Review:

Cough in Children: A Practical Approach
Cough in Children : A Practical Approach

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INTRODUCTION

Cough is one of the commonest symptoms encountered in pediatrics. Children could present with isolated cough or with cough as a part of a symptom complex of cough, cold, fever. These complaints are often recurrent, in varying combinations, and the possible diagnosis may range from benign viral infections to serious infections like tuberculosis. What is important to realize is that many causes of cough are noninfective, the commonest of them being asthma. In elucidating the cause, investigations have their limitations. An X ray chest is only occasionally useful in diagnosing the cause of cough (eg foreign body). In fact, most children with significant cough have a normal chest X ray. Similarly, the utility of CBC in differentiating infection from no infection, and further, viral from bacterial infection, is limited. Routine investigations do not help in diagnosing asthma, while special investigations have limitations of availability and interpretation. Thus, it is only a systematic clinical approach comprising of a detailed history followed by a thorough clinical examination that is the key to a confident diagnosis and rational management of cough in children.

CONFIRM SYMPTOMS – CLARIFY TERMS

Often, cough and cold are terms that could be used loosely by parents. Therefore, we need to clarify with them as to exactly what they mean by these complaints. It is not uncommon that when they complain of ‘cough’, they may actually mean sticky material vomited out (my child brings out a lot of ‘cough’), which could, in reality, be just mucinous material from the stomach. Similarly, some refer to sticky nasal discharge as ‘cough coming out of the nose’. On other occasions they may complain that the ‘chest is full’; they may be meaning just noisy breathing (which is often due to a compliant chest wall) or rattling of the chest (a vibratory feel when the infant is held by the chest). If these things are not clarified, we run the risk of ‘interpreting wrong data’.

If the complaint is a cold, again one needs to confirm whether they mean a running nose or blocked nose or just noisy breathing. If the nose is really running, the type of discharge is somewhat important. While watery running nose always indicates a viral infection or allergic rhinitis, thicker white or green mucoid discharge does not necessarily mean a bacterial infection. Noisy breathing is extremely common in newborns and young infants, who may actually have no ‘cold’ whatsoever.
CLINICAL APPROACH TO COUGH

LOCALIZING THE ANATOMY

Cough is a reflex intended to drive away an irritant from the airways and keep the airway clean of secretions.

The first step in diagnosing a cough is to localize the microanatomical part of the respiratory system from where the cough is originating.

Airway

When cough is the predominant symptom, the anatomic seat of the disease is ‘the airway’. Larger the airway involved, higher is the intensity of cough. Thus, we can further subdivide the anatomic origin of cough into:

Upper airway: e.g. croup, leads to a loud dry hacking barking hoarse cough with stridor and suprasternal retractions.

Lower large airway involvement: (as in asthma involving the larger bronchi) leads to an intense cough, which may be wet, accompanied with tachypnea, but cough is more than tachypnea, and there are subcostal retractions.

Lower small airway involvement: (smaller bronchi and bronchioles) results in a cough of low intensity. Thus, bronchiolitis is characterized by more tachypnea than cough. Those with bronchiolitis who have a significant cough are most likely to have a prominent element of hyper-reactive airway disease and more widespread involvement of airways.

Lung parenchyma

Pneumonia is primarily an inflammation of the alveoli; the distal smaller airways are involved secondarily a little later in the illness. Therefore, in the beginning of the illness in (bacterial) pneumonia, fever is more prominent while cough is not; in fact, it comes up and becomes significant a little later in the disease. The clinical signs may be those of consolidation (impaired note, bronchial breathing, crepitations); whatever, the clinical signs, they follow a lobar distribution i.e. the signs are found over an area representing the surface anatomy of individual lobes of the lungs.

Pleura

Pleural pathology can lead to a dry cough in the beginning of the illness; at this stage it is likely to be accompanied with pleural chest pain (unilateral, aggravated by deep breathing/coughing, relieved by lying on the affected side – splinting). As the
pathology progresses and leads to a pleural effusion, the cough may subside and breathlessness may follow. The clinical sign would be a pleural rub initially (difficult to appreciate), and decreased movement, impaired note, reduced vocal resonance later. These signs would show a pleural distribution i.e. they would be found all over the front, sides and back, below a particular intercostal space.

**Interstitium**

Interstitial diseases lead to minimal cough, which is gradual in onset, slowly progressive and chronic. Other accompanying presenting features include gradual onset, subtle slowly progressive breathlessness, restriction of physical activity and failure to thrive. Physical examination of the chest may reveal only subtle tachypnoea; or additionally, crepitations which are generalized in their distribution.

