to remain asymptomatic and is on regular follow-up.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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