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CASE REPORT

A twelve-year-old boy with Overlapping Features of Asthma and Protracted Bacterial Bronchitis

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ABSTRACT

A twelve-year-old boy presented with repeated attacks, almost every month, of dry cough, shortness of breath, and wheezing for over 18 months, which responded to bronchodilators and relapsed despite anti-inflammatory prophylaxis. The child had persistent leucocytosis and neutrophilia, not responding to short courses of oral antibiotics given during the relapses. A severe attack necessitated admission to a tertiary care hospital, where he was treated with IV antibiotics for a longer duration. Thereafter, there has been no relapse for the last six months, and the blood counts returned to normal. Thus, this patient's clinical presentation combines bronchial asthma and protracted bacterial bronchitis features.

Introduction

Bronchial asthma (BA) is a chronic inflammatory disease that presents with episodic wheeze and a dry cough caused by variable narrowing of the airways. The narrowing leads to rhonchi on chest auscultation and responds to bronchodilators. As against this, protracted bacterial bronchitis (PBB) is an infective ailment of the lungs that presents as a daily wet cough that lasts beyond four weeks and responds to antibiotics. Chronic cough of PBB leads to considerable morbidity and decreased quality of life, disturbed sleep, declining playfulness, and decreased school performance.[1] It may cause parental anxiety. PBB presents with rattling sounds in the chest caused by secretions in the airways, often wrongly reported as a wheeze by the parents and the primary care staff. This leads to the overdiagnosis of BA and the delayed diagnosis of PBB, although they occasionally coexist. What differentiates the two is the nature of the cough: wet in PBB and often dry in BA.[1]

Case description

A twelve-year-old boy presented to the Kamshet Primary Health Centre (PHC) with shortness of breath, wheezing, and a dry cough on and off for 18 months. There was no accompanying fever. There were relapses practically every month. The child was okay between the episodes, had no cough or wheeze, attended school, ate well, and slept well. He was average-built, afebrile, not sick-looking, and had no clubbed fingers. His accessory muscles of respiration were active. There was no chest deformity. On auscultation, a widespread wheeze was heard. His blood reports showed raised white blood cell counts,15600/cmm, and neutrophil counts, 74%. In the next attack, six weeks later, they were 15,700 and 88%, respectively. The chest X-ray was unremarkable; there were no changes to suggest bronchiectasis. Bronchoalveolar lavage (BAL), spirometry, and computed tomographic (CT) scan were unavailable. He was prescribed oral cotrimoxazole and salbutamol for 5 days for the acute attack and a long-acting theophylline for prophylaxis. He responded well to treatment but only to relapse. He had three such attacks for which he attended the PHC, responding to bronchodilators and cotrimoxazole. Oral amoxicillin-clavulanate was added after the third attack, but only for five days. Blood counts were unchanged. The next episode was severe enough to get him admitted to a tertiary care center, where he was treated with intravenous antibiotics and bronchodilator therapy. His blood count returned to normal: WBC 6400/cmm, N 50%, and no relapses for six months.

Discussion

Thus, our patient presented with episodic breathlessness accompanied by a dry cough and wheezing without fever for over one-and-a-half years. Between the episodes, he had no cough or wheeze and attended school. So far, the story suggested BA. Children with BA typically present with a symptom triad of wheezing, shortness of breath, and cough, appearing intermittently. Of these symptoms, a wheeze is a key feature [2]. Wheeze is an expiratory, high-pitched whistling sound caused by inflammation and narrowing of the small airways and responds to bronchodilators. With the diagnosis of BA, salbutamol was prescribed for immediate relief, long-acting theophylline was prescribed for prevention, and cotrimoxazole was prescribed because of abnormal white cell counts. However, persistent high white cell counts, raised neutrophil counts, and a response to IV antibiotics suggest an accompanying infective ailment such as PBB, a suppurative lung disorder believed to be a precursor of bronchiectasis [3]. When the markers of bacterial infection, such as C-reactive protein and white blood cells, are abnormal, they may suggest the progression of PBB to bronchiectasis. In our patient, frequent antibiotic administration may have interrupted this link.

Of the 117 children with chronic coughs reviewed by a pediatric pulmonologist, 55/117 (47.0%) were diagnosed with protracted bacterial bronchitis.[4] There is a significant correlation between the severity of bronchiectasis on CT and markers of systemic inflammation, such as WBC counts and CRP.[5] A chest CT scan would have helped diagnose bronchiectasis with assurance in our patient. White cell and neutrophil counts are normal during early stages, rise with bronchiectasis exacerbations, and fall during remissions.[6]

Broadly speaking, PBB is a disease of preschool children aged between 10 months and 4.8 years 7, although it can occur at any period of life. PBB may be clinical or microbiological. Clinical PBB has a chronic wet cough for more than four weeks, in the absence of symptoms or signs of other chronic pulmonary disease, and resolves perceptibly with 14 days of antibiotic treatment. In addition to the features of clinical PBB, microbiological PBB shows signs of infection during the bronchoalveolar lavage (BAL) examination 8. That includes high bacterial counts (≥104 CFU/mL) of Haemophilus influenzae, Streptococcus pneumoniae, and Moraxella catarrhalis and a high neutrophil count. Adenovirus, Rhinovirus, and other viruses have been detected in BAL samples from children with PBB, but the clinical significance is still unclear. 9 A positive BAL culture for H. influenzae and recurrent PBB (> three episodes/year) were identified as the main risk factors for bronchiectasis in a prospective study comprising 161 children.[10]