Thus, generalized signs indicate either airway or interstitial involvement whereas localized signs indicate parenchymal or pleural involvement. Also, viral infections lead to generalized involvement whereas bacterial infections lead to localized involvement.

**TYPE OF COUGH**

The type of cough may suggest the site of disease. Dry hacking cough suggests pharyngitis, barking cough suggests laryngitis, while a productive cough with rattling in the chest suggests bronchitis. In children, bronchitis is usually secondary to allergic inflammation or a viral infection; it is rarely due to a bacterial infection.

**ONSET, DURATION, PROGRESS**

Like any other symptom, one needs to get details about the ODP. The onset of cough may offer a clue to the probable diagnosis. Sudden onset of cough denotes an inhaled foreign body, an acute onset of cough suggests bronchitis as is seen in asthma, whereas a sub acute onset over days indicates an infection such as pharyngitis or whooping cough.

The progression of cough also helps in deciding a probable etiology. Episodic, nocturnal cough is seen in asthma or post-nasal drip, while a gradually worsening cough with a whoop is seen in pertussis (whooping cough). Nocturnal cough has to be further explored. Cough that occurs soon after the child lies down in the supine position is likely to be due to post nasal drip, whereas one that occurs a few hours later, in the wee hours of the morning is likely to be due to hyperreactive airway disease.
IMPORTANT QUESTIONS TO BE ASKED

Past history of (h/o) recurrent cough:
Strong pointer to hyper-reactive airway disease

Family h/o cough:
At present: suggestive of (s/o) contagious infection – viral / pertussis
In the past, or all along: s/o atopy in family

One often needs to ask leading questions like anybody in the family suffering from sneezing early in morning, or ‘sinus trouble’, or skin itching, or frequent ‘bad throat’ or asthma, to elicit family history of atopy. Otherwise, it is often denied at the first instance.

H/o associated symptoms and their sequence of appearance:

Fever:
If the illness starts with significant fever, it denotes an infection, viral or bacterial. At times, a viral infection may start with a prodrome of cold, cough for 1-2 days followed by significant fever.

\[\text{A viral infection can trigger off an episode in a child with hyper-reactive airway disease – thus in a child with history s/o HRAD, presence of high fever in some of the episodes of cough does not change the diagnosis}\]

\[\text{Mild fever is possible simply because of inflammation even in hyperreactive airway disease.}\]

\[\text{A viral infection can trigger off an episode in a child with hyper-reactive airway disease (HRAD) - thus in a child with history s/o HRAD, presence of high fever in some of the episodes of cough does not change the diagnosis.}\]

Cold:
Cough associated with cold denotes probable viral infection or allergy.

Breathlessness:
Cough with breathlessness, but without fever, indicates asthma (significant cough); while, cough (not a major symptom) with breathlessness and fever may be due to pneumonia. Similarly, cough associated with cold, breathlessness and fever (often mild) is typical of acute bronchiolitis.
H/o snoring/mouth breathing:

This indicates adenoid hypertrophy, which could be secondary to recurrent allergic inflammation

Vomiting:

is a common accompaniment of cough, especially in younger children. It could either be the cause (as in aspiration) or the effect (of severe cough). Contrary to common belief, aspiration can exist without overt vomiting.

<table>
<thead>
<tr>
<th></th>
<th>Cough</th>
<th>Fever</th>
<th>Breathlessness</th>
<th>Noisy breathing</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharyngitis</td>
<td>++ hacking</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Laryngitis</td>
<td>+ barking</td>
<td>++</td>
<td>+/-</td>
<td>stridor</td>
<td>-</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>+++ wet</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+/-</td>
</tr>
<tr>
<td>Asthma</td>
<td>+++</td>
<td>-</td>
<td>++</td>
<td>wheeze</td>
<td>+</td>
</tr>
<tr>
<td>Bronchiolitis</td>
<td>+/-</td>
<td>+/-</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>+/-</td>
<td>++</td>
<td>+/-</td>
<td>grunt</td>
<td>-</td>
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</tbody>
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Table 1. Type and intensity of symptoms in various respiratory disorders
Recurrent cough is a common symptom in office practice. While it is important to try and differentiate between recurrent and persistent cough, it is more important to

