

OBSERVATION: CASE REPORT

Bronchial Thermoplasty for Severe Asthmatic Cough

Background: Bronchial thermoplasty is a novel treatment for severe asthma that reduces the volume of airway smooth muscles and the number of airway nerves and epithelial neuroendocrine cells (1). These reductions are associated with fewer asthma exacerbations. However, little is known about the efficacy of this therapy on cough.

Objective: To describe a patient with severe, cough-predominant asthma whose cough was alleviated by bronchial thermoplasty.

Case Report: A 35-year-old woman presented with a 2.5-year history of chronic cough. The patient was diagnosed with asthma 6 months earlier on the basis of wheezing on auscultation and the ability of inhaled salbutamol to increase FEV₁ by 13.8% above baseline levels. The cough had worsened and was awakening the patient and disturbing conversation despite treatment with high-dose inhaled corticosteroids, long-acting β_2 -agonists, and leukotriene-receptor antagonists. A 7-day course of oral prednisolone, 20 mg/d, also had not improved the cough.

The patient had a cough visual analogue scale score of 67 mm (range, 0 to 100 mm, with lower scores indicating less frequent cough) and a total Leicester Cough Questionnaire score of 9.1 (range, 3 to 21, with higher scores indicating better quality of life) (2). These findings documented that the cough was frequent and severe. In addition, the patient had an Asthma Control Test score of 16 (range, 5 to 25, with higher scores reflecting greater asthma control and scores >19 indicating well-controlled asthma). Blood eosinophil counts and levels of exhaled nitric oxide and serum IgE were normal, and we could not detect sensitization to inhaled aeroallergens (data not shown). On capsaicin (the irritating compound in hot chili peppers) cough sensitivity testing done with the fixed-time inhalation method, an inhalation of the lowest capsaicin concentration (0.61 mcM) evoked 7 coughs (Table).

We began treatment with sustained theophylline, tiotropium, and erythromycin, but cough frequency, cough-specific quality of life, asthma control, and the number of capsaicin-induced coughs remained unchanged at 6-month follow-up (Figure). We used bronchial thermoplasty to treat all visible bronchi with heat energy at 65 °C for 10 seconds during 3

procedures at 3-week intervals for a total of 138 activations. The cough improved immediately after the first procedure. Three months after the final procedure, we documented improvements in cough intensity (cough visual analogue scale score, 36 mm), cough-related quality of life (Leicester Cough Questionnaire score, 14.6), and asthma control (Asthma Control Test score, 19). The number of capsaicin-induced coughs also decreased, but measures of systemic eosinophilic and airway inflammation and pulmonary function remained unchanged.

Discussion: Some patients have asthmatic cough that is frequent and severe enough to justify the aggressive treatment that we used in this patient. Understanding how this treatment works would be comforting, but we can only speculate about the mechanism. Asthmatic cough is generally induced by bronchoconstriction via A- δ fibers of the airway smooth muscle (3), and acute bronchoconstriction promotes the capsaicin cough response (4). Airway neuronal dysfunction may therefore be a useful therapeutic target. Patients with stable asthma, particularly women and nonatopic patients, have a more pronounced cough response to capsaicin than healthy persons (5). This patient's capsaicin cough response improved after bronchial thermoplasty, which suggests that this therapy may alter the expression of transient receptor potential vanilloid-1, the capsaicin receptor. This receptor is a nonselective cation channel that is activated by temperatures greater than 43 °C; acidic conditions; capsaicin; and allyl isothiocyanate, which is the pungent compound in mustard and wasabi. Decreasing neuronal dysfunction and altering the capsaicin receptor may thus have contributed to this patient's improvement. Whatever the explanation, we believe that other clinicians should consider bronchial thermoplasty for patients with severe asthmatic cough who have not responded to more conventional therapies.

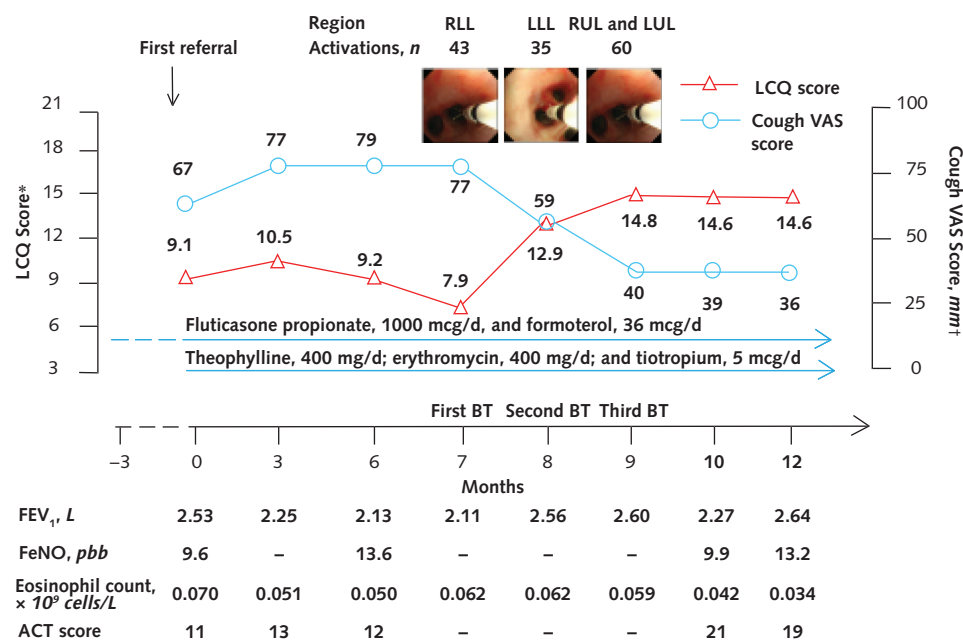
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Table. Time Course of the Number of Coughs in Response to Capsaicin*

Variable	Before Bronchial Thermoplasty						After Bronchial Thermoplasty	
Time after referral, mo	0	1	2	3	6	10	12	
Coughs, n								
0.61 mcM of inhaled capsaicin	7	11	20	19	11	3	0	
1.22 mcM of inhaled capsaicin	ND	ND	ND	ND	ND	16	5	

ND = not done.
* Cough response to capsaicin was evaluated by the dose-response, fixed-time method. Each capsaicin concentration was inhaled for 15 s followed by saline for 45 s at 1-min intervals for 10 doubling concentrations (0.61–312 mcM). The number of coughs was counted during the 1-min inhalation for each concentration. When cough was evoked ≥ 5 times, the next doubling dose was not inhaled.

Figure. Clinical course of cough intensity, cough-specific quality of life, asthma control, and clinical indices.



ACT = Asthma Control Test; BT = bronchial thermoplasty; FeNO = fractional exhaled nitric oxide; LCQ = Leicester Cough Questionnaire; LLL = left lower lobe; LUL = left upper lobe; RLL = right lower lobe; RUL = right upper lobe; VAS = visual analogue scale.
* Higher scores indicate better cough-related quality of life. The minimum clinically important difference is ≥ 1.3 .
† Lower scores indicate less intense cough.

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