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Tale of Two Winter Respiratory Illnesses

November marks the season of two viral respiratory illnesses for which steroids are part of the treatment. But although the role of steroids is now established for croup, their use in bronchiolitis remains controversial.

Croup, otherwise known as laryngotracheal bronchitis, typically begins with an upper respiratory infection and proceeds to a barking cough, hoarseness, and then stridor. Caused mostly by the parainfluenza viruses (1,2, or 3) or respiratory syncytial virus (RSV), it is usually mild and self-limited, although in rare cases, obstruction can occur.

It's important to differentiate croup from bacterial tracheitis, which is characterized by thick, purulent exudate in a child who is highly febrile and toxic with an elevated WBC count, and from the rare case of epiglottitis, in which the child is typically drooling, looks very toxic, has significant airway obstruction, and is air hungry.

Humidified air is the primary treatment for the child with mild croup, despite the lack of clinical trials supporting its use. Anecdotal, using a humidifier or placing the child in hot shower mist results in resolution of croupy symptoms relatively rapidly, whereas respiratory symptoms might progress without treatment. Although there are no controlled trials to support this treatment, such an approach is frequently successful.

Though steroids have been well-established in the treatment of severe croup, in recent years, oral dexamethasone, along with oxygen, has become standard for the child with moderate croup, as well. Recent data have pointed to its benefit, and physicians have become more comfortable using steroids in such children in the context of asthma.

In a recent Cochrane metaanalysis of 31 controlled trials involving a total of 3,736 children with croup, glucocorticoid treatment was associated with significant improvements in the Westley croup score at 6 and 12 hours. The steroid-treated children had half the number of return visits/readmissions and spent a mean of 12 fewer hours in the emergency department and/or hospital (Cochrane Database Syst. Rev. 2004;CD001955).

Epinephrine use was also 10% lower among the steroid-treated children in the Cochrane analysis. When nebulized epinephrine is needed—typically if stridor is moderate, worse, or persistent after initiation of steroids—it's important to observe the child for 3-4 hours after initiation of epinephrine, to make sure stridor does not return, given that the effects of epinephrine do not usually last beyond 2 hours.

For the child with severe croup, the initial treatment is oxygen along with nebulized epinephrine to break the spasm.

Steroids are clearly indicated after that; it's just a matter of determining whether the child can tolerate them orally or needs to receive them intravenously.

In contrast to croup, the treatment of bronchiolitis—and indeed its clinical identification—are less well defined. A near-universal illness within the first 2 years of life during the months of November-April, bronchiolitis is usually caused by RSV, although now it appears that human metapneumovirus may account for up to 15% of cases.

Children at greatest risk for serious disease are those younger than 6 months, those born prior to 35 weeks' gestation, and those with chronic lung disease (particularly bronchopulmonary dysplasia), heart disease, or severe immunocompromise, such as bone marrow transplant recipients.

Although the classical presentation of bronchiolitis is coryza, stridor, and mild to moderate respiratory distress, a small proportion of children will present with apnea alone.

Most experts would agree that oxygen and fluids (usually given intravenously) are part of the treatment, though there is some debate about how much fluid is appropriate to prevent dehydration but avoid excess fluid in the lungs. More controversial, however, are the roles of bronchodilators and of steroids.

Results of various studies looking at the response to β -agonist therapy among children with bronchiolitis have been mixed. The problem with these studies appears to be that the results have depended upon the population selected: Studies that have included only children with nasal washings positive for RSV or "pure" bronchiolitis tend to show less benefit, whereas bronchodilators have tended to work better in studies that use a clinical definition for bronchiolitis that includes repeated wheezing, which overlaps with asthma.

Indeed, it's nearly impossible to distinguish RSV bronchiolitis from a first asthma episode in a 6-month-old.

Some of these infants may have more of

an atopic illness than a true respiratory viral illness, and we do know that bronchodilators work best in children with atopic disease.

But, it has been hypothesized that RSV may act as a trigger for wheezing in an atopic child, so the presence of RSV certainly doesn't eliminate the potential of allergic bronchospasm.

My approach, then, is to give a trial of inhaled albuterol when the child's symptoms are severe enough to be in the hospital or emergency department and to assess oxygenation, respiratory effort, and respiration rate/retraction after 1-2 hours. If the child has had recurrent episodes or has underlying lung disease, a consideration of steroids is appropriate. Studies to date have found inconsistent results as to the benefit of steroids in first episodes with potential benefit in those with underlying lung pathology or recurrent episodes—the hypothesis being that decreasing bronchiolar inflammation and swelling relieves the airway obstruction. More data support the use of oral than nebulized steroids in children who can take them by mouth. Otherwise, intravenous steroids are required.

Interestingly, recent data have come out suggesting racial differences in response to both glucocorticoids and to inhaled albuterol.

One study, for example, found that black asthmatics required greater concentrations of glucocorticoid in vitro to suppress T-lymphocyte activation (Chest 2005;127:571-8), while another found significant differences in bronchodilator response between Puerto Rican and Mexican asthmatic subjects, based on pharmacogenetic differences (Am. J. Respir. Crit. Care. Med. 2005;171:535-6).

More studies are necessary so we can begin to incorporate these avenues of research into clinical practice. ■

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BY STEPHEN I. PELTON, M.D.

IM Dexamethasone May Shorten Bronchiolitis Course

BY NANCY WALSH
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WARSAW — A single intramuscular injection of 0.6 mg/kg dexamethasone decreased the duration of symptoms and hospital stay among young children with bronchiolitis in a randomized, placebo controlled trial, according to Jamaree Teeratakulpisarn, M.D.

The optimal treatment of acute bronchiolitis remains controversial, Dr. Teeratakulpisarn said.

Some reports in the literature suggest that corticosteroids may be helpful, and a single dose of dexamethasone has been shown to be beneficial in the treatment of croup.

"We therefore conducted a randomized, double-blind, placebo controlled trial in 174 children younger than 2 years hospitalized with acute bronchiolitis," Dr. Teeratakulpisarn wrote in a poster session at an international congress of the World Society for Pediatric Infectious Diseases.

The primary outcome was time to symptom resolution, which was defined as

a respiratory rate score of 0 or 1, wheezing score of 0 or 1, retraction muscle score of 0 or 1, and oxygen saturation of 95% or greater without oxygenation, the physician said.

Analysis showed that dexamethasone treatment was associated with a significant increase in favorable outcome—shorter duration of symptoms—with a hazard ratio of 1.56, compared with placebo, he said.

The treatment significantly decreased the mean duration of symptoms by 11.8 hours, duration of oxygen therapy by 16.6 hours, and length of hospital stay by 13.4 hours, reported Dr. Teeratakulpisarn of the department of pediatrics, Khon Kaen (Thailand) University.

There were very few minor side effects with the medication, and there were no significant differences between the active treatment group and the placebo group in additional drugs used, adverse effects, and complications, Dr. Teeratakulpisarn said.

This treatment should be recommended for acute bronchiolitis, Dr. Teeratakulpisarn concluded. ■

DATA WATCH

Number of Human Cases of West Nile Virus by State