**Approach to recurrent / persistent cough**

<table>
<thead>
<tr>
<th>Significant fever</th>
<th>No fever / occasional</th>
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<tbody>
<tr>
<td>Viral Generalised</td>
<td>Episodic, nocturnal</td>
</tr>
<tr>
<td>Bacterial Localised</td>
<td>Hyperactive airway disease</td>
</tr>
<tr>
<td>No involvement</td>
<td>Atopic</td>
</tr>
<tr>
<td>URI</td>
<td>Non-atopic</td>
</tr>
<tr>
<td>LRI</td>
<td>Asthma</td>
</tr>
<tr>
<td>Adenoids</td>
<td>h/o allergy</td>
</tr>
<tr>
<td>Tonsillitis</td>
<td>personal/family</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>FB</td>
</tr>
<tr>
<td>Investigate</td>
<td>L to R shunt</td>
</tr>
<tr>
<td>Clue: Deteriorating health (growth parameters)</td>
<td></td>
</tr>
<tr>
<td>Investigate</td>
<td></td>
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</table>

**Figure 1. Systematic approach to a patient with recurrent / persistent cough**

differentiate between a recurrent and persistent pathology. This may not be easy, unless there is a long enough symptom free period. Recurrent cough may represent both – a recurrent infective pathology such as recurrent viral infections or a persistent pathology such as asthma. In fact, the most common cause of recurrent cough in pediatrics is hyper-reactive airway disease or asthma. Thus, a sound clinical evaluation is necessary to differentiate various similar looking conditions.

**In fact, the most common cause of recurrent cough in pediatrics is hyperreactive airway disease or asthma**


**APPROACH**

While evaluating children with recurrent cough, we need to broadly try and divide them into two groups – with significant fever in each episode / most episodes and without significant fever or only occasional fever.

**With fever:**

The first group obviously denotes recurrent infections. The next step is to try and decide whether these infections are bacterial or viral. History suggestive of generalized involvement in the form of running nose, cough, fever, bodyache, GI complaints etc suggests a viral infection. Such a child with recurrent viral infections will have a normal growth as seen on his growth chart over time and does not need any investigations. All one needs to do is to reassure the parents that this phase will pass off.

If the history is suggestive of bacterial infections (high fever poorly responsive to antipyretic, child sick in inter febrile period, specific symptoms suggestive of localized involvement of any one anatomical site), one needs to decide whether these recurrent bacterial infections are of the upper respiratory tract or lower. In either case there has to be a background underlying cause for the recurrence, which may be evident clinically or on investigations. Further, if the recurrent infections are lower respiratory, they are likely to lead to growth failure as seen on the growth chart.

**Without fever**

This group constitutes the non infective causes of recurrent cough. The commonest cause of such a cough is hyperreactive airway disease. Next we need to find out about personal and / or family history of atopy. If it exists, this child is likely to have atopic HRAD (asthma). If it doesn’t, we need to try and identify some other common situations that may lead to hyperreactivity like prematurity, neonatal respiratory insults like MAS, ventilation etc. We also need to consider aspiration and left to right shunts as other possibilities of such a recurrent cough.

**COUGH AND WHEEZING IN THE YOUNG INFANT / CHILD**

In infants and young children, cough is often accompanied with noisy breathing that may be either wheezing or misinterpreted as wheezing (when there are nasopharyngeal sounds conducted to the chest). Even if wheezing is not noted with each episode, such episodic bouts of cough suggest the possibility of a wheeze. Thus, cough and wheeze may often represent the same disease, whether or not one notices both each time.
Infants and young children with recurrent wheezing can be broadly grouped into 3 categories.

![Graph showing the pattern of wheezing in various respiratory disorders.](image)

*Stein et al, 1997; Martinez and Helms, 1998*

**Figure 2. Pattern of wheezing in various respiratory disorders**

**Transient early wheezers**

These children may start wheezing early in life. They often have a predisposing factor such as prematurity, neonatal respiratory intervention or insult, etc. The frequency of their wheezing peaks around the age of 1-2 years after which it declines and they gradually settle down around 3 years of age or thereafter. During the individual episodes, inhaled bronchodilators may be tried and may help. However, these children do not need long term inhaled corticosteroids, nor are they likely to help modify the course, if used.

**Non atopic wheezers**

These are children who do not have a personal or family history of atopy. But they wheeze in response to various stimuli, commonest among them being viral
infections. Hence, typically, they start wheezing shortly after joining play school which is when they start getting exposed to frequent viral infections. They peak between 3-6 years and then gradually settle down. Again, during the individual episodes, inhaled bronchodilators may be tried and may help. However, these children do not need long term inhaled corticosteroids, nor are they likely to help modify the course, if used.