In a study of 104 children, tracheo and/or bronchomalacia was more common in the PBB group. Tracheomalacia makes the tracheal walls floppy and may impair mucus clearance and cause retention of tracheobronchial secretions, which facilitates the persistence of lower airway infection.[11] Although bacterial infection might, in some cases, be a primary event that causes tracheal or bronchial damage resulting in malacia, it is more likely that the malacia is generally the primary factor that results in PBB. [12]

The mainstay of PBB treatment is an oral antibiotic. Amoxicillin-clavulanic acid is the preferred antibiotic, whose efficacy has been established in a double-blind, randomized, placebo-controlled trial.[13] Two weeks of treatment are recommended; shorter courses of antibiotics tend to result in a partial resolution and a relapse of the cough after a few days of treatment,[14], as may have occurred in our patient. The other options for treatment include oral second or third-generation cephalosporins, trimethoprim-sulfamethoxazole, or a

macrolide.[15] Goyal and colleagues described 22 children whose wet cough failed to respond to oral antibiotics and resolved only after receiving intravenous antibiotics.[16] They suggest intravenous antibiotics when patients with chronic suppurative lung disease are symptomatic after oral antibiotics. Clinicians, however, often do not consider this disease in the differential diagnosis and are inclined to change the antibiotic therapy rather than to extend it in case of nonresponse.[17]

We have used more affordable options in the treatment: trimethoprim-sulfamethoxazole in place of amoxicillin-clavulanic acid for treatment[18] and slow-release theophylline instead of inhaled glucocorticoids for prevention of BA relapse. [19]

Conclusion

We describe a twelve-year-old boy with almost monthly episodes of dry cough, shortness of breath, and wheezing. He was diagnosed with bronchial asthma and was treated accordingly. His white cell counts were high, and his chest X-ray was normal. His response to bronchodilators, long-acting theophylline prophylaxis, and cotrimoxazole for infection lasted only a few weeks. During one such attack, he was hospitalized and given IV antibiotics in addition to bronchodilators. Thereafter, his counts were normal, and there was no recurrence. Thus, an apparent case of BA had persistent leukocytosis, neutrophilia, and response to IV antibiotics, suggesting the coexisting PBB.

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References

1. Gallucci M, Pedretti M, Giannetti A, di Palmo E, Bertelli L, Pession A, Ricci G. When the Cough Does Not Improve: A Review on Protracted Bacterial Bronchitis in Children. Front Pediatr. 2020 Aug 7; 8:433.
2. Martin J, Townshend J, Brodlie M. Diagnosis and management of asthma in children: BMJ Paediatrics Open 2022;6: e001277.
3. Chang AB, Marchant JM. Protracted bacterial bronchitis is a precursor for bronchiectasis in children: myth or maxim? Breathe 2019; 15: 167–170.
4. O'Grady K-AF, Drescher BJ, Goyal V, et al. Arch Dis Child Published Online First: arch dis child-2017-312848
5. Wilson C. B., Jones P. W., O'Leary C. J., et al. Systemic markers of inflammation in stable bronchiectasis, European Respiratory Journal.1998;12: 820–824.
6. Johnson E, Long MB, Chalmers JD. Biomarkers in bronchiectasis. Eur Respir Rev 2024; 33: 230234.
7. Reddy KB, Gill KS, Nair S, Bhattacharya BG. Protracted Bacterial Bronchitis: An Underdiagnosed Cause for Chronic Wet Cough in Children. Pediatr Inf Dis 2020; 2 (1):19-22.
8. Chang AB, Upham JW, Masters IB, Redding GR, Gibson PG, Marchant JM, Grimwood K. Protracted bacterial bronchitis: The last decade and the road ahead. Pediatr Pulmonol. 2016 Mar;51(3):225-42.
9. Di Filippo P, Scaparrotta A, Petrosino MI, Attanasi M, Di Pillo S, Chiarelli F, et al. An underestimated cause of chronic cough: The protracted bacterial bronchitis. Ann Thorac Med 2018; 13:7-13.
10. Wurzel DF, Marchant JM, Yerkovich ST, Upham JW, Petsky HL, Smith-Vaughan H, et al. Protracted bacterial bronchitis in children: natural history and risk factors for bronchiectasis. Chest. (2016) 150:1101–8.
11. Wurzel DF, Marchant JM, Yerkovich ST, Upham JW, Mackay IM, Masters IB, Chang AB. Prospective characterization of protracted bacterial bronchitis in children. Chest. 2014 Jun;145(6):1271-1278.
12. Benjamin, B. Tracheomalacia in infants and children. Ann Otol Rhinol Laryngol. 1984; 93:438-442.
13. Marchant J, Masters IB, Champion A, Petsky H, Chang AB. Randomized controlled trial of amoxicillin-clavulanate in children with a chronic wet cough. Thorax. 2012 Aug;67(8):689-93.
14. Gallucci M, Pedretti M, Gianetti A, et al. When the cough does not improve: A review on protracted bacterial bronchitis in children. Front Pediatr 2020; 8: 433.
15. Pichichero ME, Zagursky R. Penicillin and cephalosporin allergy. Ann Allergy Asthma Immunol 2014; 112(5): 404-12.
16. Goyal V, Grimwood K, Marchant JM, Masters IB, Chang AB. Paediatric chronic suppurative lung disease: clinical characteristics and outcomes. Eur J Pediatr 2016 Aug;175(8):1077-84.
17. Donnelly D, Critchlow A, Everard ML. Outcomes in children treated for persistent bacterial bronchitis Thorax. 2007; 62:80–4.
18. Daga S. Low-cost drugs still relevant in present-day era. Euro J Clin Med 2021; 2:10-12.
19. Daga S, Verma B, Mhapankar A, Kulkarni S, Kamble P. Theophylline in chronic asthma: A "before and after" study. The Internet Journal of Pediatrics and Neonatology. 2007 Volume 8 Number 1.