Bronchial thermoplasty: report on the first endoscopic treatment for asthma in Latin America*

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Abstract
Bronchial thermoplasty is a new bronchoscopic procedure that delivers radiofrequency energy to the airway and potentially reduces the smooth muscle-mediated bronchoconstriction. We report the case of a 48-year-old man with persistent moderate asthma submitted to bronchial thermoplasty. The treatment increased the forced expiratory volume in one second, increased the number of symptom-free days, reduced the use of relief medications, and improved the Juniper Asthma Quality of Life Scale score. In this patient, bronchial thermoplasty was well tolerated and safe. This was the first bronchial thermoplasty performed in Latin America. At 12 months after the procedure, the results were encouraging in terms of its potential benefits in patients with difficult-to-control asthma.

Keywords: Asthma/treatment; Respiratory function tests; Case reports [publication type].

Introduction
Asthma patients presenting severe episodes of bronchospasm, even with appropriate treatment, are a therapeutic challenge. Many symptoms of acute asthma and cases of severe attacks are the result of excessive bronchial smooth muscle contraction, which is the principal target of inhaled bronchodilator therapy.¹ Studies have been carried out in order to investigate the possibility that a specific phenotypic alteration of the smooth musculature in asthma patients is relevant to the physiopathology of the disease.² Bronchial thermoplasty is a bronchoscopic procedure which, through the generation and transmission of radiofrequency waves, creating heat that reduces the muscular mass in the airways of asthma patients with the objective of reducing smooth muscle-mediated bronchoconstriction. The energy is released using a catheter (Alair System; Asthmatx: Mountain View, CA, USA) connected to a radiofrequency generator.³

Safety studies have demonstrated that this is a safe procedure,³,⁴ without evidence of scarring or stenosis in the airway after the procedure. The histological evaluation demonstrated significant atrophy in the smooth muscle of airways submitted to the treatment. The first prospective study in asthma patients resulted in a significant reduction of symptoms and improvement in the peak expiratory flow after 12 weeks.⁵ In addition to confirming the safety of the procedure, a significant reduction of the bronchial hyper-responsiveness was observed in this study even 24 months after treatment.

Based on the results from the studies mentioned above, the first randomized study employing bronchial thermoplasty in asthma patients, the Asthma Intervention Research Trial, was proposed and subsequently carried out.⁶ That was a multicenter study involving patients with moderate asthma who, despite receiving treatment appropriate to the severity of their disease (long-acting bronchodilator and inhaled corticosteroid), presented symptoms due to bronchospasm. The aim of the study was to examine the safety and efficacy of bronchial thermoplasty in asthma patients who have been submitted to the procedure by monitoring them for 12 months after the treatment.

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Submitted: 10 October 2006. Accepted, after review: 14 March 2007.
The preliminary results were encouraging. The authors of present study took part in the study mentioned above, in which they randomized 12 patients for treatment.

Here, we describe the case of the first asthma patient treated with bronchial thermoplasty at our facility, which was also the first case of endoscopic treatment for asthma in Latin America.

Case report

A patient with moderate persistent asthma, under treatment with long-acting bronchodilator and inhaled corticosteroid in appropriate doses (formoterol 12 µg + budesonide 400 µg administered with powder inhaler every 12 h) was included in the study and submitted to bronchial thermoplasty. The patient reported atopic asthma since childhood, with worsening of symptoms in recent years. Even under appropriate treatment for more than 36 months, the patient remained symptomatic, presenting frequent crises (3 to 4 per year) and therefore requiring courses of oral corticosteroid. This was a patient with uncontrolled asthma in the fourth step of treatment.

In the first functional evaluation, the patient presented a forced expiratory volume in one second (FEV₁) of 2.48 L (68%), and, on the methacholine bronchoprovocation test, the provocative concentration that induced a 20% decrease in FEV₁ (PC_{20}) was 0.57 mg/mL.

The patient was submitted to bronchial thermoplasty (Figure 1) with the Alair system in three sessions (right lower lobe, left lower lobe, and upper lobes) with a three-week interval between sessions. Every treatment session was performed under general anesthesia without any complication. The procedure was well tolerated by the patient. In each of the three sessions, the patient was discharged from the recovery room with preserved pulmonary function.

In evaluations performed 4, 6, and 12 months after the bronchial thermoplasty, the patient presented the following FEV₁ values: 2.67 L (73%), 2.90 L (79%), and 3.02 L (83%), respectively, demonstrating a significant improvement in the pulmonary function compared with basal values (Table 1). There was no significant change in the PC_{20} after 12 months. In addition, comparing the final analysis (at 12 months after treatment) with the initial analysis (at four weeks before treatment), there was a 64% increase in the number of symptom-free days, a reduction in the use of relief medication (from 24.1 inhalations to 2.3 inhalations per week), and an improvement in the Juniper Asthma Quality of Life Scale (AQLS) score (from 2.4 to 3.7 points). The comparison between pre-treatment and post-treatment values is shown in Table 1.

Discussion

The aim of bronchial thermoplasty is to reduce smooth muscle thickness in the segmental and subsegmental bronchi through the application of radiofrequency energy to the airways. The resulting anatomical alteration is intended to provide clinical benefits to asthma patient by reducing smooth muscle contractility in the airways, potentially also reducing the number of episodes of bronchospasm and asthma exacerbation.

In most cases, asthma can be well controlled through educational and environmental measures, together with good treatment compliance. There is a portion of patients, however, who despite optimized treatment, remain symptomatic and present frequent exacerbations. In such patients, even those without aggravating factors (gastroesophageal reflux, chronic sinus disease, aspergillosis, etc.), asthma can remain uncontrolled even with prolonged treatment and follow-up evaluations by a specialist. This segment of patients, although representing a small proportion of the asthma patient population, is responsible for a significant portion of the medical and hospital activities involved in the treatment of asthma.

Figure 1 - Bronchial thermoplasty in an asthma patient. Bronchoscopic image.
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Safety and efficacy were observed at the first 12 months of follow-up. This was the first patient treated with this technique in Latin America, and the results demonstrate that it is a promising therapeutic method, albeit still in the experimental phase, for the control and treatment of symptoms in patients with moderate or severe asthma. Further studies with larger patient samples are needed in order to confirm the long-term efficiency and utility of bronchial thermoplasty in the treatment of asthma patients.

References

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