**Atopic wheezers (persistent wheezers)**

These are children who have personal or family history of atopy, and may start wheezing at any age, in response to various triggers, and may continue to wheeze even beyond early childhood. These are the ones who are likely to have asthma.

**One point evaluation**

When a young child is seen for the first time for wheezing, at that point it may not be clear as to which of the above 3 groups he belongs to. To help decide this, the past and the future trend is important. The trend so far can be obtained from the history and if necessary, the child can be observed and followed for another 3 – 6 months to decide the future trend and then decide on definitive long term treatment if necessary.

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TREATMENT OF COUGH

It is important to diagnose the cause of cough to be able to provide the correct treatment.

Treatment of the cause

If the cause is curable, treatment of the cause will automatically relieve the cough. Thus, cough following a bacterial pneumonia does not need a cough syrup, the antibiotic treatment of the pneumonia itself will relieve the cough over time. On similar lines, if the cause of the cough is asthma, treatment of the underlying inflammation (inhaled medications) is necessary. Unless this is done, any amount of cough syrups will not help.

Symptomatic relief

If the cause is not treatable, as in the case of a viral infection, one attempts to provide symptomatic relief. For this, one has to decide the need to provide such relief; just because the child is coughing, he / she does not necessarily need a cough syrup. This need for treatment depends on the amount of discomfort that the infant or child is experiencing. Thus, it is important to realize that by symptomatic treatment, we need to relieve the distress or discomfort arising out of the cough, rather than attempting to eliminate cough itself. A majority of children with significant cough are uncomfortable particularly while sleeping, since the cough worsens in the lying down position; they may be relatively fine at other times. Thus, they need relief at a specific time only. Therefore, it follows that cough syrups should not be prescribed on a round the clock basis i.e. 3-4 times a day, but should be administered only on a SOS basis.

Efficacy

There is considerable debate whether cough syrups really work. In clinical practice, one needs to have a practical approach. Hence, to begin with, one must question the need of the cough syrup; it is possible that home remedies such as mixture of ginger, lemon and tulsi in honey could be as good (and are safer). At the other extreme, it is not that one should never use a cough syrup; however, one must have realistic expectations with respect to the speed and extent of relief from cough. 
Choosing cough syrups

Irrational formulations

It is not uncommon to find cough syrups with contradictory ingredients i.e. the same syrup has a cough suppressant and an expectorant. Others contain either too less or too much of different ingredients making dosage titration difficult. In fact, many have an added antipyretic; such multiple ingredient cough syrups are irrational and should not be used.

Since infants and young children cannot really expectorate, expectorants like guaifenesin are not useful at all in young children. Similarly, mucolytics have no conclusively proved role in children, except maybe, in special situations. Thus, these ingredients may add to the cost, without adding much to the benefit.

Rational formulations

As a corollary, ideal cough syrups should have a single ingredient, or at the most two – a cough suppressant and an antihistamine, in the right quantity relative to each other.

The best choice lies between a bronchodilator such as salbutamol or terbutaline for spasmodic cough and a cough suppressant such as dextromethorphan or pholcodeine for other types of cough. Oral bronchodilators have an erratic action in infants and toddlers, and therefore, need to be monitored not only for side effects but for benefit as well. Codeine is an excellent and powerful cough suppressant but is likely to result in constipation. First generation antihistamines may also be considered for relief of discomfort; since they sedate the child, he / she thereby does not perceive the irritation in the airways and therefore, does not cough.

When used judiciously on a SOS basis, all these drugs are safe enough, though their benefits are limited.

It is best that we familiarize ourselves with the ingredients of the cough syrup that we usually prescribe; we should choose just a few preparations from amongst too many that are available.

Failure to respond

It is also important to realize that many common conditions that cause cough in children may take upto 10-14 days to subside. At the same time, while a distressing cough is a nuisance, by itself it is not medically serious. Therefore, one must avoid the temptation to keep changing cough syrups. At the same time, any cough that persists for more than 2 weeks needs a proper evaluation and one cannot just go on treating with cough syrups.

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Treatment of 'cold'

'Cold' i.e. running nose (rhinorrhea) or nasal obstruction may be treated with antihistamines or adrenergic drugs (nasal decongestants). Oral phenylephrine and antihistamines are the preferred pharmacologic agents that may be used. Again, they have a limited beneficial effect. Pseudoephedrine use can be dangerous in children.

