

# Bacterial Tracheitis and the Child With Inspiratory Stridor

Thomas Jevon, MD, and Robert L. Blake, Jr, MD  
Columbia, Missouri

Traditionally the presence of inspiratory stridor and upper respiratory tract disease in a child has led the primary care physician to consider croup, epiglottitis, and foreign body aspiration in the differential diagnosis. The following case demonstrates the importance of considering another condition, bacterial tracheitis, in the child with upper airway distress.

## Case Report

A 30-month-old boy with a history of atopic dermatitis and recurrent otitis media, currently receiving trimethoprim-sulfamethoxazole, presented to the emergency room late at night with a one-day history of low-grade fever and cough and a three-hour history of inspiratory stridor. He was in moderate to severe respiratory distress with a respiratory rate of 60/min, a pulse rate of 120 beats/min, and a rectal temperature of 37.6°C. Lateral neck roentgenogram revealed a normal epiglottis and no evidence of a foreign body. Physical examination revealed bilateral retracted tympanic membranes, a normal oropharynx, sternal and intercostal retractions, inspiratory stridor, and a few scattered wheezes. The remainder of the examination was unremarkable. Chest roentgenogram was normal, and the white blood count was  $12.5 \times 10^3/\mu\text{L}$  with 63 polymorphonuclear leukocytes, 7 band forms, 25 lymphocytes, and 5 monocytes.

The child was admitted to the hospital with a presumptive diagnosis of croup and was treated with mist, hydration, and racemic epinephrine. Initially he improved slightly, but approximately eight hours after admission he was in marked respiratory distress and had a fever of 39.4°C. At this time he had a brief seizure. After this episode his arterial blood gases on room air were  $P_{O_2}$  38 mmHg and  $P_{CO_2}$  45 mm Hg, and pH 7.38. Direct laryngoscopy was performed, revealing copious purulent secretions below the chords. This material was removed by suction, and an endotracheal tube was placed. He was treated with oxygen, frequent suctioning, and intravenous nafcillin and chloramphenicol. Culture of the purulent tracheal secretions subsequently grew alpha and gamma streptococci and *Hemophilus influenzae* resistant to ampicillin. Blood cultures were negative. Improvement occurred over the next few days. White blood cell count was  $10 \times 10^3/\mu\text{L}$  with 57 polymorphonuclear leukocytes, and 20 band forms on the third day. He was extubated on the fourth day, switched to oral cefaclor on the sixth day, and discharged on the seventh day. On follow-up one month after discharge he was well.

## Discussion

This patient initially presented with typical croup but turned out to have a more serious, life-threatening illness. Recent reports indicate that bacterial tracheitis may represent a re-emerging condition that should stimulate a rethinking of

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From the Department of Family and Community Medicine, University of Missouri-Columbia, Columbia, Missouri. Requests for reprints should be addressed to Dr. Thomas Jevon, Department of Family and Community Medicine, University of Missouri-Columbia, Columbia, MO 65212.

the management of the child with upper airway distress.

Before the advent of antibiotics, severe infection of the trachea, characterized by subglottic edema and purulent tracheal secretions, was recognized as a serious disease with mortality as high as 50 percent. With the availability of antibiotics, the morbidity and mortality associated with bacterial infection of the upper airway has dropped. In the child with inspiratory stridor, clinical attention in recent years has been directed toward differentiating acute epiglottitis from the more common and more benign viral croup.

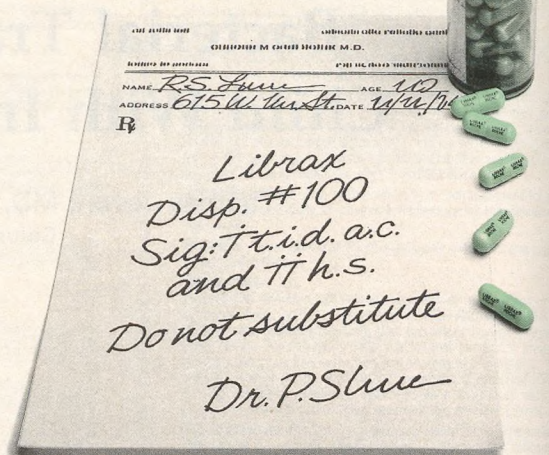
In 1979 Jones et al<sup>1</sup> reported eight children, encountered in a university setting over a 14-month period, with severe bacterial infection of the trachea. Each child had upper airway obstruction with a normal epiglottis on radiographic examination. When standard therapy failed to produce improvement or the children deteriorated, bronchoscopy was performed. In all cases, purulent secretions were found, and *Staphylococcus aureus* was cultured from the material in six cases. Each patient was treated with parenteral antibiotics and received intensive care. Seven required intubation or tracheostomy. Two suffered cardiorespiratory arrest and were resuscitated.

