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*From the Department of Child Health, Medical School, University  
of Airlangga, Surabaya.*

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## Status Asthmaticus

by

J.S. PARTANA

### Abstract

*The therapy of status asthmaticus must be rational.*

*Thus it is important to evaluate: 1. the severity and duration of an asthmatic attack. 2. the degree of dehydration. 3. whether infection plays a role. 4. all medication previously administered. 5. any possible complication.*

*Treatment is as follows :*

1. *Fluid and electrolyte therapy is important not only for the correction of dehydration and electrolyte disturbances but also for preventing inspissation of mucus in the bronchi. The best route of fluid administration is intravenous.*
2. *Potassium iodide orally administered may be helpful as an expectorant.*
3. *After hydration and normal acid-base balance have been established, epinephrine may be of benefit.*
4. *Aminophylline is effective when administered intravenously. It should be used with extreme caution: the dose should not exceed 3 mg per kg of body weight, it should be given slowly and should not be given more frequently than every 8 hours.*
5. *Corticosteroids should be administered, especially in cases who have received suppressive doses previously.*
6. *Humidified oxygen administration is of the utmost importance.*
7. *Antibiotics are recommended when infection is suspected.*
8. *Management of complications.*

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In Surabaya status asthmaticus among children does not seem to be a great problem. Between August 1973 and January 1974, 14 children were admitted to Dr. Soetomo Hospital with the diagnosis of status asthmaticus. This is about 1 percent of the total admission of 1420 children during the same period. All 14 cases recovered. Nevertheless, we have to be aware of the potential dangers of status asthmaticus.

#### Etiology

Status asthmaticus is a severe asthmatic attack, which does not respond to conventional treatment, especially to epinephrine injections.

One possibility for this poor response to epinephrine is infection, which is not seldom encountered in patients with status asthmaticus. Another important factor is dehydration, which leads to the formation of mucus plugs. In other countries excessive use of inhalers, sedatives and narcotics are mentioned as possible causes of status asthmaticus. Acidosis and hypoxaemia are also considered as causative factors.

#### Pathology

**Gross:** Obstruction of the bronchi and bronchioli is caused by contraction of smooth muscles, mucosal edema and excessive secretion of mucus.

**Microscopy:** The bronchial mucosa shows eosinophilic, or plasma cell infiltrations.

There is hypertrophy and hyperplasia of the mucus glands in the

bronchial wall. In the mucus eosinophils, epithelial cells and Charcot-Leyden crystals may be found. The basement membrane is thickened. Hypertrophy of the bronchiolar musculature may also be seen.

#### Pathophysiology

Increase in airway resistance is the basic problem in asthma, which is caused by 3 factors: bronchospasm, edema of the mucosa and excessive mucus production. Other factors contributing to the increase in airway resistance are thickening of the bronchial wall caused by inflammation and hyperplasia of the mucus glands, obstruction of the airways by exudate, by external compression or internal cohesion.

Since the tracheobronchial tree shortens and narrows during expiration, airway resistance is more pronounced in this phase of respiration and this leads to hyperinflation. This is followed by an increase in residual volume, total lung volume and functional dead space and a decrease in pulmonary compliance and alveolar ventilation.

With the increase in airway resistance, the use of the accessory muscles of respiration becomes mandatory. This leads to increased transpulmonary pressure, which may close the small bronchioli.

With labored breathing there is a rise in oxygen consumption and production of carbondioxide and oxidative metabolic products. This results

in hypoxemia and hypercapnia, causing central nervous system, cardiovascular and metabolic disturbances.

### Examination

#### History

It is important not only to evaluate the duration and severity of the asthmatic attack, but also the severity and course of previous attacks. The degree of dehydration can be estimated from the intake, vomiting, fever, bodyweight and urine production. Although low grade fever can be found in asthma, together with purulent secretion it must be considered as suggestive of infection. All previous medication must be listed regarding the dose and the time given. This is especially important with aminophyllin so as to prevent overdosage. With previous use of corticosteroid it may be life-saving to give corticosteroid treatment in high dosage.

#### Physical Examination

Signs of infection, the degree of dehydration, respiratory and cardiovascular function and the sensorium must be evaluated.

#### Laboratory Examination

Investigations needed are blood, urine and stool examinations, tuberculin skin testing, electrolyte and blood gases determination and an E.C.G.

An X-Ray picture is essential to detect complications as pneumonia, atelectasis, pneumothorax and pneumomediastinum.

### Treatment

#### Hydration

An often neglected but very important aspect in the treatment of status asthmaticus is correction of the dehydration (and electrolyte imbalance) to prevent inspissation of mucus in the bronchi. The same types and amounts of fluid and electrolytes can be used as in other pediatric problems.

#### Iodides

In some patients Iodide is worth trying as an expectorant, but in iodide-sensitive patients it is contraindicated. Most often it is given as a watery solution of the potassium salt.

#### Epinephrine

Epinephrine must not be given in status asthmaticus. But after hydration and acid-base balance have been restored, epinephrine may be beneficial.

#### Aminophylline

Aminophylline is usually very effective when given intravenously over a 15-minute period. The recommended dose is 3 mg per kg bodyweight diluted in a 5% dextrose solution. It may be dangerous if repeated before 8 hours. Signs of aminophylline intoxication include vomiting, hematemesis, convulsions, coma and death.

#### Corticosteroids

Corticosteroids may be life-saving in status asthmaticus, especially in

patients who had previously received suppressive doses. It should be given immediately in an adequate dose.

A dose of 100 mg of a water soluble hydrocortison preparation given every 6 hours usually suffices.

A short term corticosteroid therapy has almost no side effects and it is not necessary to lower the dose gradually.

#### *Oxygen*

Oxygen treatment is indicated in status asthmaticus. The most convenient method is by nasal catheter. Drying of the mucus membranes

should be prevented by giving humidified oxygen.

#### *Alcalization*

Sodium lactate may be used although there is a risk of causing lactic acidosis. Sodium bicarbonate is usually more effective.

#### *Antibiotics*

Antibiotics should be given if infection is suspected. With respiratory depression and with serious complications like pneumothorax and pneumomediastinum, the anesthesiologist and pulmonologist must be consulted.

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