Decongestants can be in the form of nasal drops (eg xylometazoline, oxymetazoline etc); they run the risk of rebound congestion and are therefore rarely recommended. Instead, it is recommended to use saline nasal drops to relieve nasal obstruction; they are safe, can be used at any age, and as many times a day as needed.

Treatment in newborns

**Significant cough in newborns is rare, and if really present, indicates serious illness**

As mentioned earlier, cough and cold in newborns has to be reconfirmed to be really present before deciding on further action. Significant cough in newborns is rare, and if really present, indicates serious illness. Nose block that interferes with sucking (feeding) or sleeping peacefully can be treated with saline nose drops and partially propped up position. Cough and cold syrups should be avoided in newborns and young infants because they may hardly benefit, and yet, have a high propensity for ill effects like excessive sedation or irritability.

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Antibiotics

Significant cough as the chief or only complaint is rarely due to bacterial infection (except pertussis). Hence, in the absence of a thoughtful detailed analysis, one ends up using antibiotics as cough syrups, when there is no bacterial infection whatsoever.
CASE STUDIES

CASE 1

An 8 month old infant presents with cough, cold and fever for the last 2 days. How should we manage this child?

We need to gather a few additional details in the history, and look for specific examination findings that are relevant to such a child.

On detailed enquiry, his cough started insidiously and has worsened over the last two days. He started running fever and simultaneously developed a cold, both of which have continued for the past 2-3 days. He is comfortable when the fever is temporarily controlled with paracetamol. His elder sib had suffered from a similar illness 5 days ago and has now recovered. There is no past history of similar complaints or of any other significant illness in this child.

Physical examination reveals a febrile child with congested eyes and throat, with scattered foreign sounds on auscultation.

What are our management options?

1. Start an antibiotic
2. Symptomatic therapy and observe progress
3. Investigate

IDEAL OPTION

Option 2 - Symptomatic therapy and observe progress

This is most likely to be a viral infection, as depicted by
a) fever with normal interfebrile period
b) generalized involvement of upper and lower respiratory tract
c) significant cough (rarely bacterial infection)
d) history of a similar illness in a sib.

Paracetamol is the drug of choice and the fever is likely to settle over a day or two by itself. A cough syrup may be prescribed (see cough basics) if the cough is distressing, and should be used only on a need basis and not round the clock.

INCORRECT OPTIONS

Option 1 – Start an antibiotic

An antibiotic should be prescribed only if the clinical diagnosis is an acute bacterial
infection. Therefore, it is not justified in this child. If one is not sure, in a stable child, there is no harm in waiting for a day that generally helps in rational decision making.

**Option 3 - Investigate**

Since the clinical suspicion is that of an acute viral infection, there is no need for any investigations. CBC would not necessarily help in differentiating an acute bacterial from an acute viral infection.

**Lessons learnt**

1. An acute onset of fever does denote an acute infection, but not necessarily a bacterial infection

2. A diagnosis of an acute viral infection can be made with reasonable confidence on clinical grounds; having done so, it is rational to offer symptomatic therapy alone and observe the child.

3. Laboratory tests are unnecessary if the clinical suspicion is an acute viral infection.

**CASE 2**

A 3 year old child presents with fever, cold and cough for the last 3 days. He has been repeatedly suffering from such episodes, every month, since last year. He has been treated with repeated courses of antibiotics and his CBC and chest x-ray have been normal.

How should we manage this child now?

As mentioned in earlier cases, in order to decide the correct management options, we need more details.

**On detailed enquiry**, this child’s illness starts with fever each time, often high right at the onset, followed by a watery running nose and cough; the symptoms disappear over 4-5 days and subsequently, he is normal in between episodes. Though the parents did complain of such illnesses almost every month, this child had actually suffered three such episodes in the last five months, ever since he joined play school.

**Physical examination** reveals a generally healthy boy; there are no significant abnormal findings.

What are our management options now?

1. Treat with an antibiotic again

2. Repeat investigations
Lessons learnt

1. It is important to differentiate viral infections from bacterial infections.
2. An antibiotic should not be prescribed without reasonable evidence of bacterial infection.
3. In case of recurrent bacterial infections, we need to evaluate the child for an underlying cause for the same eg an anatomical defect, a functional disorder or immune deficiency.
4. In case of recurrent viral infections, we need to just reassure parents about the benign nature of these illnesses, which would progressively become infrequent over time.

