Case report

A rare asthma mimic exposed by basic physiology

N. NAVANI\textsuperscript{1}, D. COSTELLO\textsuperscript{2}, J.M. BROWN\textsuperscript{3}, G. SANDHU\textsuperscript{2}, S.M. JANES\textsuperscript{1} and J. GEORGE\textsuperscript{3}

From the \textsuperscript{1}Centre for Respiratory Research, University College London, \textsuperscript{2}Department of Surgery, Royal National Throat, Nose and Ear Hospital and \textsuperscript{3}Department of Thoracic Medicine, University College London Hospital, London, UK

Address correspondence to Dr N. Navani, Centre for Respiratory Research, University College London, Rayne Institute, 5 University Street, London WC1E 6JJ, UK. email: n.navani@ucl.ac.uk

Case report

In October 2008, a 44-year-old lady was referred for optimization of her asthma therapy prior to commencing in vitro fertilization treatment. She had been diagnosed with asthma in 2006 following a viral infection and was using inhaled beclamethasone (200 μg twice daily) and inhaled salbutamol when required. In the preceding 18 months, she had made two visits to the emergency room with breathlessness, and improved with nebulized salbutamol and a course of oral corticosteroids. She had felt increasingly breathless over the previous 3 months. There was no other past medical history. Written consent was obtained from the patient.

Clinical examination did not reveal any evidence of expiratory wheeze or inspiratory stridor, and chest radiograph was normal. Spirometry revealed a forced expiratory volume in 1 s (FEV\textsubscript{1}) of 3.23 l (110% predicted) and a forced vital capacity (FVC) of 3.96 l (116% predicted), while the peak expiratory flow (PEF) was 283 l/min (69% of predicted). None of these indices improved following nebulized salbutamol.

The Empey index [calculated as the FEV\textsubscript{1} (ml/s) divided by the PEF (l/min)] was 11.4. Empey index values >10 are considered abnormal.\textsuperscript{1} A flow-volume loop was therefore obtained and was suggestive of a fixed upper airway obstruction.

Video bronchoscopy under conscious sedation was performed. A circumferential narrowing of the trachea was observed 3 cm below the vocal cords (Figure 1A) and it was not possible to advance the bronchoscope beyond the lesion. At its narrowest point, the trachea was 5 mm in diameter.

The absence of previous intubation, upper airway trauma or tracheostomy in the history was verified. There was no evidence of a systemic inflammatory or infective disorder and serum test for the anti-neutrophil cytoplasmic antibody was negative.

A diagnosis of idiopathic subglottic stenosis was made and the patient was referred for urgent suspension laryngoscopy under general anaesthesia. The lesion was biopsied and radial cuts were made with the carbon dioxide laser. This was followed by balloon dilatation up to 16 mm. The biopsy specimens were subsequently reported as showing non-specific inflammatory and fibrotic changes.

After the procedure, the patient’s symptom of breathlessness completely resolved and the PEF improved to 600 l/min (146% predicted). Post-operative FEV\textsubscript{1} and FVC remained unchanged at 3.29 l and 3.86 l, respectively, resulting in an improved Empey index of 5.48. Surveillance endoscopic examination at 3 months after the procedure...
revealed a patent airway (Figure 1B), and the flow-volume loop was now within normal limits. Inhaled medications for asthma were discontinued and she remained well without any respiratory symptoms.

**Discussion**

Idiopathic subglottic stenosis is a rare condition and the majority of cases are initially misdiagnosed as asthma. The condition typically occurs at the lower border of the cricoid and involves the first tracheal ring, but may also extend cranially. The diagnosis is made after excluding other traumatic and inflammatory/infective causes of subglottic stenosis. The condition occurs almost exclusively in women post-puberty. A hormonal aetiology is suspected but not proven.

Conditions causing upper airway obstruction are rare and are frequently mistaken for asthma. If not correctly diagnosed and treated, they may rapidly progress to respiratory failure. Empey first highlighted the relationship between the PEF and FEV$_1$ in 1972 and argued that a disproportionately low PEF should alert the clinician to the possibility of upper airway obstruction. In the present case, this simple observation led to a prompt diagnosis and avoidance of potentially life-threatening airway obstruction.

**Funding**

N.N. is an Medical Research Council Clinical Research Training Fellow.

Conflicts of interest: None declared.

**References**