Since 1979 additional reports of bacterial tracheitis have helped construct a clinical picture of the condition and provide insight into its recognition and management.<sup>2-6</sup> The ages of reported cases have ranged from one month to 11 years, with a mean around 2.5 years. Inspiratory stridor and cough are relatively consistent clinical manifestations. Frequently nonspecific upper respiratory tract symptoms are present for several days prior to the onset of distress, which may be fairly sudden. Fever is often, but not invariably, present. On examination the child appears to have croup. Roentgenograms of the upper airway may be normal or may show subglottic narrowing consistent with croup or a shaggy border of the tracheal air column. There is usually a mild to moderate leukocytosis, and relatively severe hypoxemia is common. There is some evidence that measurement of C-reactive protein may be useful in distinguishing bacterial tracheitis from croup.<sup>7</sup>

As bacterial tracheitis is a very serious, life-threatening condition, recognition and appropriate

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As with all anticholinergics, inhibition of lactation may occur. **Precautions:** In elderly and debilitated, limit dosage to smallest effective amount to preclude ataxia, oversedation, confusion (no more than 2 capsules/day initially; increase gradually as needed and tolerated). Though generally not recommended, if combination therapy with other psychotropics seems indicated, carefully consider pharmacology of agents, particularly potentiating drugs such as MAO inhibitors, phenothiazines. Observe usual precautions in presence of impaired renal or hepatic function. Paradoxical reactions reported in psychiatric patients. Employ usual precautions in treating anxiety states with evidence of impending depression; suicidal tendencies may be present and protective measures necessary. Variable effects on blood coagulation reported very rarely in patients receiving the drug and oral anticoagulants; causal relationship not established.

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**Azo Gantrisin®**

Each tablet contains 0.5 Gm sulfisoxazole/Roche and 50 mg phenazopyridine HCl.

Before prescribing, please consult complete product information, a summary of which follows:

**INDICATIONS:** Initial treatment of uncomplicated urinary tract infections caused by susceptible strains of *Escherichia coli*, *Klebsiella* species, *Enterobacter* species, *Proteus mirabilis*, *Proteus vulgaris* and *Staphylococcus aureus* when relief of pain, burning or urgency is needed during first 2 days of therapy. Azo Gantrisin treatment not to exceed 2 days. Evidence lacking that sulfisoxazole plus phenazopyridine HCl better than sulfisoxazole alone after 2 days. Treatment beyond 2 days should only be continued with Gantrisin (sulfisoxazole/Roche). (See DOSAGE AND ADMINISTRATION.) **Important Note:** Coordinate *in vitro* sulfonamide sensitivity tests with bacteriologic and clinical response. With ongoing therapy, add aminobenzoic acid to culture media. Increasing resistance of organisms may limit sulfonamide usefulness. As identical doses produce wide variations, measure blood levels in patients receiving sulfonamides for serious infections: 12 to 15 mg/100 ml is optimal; adverse reactions are more frequent above 20 mg/100 ml.

**CONTRAINDICATIONS:** Children under 12; known sensitivity to either component; pregnancy at term and during nursing period; in glomerulonephritis, severe hepatitis, uremia and pyelonephritis of pregnancy with gastrointestinal disturbances.

**WARNINGS:** Sulfonamides are bacteriostatic; organisms causing common infections are often resistant. Sulfas won't eradicate group A streptococci or prevent sequelae like rheumatic fever and glomerulonephritis. Deaths from hypersensitivity reactions, hepatocellular necrosis, agranulocytosis, aplastic anemia and other blood dyscrasias have been reported. Sore throat, fever, pallor, purpura or jaundice may be early signs of serious blood disorders. Perform blood counts and renal function tests.

**PRECAUTIONS: General:** Use with caution in patients with impaired renal or hepatic function, severe allergy, bronchial asthma. Hemolysis may occur in glucose-6-phosphate dehydrogenase-deficient individuals.

The more soluble sulfonamides are associated with fewer renal complications. Maintain adequate fluid intake to prevent crystalluria and stone formation.

**Information for Patients:** Maintain adequate fluid intake; urine will turn reddish-orange.

**Laboratory Tests:** Perform urinalysis with careful microscopic examination at least once a week and regular blood counts after 2 weeks therapy; measure blood levels in patients with serious infection (see INDICATIONS). **Drug Interactions:** Sulfonamides may displace oral anticoagulants from plasma protein binding sites, increasing anticoagulant effect. Can also displace methotrexate. **Drug Laboratory Test Interactions:** May affect liver function tests in hepatitis.

**Carcinogenesis, Mutagenesis, Impairment of Fertility: Carcinogenesis:** Azo Gantrisin has not undergone adequate trials relating to carcinogenicity; each component, however, has been evaluated separately. Rats appear especially susceptible to goitrogenic effects of sulfonamides; long-term administration has resulted in thyroid malignancies in this species.

Long-term administration of phenazopyridine HCl has induced neoplasia in rats (large intestine) and mice (liver). No association between phenazopyridine HCl and human neoplasia reported; adequate epidemiological studies have not been conducted. **Mutagenesis:** No studies available. **Impairment of Fertility:** The components of Azo Gantrisin have been evaluated in animal reproduction studies. In rats given 800 mg/kg/day sulfisoxazole, there were no effects on mating behavior, conception rate or fertility index. Fertility was not affected in a two-litter study of rats given 50 mg/kg/day phenazopyridine.