CASE 3

A 3 year old child has come with the complaints of high fever and cough for the last 4 days. She has had three such episodes over the last four months; each time she was prescribed co–amoxiclav and gradually improved over a week.

How should we manage this child now?

Detailed history is vital.

On detailed enquiry, she gets quite sick during these episodes. Besides the fever and cough, she also has a foul smelling greenish nasal discharge. Even between illnesses, her general well being is disturbed as she feels tired. She keeps her mouth open most of the time, drools saliva in her sleep, and also snores at times. She is generally restless in her sleep and often remains irritable during the day as well.

Physical examination reveals mouth breathing with a congested throat. Other systems reveal no abnormality.

What are our management options?
1. Start the same antibiotic again
2. Change to different / higher antibiotic
3. Investigate
4. Plan long term management

IDEAL OPTION

Option 1 followed by option 4

Start antibiotic and investigations after infection is controlled

This child’s history clearly depicts a bacterial infection, in view of the greenish foul
Lessons learnt
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2. An antibiotic should not be prescribed without reasonable evidence of bacterial infection.
3. In case of recurrent bacterial infections, we need to evaluate the child for an underlying cause for the same eg an anatomical defect, a functional disorder or immune deficiency.
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IDEAL OPTION
Option 1 followed by option 4
Start antibiotic and investigations after infection is controlled

This child’s history clearly depicts a bacterial infection, in view of the greenish foul
smelling nasal discharge along with high fever that takes almost a week to resolve after antibiotic therapy. So there is no doubt that this child justifies the use of an antibiotic. One may consider a community acquired infection like streptococcal infection in this child and therefore, even use Amoxicillin or a first generation cephalosporin (it is not mandatory to use co amoxiclav that only adds cost to treatment without any significant benefit). However, what is important is that as this child has been getting recurrent bacterial infections, she has to be reassessed / investigated for an underlying cause, once this infection is controlled.

This child obviously has an upper airway obstruction due to enlarged adenoids, as is suggested by mouth breathing and snoring. These enlarged adenoids are the cause of the recurrent episodes of bacterial infection. Thus we need to plan long term treatment for this child. Many such children may have a combination of allergy and infection that is responsible for the enlarged adenoids; these need to be evaluated in detail and treated accordingly. Occasionally, surgery may be required, especially if hearing is affected.

**INCORRECT OPTIONS**

**Option 2 - Change to different / higher antibiotic**

The repeated recurrence of the bacterial infection in this child does not suggest a failure of the antibiotic used; it indicates a failure to identify the underlying cause. Therefore, there is no need to change the antibiotic or use higher antibiotics in an attempt to prevent recurrences; one has to identify and treat the underlying cause.

**Option 3 alone - Investigate**

One need not wait for the results of investigations to treat her acute illness, since CBC is unlikely to alter the choice of therapy. While it is mandatory to investigate her for an underlying cause, there is no hurry to do so during the acute illness. In this case, the underlying cause is clinically obvious; at other times, radiological or other investigations may be necessary to detect such an underlying abnormality.

**Lessons learnt**

1. When an acute bacterial infection is clinically nearly certain, an antibiotic can be prescribed without investigations, especially if the infection is not involving major organs (eg pneumonia, meningitis or UTI).

2. Any child with recurrent bacterial infections needs to be investigated further, to pinpoint the underlying cause of recurrence.

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When an acute bacterial infection is clinically nearly certain, an antibiotic can be prescribed without investigations, especially if the infection is not involving major organs (eg pneumonia, meningitis or UTI).
CASE 4

A 3 year old boy presents with severe cough for the last two weeks. There is a past history of recurrent cough since the age of 18 months. He has been treated with antibiotics on many occasions without much benefit. Various laboratory tests and chest x-rays have been normal on many occasions.

How should we manage this child now?

As discussed earlier, in case of long standing complaints, it is all the more important to get a more detailed history.

On detailed enquiry, his cough is episodic, nocturnal and aggravated by exercise. At times, it is accompanied by a cold. Fever is occasional, occurs a few days after the onset of cough, and is mild & short lasting. He has suffered from infantile eczema in the past, and his uncle suffers from asthma.

Physical examination reveals a fairly healthy, active and comfortable child, whose chest is clear on auscultation.

What are our management options?

