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Bronchial thermoplasty

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ABSTRACT

Asthma is a chronic inflammatory disease of the airways characterized by airway hyperresponsiveness and airflow obstruction. Chronic airway inflammation can lead to an increase in thickness of airway smooth muscle which causes airflow constriction and breathing difficulty. Clinical trials have demonstrated significant improvements on asthma patients who received bronchial thermoplasty (BT).

Keywords: Smooth muscle, Uncontrolled asthma, Radiofrequency, Airway

Bronchial thermoplasty treatment

Bronchial thermoplasty (BT) is a new treatment modality in severe asthma. It is a bronchoscopic procedure in which the large sub-segmental airways are heated to 65°C by an electrode with radiofrequency energy which ablates and reduces the bronchial smooth muscle mass. It is performed with fiberoptic bronchoscopy in 3 separate procedures in which all accessible airways located beyond the main stem bronchi (average of 3-10 mm in diameter), one for the each lower lobe of the lung and another for both upper lobes. The delivery of energy during bronchial thermoplasty uses continuous feedback to control the degree and time of tissue heating to decrease airway smooth muscle mass without airway perforation or stenosis. Most patients with difficult-to-treat asthma require 3-4 medications and long-term oral corticosteroids or frequent use [1]. Alternative therapies have offered the advantage of preventing the major side effect of steroids [2].

Selection of treatment candidates is an important step.

Patients between 18-65 years of age, non-smoker for at least the preceding year and patients who have severe asthma not well controlled by inhaled corticosteroids and long-acting bronchodilators can be appropriate. The use of this technology to treat asthma was used first in animals and then it was later performed in patients with asthma [3,4]. In vivo and in vitro studies have shown that anti-inflammatory effects of glucocorticoids were decreased in patients with severe asthma [5]. Therefore, new treatment modalities were experienced in this field and GINA guideline recommends BT to be considered step 5 therapy in patients with uncontrolled severe asthma (evidence level A).

The Asthma Intervention Research trial was the first randomized controlled trial of BT and conventional therapy. BT group had 50% fewer mild exacerbations in the following 12 months. BT group had more adverse respiratory events and hospitalizations after the procedure but after 6 weeks there was no difference between the two groups. After one year, there was more improvements in Asthma Control Questionnaire and Asthma Quality of Life Questionnaire scores. The most common adverse events were dyspnea, wheezing, cough and chest discomfort [7,8].

The Asthma Intervention Research 2 trial which is a randomized clinical trial of BT in patients with severe asthma, showed a reduction in severe exacerbations and reduction in emergency visits due to respiratory symptoms [9-11].

There are many contraindications for BT which include an age younger than 18 years, patients who have pacemaker, other implantable devices, an allergy to a medication used in bronchoscopy like atropine, lidocaine. This procedure must be postponed if a patient have an asthma exacerbation, respiratory infections or coagulopathy [12].

In this procedure, severity of lung function should not be used as indication. BT can be performed in patients who have important symptoms that are uncontrolled despite all medications. It is not clear which asthma phenotypes

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should be chosen for BT. But there is no clear information to consider one option over the others. BT is effective in central airway obstruction as seen in patients with asthma. Location is very important in this procedure.

Conclusion

BT becomes more widely accepted as a treatment option for patients with uncontrolled asthma. Clinical studies indicate an improvement in quality of life. More research is needed to determine which asthma phenotypes should BT be preferred.

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