**Pregnancy: Teratogenic Effects:** Pregnancy Category C. The components of Azo Gantrisin have been evaluated. At 800 mg/kg/day sulfisoxazole was nonteratogenic in rats and rabbits, with no perinatal or postnatal effects in rats. In two other studies, cleft palates developed in rats and mice after 500 to 1000 mg/kg/day sulfisoxazole. No congenital malformations developed in rats given 50 mg/kg/day phenazopyridine. As there are no satisfactory animal or human studies, it is not known whether Azo Gantrisin can cause fetal harm or affect reproduction capacity. Use during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nonteratogenic Effects, Nursing Mothers and Pediatric Use:** See CONTRAINDICATIONS.

**ADVERSE REACTIONS: Allergic:** Anaphylaxis, generalized allergic reactions, angioneurotic edema, arteritis and vasculitis, myocarditis, serum sickness, conjunctival and scleral injection, periarteritis nodosa, systemic lupus erythematosus. **Cardiovascular:** Tachycardia, palpitations, syncope, cyanosis. **Dermatologic:** Rash, urticaria, pruritus, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis, photosensitivity. **Endocrine:** Goiter production, diuresis, hypoglycemia. Cross-sensitivity with some goitrogens, diuretics (acetazolamide and the thiazides) and oral hypoglycemic agents may exist. **Gastrointestinal:** Nausea, emesis, abdominal pain, anorexia, diarrhea, glossitis, stomatitis, flatulence, salivary gland enlargement, G.I. hemorrhage, pseudomembranous enterocolitis, melena, pancreatitis, hepatic dysfunction, jaundice, hepatocellular necrosis. **Genitourinary:** Crystalluria, hematuria, BUN and creatinine elevation, nephritis and toxic nephrosis with oliguria and anuria, acute renal failure, urinary retention. **Hematologic:** Leukopenia, agranulocytosis, aplastic anemia, thrombocytopenia, purpura, hemolytic anemia, anemia, eosinophilia, clotting disorders including hypoprothrombinemia and hypofibrinogenemia, sulfhemoglobinemia, methemoglobinemia. **Musculoskeletal:** Arthralgia, chest pain, myalgia. **Neurologic:** Headache, dizziness, peripheral neuritis, paresthesia, convulsions, tinnitus, vertigo, ataxia, intracranial hypertension. **Psychiatric:** Psychosis, hallucinations, disorientation, depression, anxiety. **Miscellaneous:** Edema (including periorbital), pyrexia, drowsiness, weakness, fatigue, lassitude, rigors, flushing, hearing loss, insomnia, pneumonitis.

**OVERDOSAGE: Signs:** Anorexia, colic, nausea, vomiting, dizziness, drowsiness, unconsciousness; possibly pyrexia, hematuria, crystalluria. Blood dyscrasias and jaundice may occur later. **Treatment:** Institute gastric lavage or emesis; force oral fluids; administer intravenous fluids if urine output is low with normal renal function. Monitor blood counts and appropriate blood chemistries, including electrolytes. In cyanosis, consider methemoglobinemia and treat with intravenous 1% methylene blue. Institute specific therapy for blood dyscrasias or jaundice.

**DOSAGE AND ADMINISTRATION:** Azo Gantrisin is intended for the acute, painful phase of urinary tract infections. The recommended dosage in adults is 4 to 6 tablets initially, followed by 2 tablets four times daily for up to 2 days. Treatment with Azo Gantrisin should not exceed 2 days. Treatment beyond 2 days should only be continued with Gantrisin (sulfisoxazole/Roche).

**HOW SUPPLIED:** Tablets, each containing 0.5 Gm sulfisoxazole/Roche and 50 mg phenazopyridine HCl—bottles of 100 and 500.

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treatment are crucial. Any child with the croup syndrome who fails to respond to the usual therapeutic measures should be assessed for the disease. Leukocytosis and a high fever should further raise suspicion of bacterial tracheitis. The diagnosis depends on visualization by laryngoscopy or tracheoscopy of purulent tracheal secretions. Performance of this diagnostic and therapeutic procedure should not be delayed when the condition is suspected.

Treatment of bacterial tracheitis requires an intensive care environment; access to the airway via an endotracheal tube or tracheostomy is essential for adequate clearance of secretions and assurance of air flow. Accidental extubation or occlusion by thick secretions are major risks in this situation and require careful management. In addition, parenteral antibiotic therapy should be directed to the likely pathogens, *Staphylococcus aureus*, *Hemophilus influenzae*, and hemolytic streptococci.

The recent reemergence of this pre-antibiotic era disease is unexplained. It is unlikely that the even rare occurrence of such a serious disorder would have escaped comment in the literature over a period of several decades. The incidence has thus probably increased significantly in recent years, and there is some evidence that the condition may be as frequent as acute epiglottitis.<sup>1</sup> In some series complication and mortality rates for bacterial tracheitis have been higher than those for epiglottitis.<sup>5</sup> Physicians have been appropriately sensitized to the dangers of epiglottitis; a similar awareness of bacterial tracheitis seems warranted.

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