1. Short acting bronchodilators +/- antibiotics
2. Long term therapy
3. Reinvestigate for TB / Anti-TB therapy
4. Pulmonary function tests for asthma

IDEAL OPTION

Option 2 - Long term therapy

This child has bronchial asthma as suggested by afebrile, episodic, nocturnal cough, with a personal history of atopy and a family history of asthma. The diagnosis of asthma is clinical, based on these aforementioned features on the history. Since the clinical manifestations are classically episodic, the absence of physical findings (wheeze) is still consistent with the diagnosis. Hence, he needs long term therapy with inhaled corticosteroids for prevention and long term control, along with intermittent use of inhaled short acting bronchodilators for relief of symptoms.
INCORRECT OPTIONS

Option 1 - Short acting bronchodilators +/- antibiotics

While short acting bronchodilators may provide temporary symptomatic relief, it is likely to be short lived and the response likely to be suboptimal. This is so because it is important to simultaneously control inflammation of the airways by using inhaled corticosteroids. Moreover repeated and prolonged use of bronchodilators leads to the development of ‘tolerance’ i.e it’s benefits go down.

The fact that repeated antibiotic courses administered earlier were ineffective is no surprise as there is no infection. Therefore, obviously an antibiotic is not necessary. This child’s fever is mild, short lasting, self limiting and comes up only occasionally after a few days of onset of cough. This suggests that the fever is due to inflammation of the airways and not due to any bacterial infection.

Option 3 - Reinvestigate for TB / Anti-TB therapy

Tuberculosis is not to be considered in this child because

a) cough as an isolated predominant manifestation is uncommon in childhood tuberculosis
b) fever is not prominent at all
c) in spite of the recurrent cough over a long period, he has remained generally healthy

Therefore, a mantoux test and chest x-ray are not necessary. Similarly, an empirical trial with anti-TB treatment is out of question.

Option 4 - Pulmonary function tests for asthma

Pulmonary Function Testing is generally possible beyond the age of 5-6 years. Even at that age, adequate training is required to get the best results (that are reproducible). Thus, asthma in children is diagnosed on clinical grounds and PFT is reserved for older children whose diagnosis is uncertain.

Lessons learnt

1. Asthma is a clinical diagnosis based on typical features in the history.
2. As asthma presents with episodic symptoms, at a given time, the physician may not find evidence of bronchospasm. Thus, the history is crucial as a guide to the correct diagnosis.

   In general, a trial of anti-TB therapy is never justified

3. In such cases, prescribing antibiotics is irrational.
4. In general, a trial of anti-TB therapy is never justified.

Asthma is a clinical diagnosis based on typical features in the history
CASE 5

An 8 month old infant presents with fever for 3 days, followed by cold and cough that is on for the last 10 days.

How should we manage this child?

In order to decide the correct management options, we need to get some more details.

On detailed enquiry, her fever subsided after the first 2 days, but the cough worsened and has continued for the past 10 days. She coughs mostly at night during sleep.

Physical examination shows a comfortable child without any localizing signs. Her chest is clear on auscultation.

What are our management options?

1. Start an antibiotic
2. Investigate
3. Symptomatic therapy & wait and watch

IDEAL OPTION

Option 3 – Symptomatic therapy & wait and watch

Since her illness started with fever, it is an infection. This infection is quite likely to be an acute viral infection since her fever has quickly settled within a few days. The worsening of cough does not represent a deterioration of infection (if so, the fever would not have settled).

Therefore, this is a post-viral hyperreactive airway disease leading to a prolonged cough that would generally subside by two weeks. The cough is nocturnal due to a post-nasal drip. Thus, one may attempt to provide symptomatic relief with a cough syrup.

Hyperreactive airway disease refers to an airway that reacts to triggers that would not elicit a similar response in other normal children. So it is akin to short temper. Just like short temper, it may cool down over time. Such hyperreactive airway may be triggered by either allergy that is often hereditary or by non-atopic factors such as viral infection (as in the above case) or by aspiration of ingested material into airways as happens in gastroesophageal reflux.

The worsening of cough does not represent a deterioration of infection (if so, the fever would not have settled)
INCORRECT OPTIONS

Option 1 – Start an antibiotic
Antibiotic therapy is irrational as this is not an acute bacterial infection. Since the fever has subsided, even though the cough persists, it does not suggest a bacterial infection.

Option 2 - Investigate
As already discussed, we are not suspecting persistence or worsening of a bacterial infection. Therefore, a CBC or X ray chest is unlikely to be of any help. Since tuberculosis is not being considered at all, Mantoux test is out of question.

