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GPs Meet Rare Lung Disorders Task Force factsheet: childhood interstitial lung disease

Definition

Childhood interstitial lung disease (chILD) includes a range of rare disorders of the lung parenchyma (and, sometimes, airways) that have certain clinical features in common. Specific conditions within chILD include surfactant protein B or C deficiency, alveolar capillary dysplasia with misalignment of lung veins, pulmonary interstitial glycogenosis, neuroendocrine cell hyperplasia, hypersensitivity pneumonitis, eosinophilic pneumonia, lymphocytic interstitial pneumonia, alveolar proteinosis, granulomatosis with polyangiitis, sarcoidosis, lung alveolar proteinosis, and Langerhans' cell histiocytosis. chILD may complicate other disorders including inflammatory bowel disease and liver disease. In many children with chILD, no specific diagnosis can be made.

Key messages

- Think about chILD if a child has chronic, unremitting tachypnoea, retractions, crackles and failure to thrive. Symptoms of early chILD are very unspecific and may be missed unless there is a high level of suspicion.
- Refer the patient to a specialist centre in paediatric pulmonology.
- Follow your patient longitudinally in collaboration with the reference centre, and be alert to comorbidities, complications of disease or treatment, or signs of recurrent or worsening lung disease.

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Prevalence

The prevalence of childhood interstitial lung disease (chILD) is probably well below 1 in 100 000. It is more frequent in males than in females, and tends to occur in young children (<2 years).

Clinical manifestations

Symptoms suggestive of chILD include progressive chronic dry cough, tachypnoea, retractions, failure to thrive, digital clubbing, diffuse crepitations, reduced exercise capacity, hypoxaemia and cyanosis in advanced cases. Lung function may show both restriction and obstruction, with impaired diffusion capacity and reduced compliance. Chest radiography and high-resolution computed tomography (HRCT) studies show diffuse parenchymal abnormalities.

Characteristically, infants present with failure to thrive and progressive respiratory distress. Older infants have tachypnoea, retractions, poor growth and crepitations, whereas school-age children have progressive dyspnoea and exercise intolerance, crackles, cyanosis, clubbing and poor growth.

Diagnosis

chILD should be suspected in any young child presenting with the aforementioned chronic respiratory symptoms, in whom no other known cause of lung disease is present, and if at least three out of the following four criteria are present: 1) cough, rapid and difficult breathing, exercise intolerance; 2) resting tachypnoea, retractions, crepitations or crackles, clubbing, respiratory failure; 3) hypoxaemia; 4) diffuse abnormalities on chest radiography or computed tomography (CT).

Common comorbidities include gastro-oesophageal reflux, pulmonary hypertension and failure to thrive. There may be family members in whom a diagnosis of interstitial lung disease has been made, though not necessarily in childhood.

Referral

After suspecting the diagnosis of chILD, the child should be referred to a specialist clinic where appropriate expertise and diagnostic techniques are available.

A diagnostic workup for chILD should include:

- Extensive medical history including any specific symptoms, exposures, lung disease in the family, and feeding history
- Exclusion of more common diseases (cystic fibrosis, congenital heart and lung malformations, lung disease of prematurity, chronic aspiration, infection and immunodeficiency syndromes)
- Chest HRCT scan
- Determination of the severity: nocturnal oxygen saturation profile, lung function testing (if cooperative) and cardiac ultrasound
- Determination of the aetiology: blood tests including serology for infectious microorganisms, screening for immunodeficiencies and autoimmune disease, surfactant protein deficiencies, and genetic analysis for specific disorders including surfactant protein abnormalities
- If no specific aetiology can be found: histological examination of lung biopsy (video-assisted thoracoscopic surgery)
- Evaluation of other organ systems
- Search for comorbidity: barium swallow, cardiac evaluation, oesophageal pH recording, flexible bronchoscopy and BAL to detect airway malformation, cleft, fistula, infectious microorganisms, lung bleeding, lipid accumulation, proteinosis, and lipid-laden macrophages

Treatment and follow-up

Treatment is necessary in the case of severe or progressive disease. In milder disease, of if there is evidence of spontaneous improvement, careful follow-up is indicated and toxic treatment can be avoided. Treatment of chILD is not evidence-based, and includes:

1) Oxygen supplementation in case of hypoxaemia

If no specific condition can be diagnosed:

1) A trial of prednisone 2 mg·kg^{-1} daily dose with tapering after favourable response
2) Or methylprednisolone pulses
3) Hydroxychloroquine to reduce the need for systemic corticosteroids
4) In the case of refractory disease consider addition of a second immunosuppressive (azathioprine, methotrexate, cyclosporine)

If a specific cause can be identified, specific treatment may be possible. End stage lung disease may be a reason to consider lung transplantation. Treatment may be indicated for side-effects of medication and for comorbidities.

Monitoring of a child with chILD requires lung function testing (spirometry, diffusion capacity and, if possible, compliance), nocturnal pulse oximetry profile, and with large intervals between scans chest imaging (preferably chest CT using an ultralow radiation dose). The prognosis for an individual is unpredictable and depends not only on the underlying disease process, but also on comorbidities and medication side-effects.

Further reading

1. Deterding R, Young L, Dishop M, *et al.* Diffuse lung disease in older children: report of the ChILD network review. *Am J Respir Crit Care Med* 2007; 175: A148.
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