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BRONCHIECTASIS

Bronchiectasis is a chronic inflammatory disease of the respiratory tract. Symptoms include recurrent cough, sputum production and recurrent respiratory tract infections. Bronchiectasis shares many symptoms with bronchitis, asthma, and chronic obstructive pulmonary disease (COPD). Quality of life is substantially impaired with bronchiectasis. Bronchiectasis often leads to prolonged hospital stays and is associated with an increased risk of cardiovascular events.

Definition

Bronchiectasis is described as permanent dilatation of the airways, arising from chronic bronchial inflammation and infection. Abnormal sputum production can lead to airway obstruction and sputum retention. Airflow obstruction is present in both the small and large airways. This airflow obstruction inhibits the clearance of sputum and bacteria. Bacteria in the airways may cause lower respiratory tract infections. This cycle of inflammation and infection results in progressive lung injury, leading to worsening lung function and frequent exacerbations. The key to breaking this cycle is airway clearance of bacteria and inflammatory mediators.

The typical age when symptoms first present is 40 to 70 years. The incidence of bronchiectasis is higher among females and older persons. Bronchiectasis is present in up to 50% of people with COPD.

Diagnosis

Bronchiectasis is confirmed by high-resolution computed tomography (CT) scanning. Chest x-ray is usually not adequate to diagnose bronchiectasis. Spirometry is useful in assessing the severity of the condition but can often be normal.

Sputum microbiology is critical for identifying bacterial colonisation in the lungs and determining appropriate antibiotic treatment. Haemophilus influenzae, Streptococcus pneumoniae and Moraxella catarrhalis are the most common isolates identified, followed by Pseudomonas aeruginosa. Colonisation in the airways with P. aeruginosa is associated with about a 3-fold increased risk of death, 6-fold increase in hospital admissions, doubled rate of exacerbations and poorer quality of life. Severity of bronchiectasis can be estimated using various validated tools, such as bronchiectasis severity index (BSI), FACED, and E-FACED, which determine exacerbation frequency, forced expiratory volume in 1 second (FEV1), age, colonisation, extension and dyspnoea scores.

Symptoms

People with bronchiectasis tend to complain of excessive sputum production. This presents as persistent or recurrent productive cough, and recurrent chest infections. Coarse inspiratory crackles may be heard on chest auscultation. Chest infections are often slow to resolve.

Other symptoms include:

- Blood in sputum (often streaky)
- Cough-induced chest pain
- Failure to respond to inhaled corticosteroids or bronchodilators
- Recurrent sputum isolates
- Fatigue
- Breathlessness

Clinical signs include:

- Finger clubbing
- Poor nutritional status
- Bad breath
- Hyperinflation of the chest

Reduced exercise capacity is common with bronchiectasis. It is likely due to increased sputum production, progressive airflow obstruction, chest hyperinflation and breathlessness, decreased skeletal muscle bulk and ongoing infection.

Management

The aims of managing bronchiectasis are to reduce symptoms, improve quality of life, minimise exacerbations and limit disease progression.

People with bronchiectasis may be regarded as having difficult-to-treat or treatment-resistant asthma or COPD, and mistakenly treatment with high dose inhaled corticosteroids (ICS). ICSs are not useful unless there is coexisting asthma or COPD, and there is usually limited response to bronchodilators such as salbutamol (Ventolin, Asmol, Zempreon). Bronchodilators may be beneficial before mucoactive therapy and airway clearance, but there is little benefit in routine use. When asthma and/or COPD co-exist, these conditions should be optimally managed according to guidelines.

Antibiotics play a key role in eradication of microbial colonisation in the airways. Immunisation with pneumococcal vaccine and annual influenza vaccine is recommended. Smokers should be supported to quit.

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Management of bronchiectasis requires a multimodal approach, with airway clearance techniques the mainstay of treatment. Exercise and physiotherapy are critical to optimal treatment of bronchiectasis.

Written bronchiectasis action plans are important for the management of bronchiectasis, outlining usual treatment, how to recognise worsening of symptoms, and how to adjust treatment in response to deterioration.

Airway clearance techniques

When stable, airway clearance is the most effective management strategy for bronchiectasis. Respiratory physiotherapists and pulmonary rehabilitation services should be used to teach and assess these techniques. Airway clearance programs should be taught for people with daily sputum production and reinforced during periods of exacerbation. There is good evidence that they can improve quality of life, exercise tolerance, cough, sleep quality, fatigue and mood.

Oscillating positive expiratory pressure (PEP) strategies enhance and promote mucus clearance. It involves breathing with a slightly active expiration against an expiratory resistance through a device. Many devices are available to provide oscillating PEP. PEP is generally performed once or twice daily.

Active cycle of breathing technique (ACBT) is effective in the clearance of secretions and improving lung function. It consists of 3 sections:

- Breathing control
- Thoracic expansion exercises
- Forced expiratory technique

Breathing control involves relaxed breathing; whereas thoracic expansion exercises involve deep breathing to loosen secretions and re-expand lung tissue. Forced expiratory technique or huffing aims to move the secretions through an open throat and mouth. It consists of one or two forced expirations or huffs, followed by breathing control (relaxed breathing). The action is similar to fogging up a mirror. A typical ACBT cycle therefore consists of breathing control, 3-4 thoracic expansion exercises, breathing control, and the forced expiratory technique (huffing).

Pulmonary rehabilitation programs can improve symptoms and exercise tolerance, and improve quality of life.

Exacerbations

Antibiotic therapy should only be used for exacerbations when there is increased sputum volume or change in sputum viscosity, increased sputum purulence and increased cough, which may be associated with wheeze, breathlessness or haemoptysis. People with an exacerbation of bronchiectasis may appear increasingly lethargic and malaise, and perhaps with anorexia or loss of appetite. Viral respiratory tract infections commonly trigger an exacerbation of bronchiectasis. Treatment needs to be commenced promptly at the onset of symptoms. Severe exacerbations may require hospitalisation.

Antibiotics used for non-severe bacterial exacerbations of bronchiectasis include amoxicillin or doxycycline for 14 days. If infection is due to H. influenzae or M. catarrhalis, amoxicillin/clavulanate is usually indicated. Intravenous antibiotics may be necessary for severe bacterial exacerbations. Exacerbations caused by longstanding P. aeruginosa colonisation require intravenous therapy with other antibiotics, including ceftazidime, piperacillin + tazobactam, gentamicin, tobramycin or ciprofloxacin. Ciprofloxacin is the only oral antibiotic effective against pseudomonas.

Long-term antibiotic therapy with low-dose macrolides may be warranted to reduce the frequency of exacerbations. Macrolides include erythromycin, azithromycin and roxithromycin. They can be used intermittently or continuously, only after confirming adherence to airway clearance techniques. The reduction in exacerbation frequency may be due in part to an anti-inflammatory effect of macrolides.

Summary

Bronchiectasis is a cause of chronic cough and recurrent chest infections. Management is focused on reducing symptoms, improving quality of life and minimising exacerbations. Exacerbations usually require treatment with antibiotics. Bronchodilators and corticosteroids have a limited role in the treatment of bronchiectasis unless there is co-existing asthma or COPD. Effective airway clearance is the cornerstone of bronchiectasis management.

Further information

Lung Foundation Australia
https://lungfoundation.com.au/health-professionals/conditions/bronchiectasis/

Bronchiectasis toolbox
https://bronchiectasis.com.au/

References:

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