Case progression
Unfortunately, since the cough worsened, investigations were ordered:
WBC count - 13,000/cmm  P 75 L 22 M 2 E 1
Chest x-ray – R basal pneumonitis
Based on these investigations, an antibiotic was started, but she was still coughing at the end of another 5 days.

Case analysis
Whenever a chest X-ray is reported as pneumonitis, it has to be interpreted with caution; it is extremely important to correlate with the clinical findings and the course of the disease. More often than not, ‘pneumonitis’ does not denote an area of consolidation; instead it often represents small areas of collapse secondary to obstruction by mucus plugs. Further, though this child was still coughing, what was ignored was that the cough was no longer as severe, and was in fact, getting better with time.

Lessons learnt
1. In a child with hyperreactive airways, an acute viral respiratory infection may trigger off a cough that may last well beyond the disappearance of fever.
2. Prolonged cough in such a case does not denote persistent infection.
3. In such children, starting an antibiotic is not justified; so also several unnecessary tests.
4. It is important to identify an improving trend in the symptoms.
APPROACH TO ‘TRIAD’ OF RECURRENT COUGH, COLD, FEVER

The previous three cases – case 2, 3 & 4, illustrate the most common causes of recurrent cough i.e. asthma, viral infections and upper airway bacterial infections. Though the patient may typically present with similar sounding complaints, viz. frequent episodes of the triad of symptoms—cough, cold and fever, a detailed history can fairly differentiate one from another.

The nature of cough is different in all the three conditions. In viral infections, it may be dry or wet, but is throughout the day. In asthma, it is typically nocturnal. Though this cough may be reported to occur on lying down, it occurs a few hours after the child sleeps. As against this, the child coughs immediately on lying down in adenoid related bacterial infections due to a postnasal drip.

Similarly, the nature of the cold is different in all the three conditions—intermittent watery along with fever in viral infections, a perennial cold with itching of the nose in asthma, and an infected thick purulent nasal discharge in bacterial infection.

Though fever is a complaint in all the three conditions, once again the specific features differ— self-limiting fever responding to antipyretics in viral infections, occasional fever in asthma, and a hectic fever in bacterial infection.

In other words, in viral infections all the three symptoms, i.e. cough, cold and fever are equally prominent, in asthma cough and cold dominate but fever does not, whereas fever is most dominant in bacterial infections, cold is equally significant and cough is relatively a lesser complaint. The family history of atopy helps; however, it is only supportive if rest of the history corroborates. Since atopy is so common, a family history of atopy may be coincidental.

During an acute attack, physical examination clearly differentiates these conditions from one another. In an acute viral infection, there is evidence of upper and lower respiratory tract involvement as suggested by congested eyes, nose and throat, besides scattered signs in the chest. In an acute bacterial infection, signs are often localized classically to the throat, while the chest is clear. Exudates on enlarged and inflamed tonsils, congestion of anterior pillar, purpuric spots on the palate and tender jugulodigastric lymph nodes are highly suggestive of bacterial acute pharyngotonsillitis. Asthma may present with prolonged expiration with or without rhonchi, along with nasal congestion.

When seen between episodes, a child with recurrent viral infections looks perfectly normal without any trace of recurrent problems. A child with recurrent bacterial infections does show an underlying cause of recurrence in the form of enlarged adenoids. This is evident by the mouth breathing and adenoid facies, the persistence
of enlarged jugulodigastric lymph nodes (though nontender), and hypertrophied tonsils in without any signs of acute inflammation. A child with asthma may show perennial rhinitis as a marker of atopy. Laboratory and radiological investigations are not contributory in such cases and diagnosis of these three conditions rests primarily on clinical grounds alone.

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Dear Doctor,

It gives us great pleasure in presenting to you this issue on a Practical Approach to Cough in Children by Dr. Rajesh Chokhani, an eminent Pediatrician from Mumbai. Dr. Chokhani has been closely associated with Dr. Y. K. Amdekar in practice and has also co-authored a couple of books with him. In this issue, Dr. Chokhani has used his years of experience to explain in a very lucid manner a practical approach, including the mistakes one can make, in the management of cough in children. I personally enjoyed reading the review and the case studies. I am sure you too would enjoy and benefit from the same.

This booklet is presented to you by Raptakos, Brett & Co. Ltd.

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Thanking you,

Medical Director

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