

A Resuscitated Case from Asphyxia by Large Bronchial Cast

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— A 62-year-old woman with bronchiectasis suffered from asphyxia due to a large bronchial cast that obstructed the bronchial tree. Immediate bronchoscopic suction of a bronchial cast of 17 cm in length through the intubated tube relieved the patients without any complications. Large bronchial casts appear to be rare in this century but it should be considered in patients with acute exacerbation of excessive sputa not only in patients with asthma or allergy but also in patients with respiratory tract infection. — asphyxia; bronchiectasis; bronchial cast
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Bronchial casts are obstructive plugs that are formed in the bronchial tree (Jett et al. 1991). They may vary in size from small segment casts of a bronchus to complete casts of an entire lung. The expectoration of a large cast is a dramatic clinical finding and the condition consequently attracts attention out of proportion to its rarity (Muller and Mithal 1988; Cairns-Bazarian et al. 1992).

As might be expected, bronchial casts are often complicated with underlying bronchial diseases (Fairshter et al. 1979) such as asthma (Morgan and Bogomolets 1968) and allergic bronchopulmonary aspergillosis (Sanerkin et al. 1966). However, a significant number of cases have no predisposing factors. Clinical and radiologic findings vary with the size of a cast and associated illnesses (Bowen et al. 1985). Bronchial casts occur at all ages and are well described in children (Liston et al. 1986). They appear to be rare in this century as general health improves. However, a recent report of subclinical forms of casts found on gastric lavage in children (Perez-Soler 1989) suggests that a bronchial cast should still be considered.

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We experienced a 62-year-old woman with bronchiectasis with a large bronchial cast of 17 cm in length, who was resuscitated completely without any neurological complications.

CASE REPORT

A 62-year-old woman with a long history of chronic airway infection associated with bronchiectasis was transferred by ambulance in a cardiopulmonary arrested state caused by upper airway obstruction. She was 151 cm in height and 35 kg in body weight and admitted to Department of Respiratory Medicine, Shiogama City Hospital, Miyagi Prefecture, once a year because of acute exacerbation of respiratory failure and her last admission was from August to October 1997. She suffered from exertional dyspnea, cough and sputa from 10 to 30 ml per day even during remission and her daily life activity was limited within her home. Her arterial blood gas analysis showed PaO₂ 68 mmHg, PaCO₂ 42 mmHg, pH 7.40 and HCO₃⁻ 26 mEq/liter during resting state and she was not treated with home oxygen therapy. On January 18 th, 1998, she suffered from frequent cough and sputa in the morning and at 9 p.m., she expectorated bloody sputum and was found to be loss of consciousness in the rest room. Her family noticed her dyspneic breathing and called ambulance but she arrived to the hospital in cardio-pulmonary arrested state with cyanosis. Immediate cardio-pulmonary resuscitation was performed and bronchoscopy (BF type 6C10, Olympus, Tokyo; 8 mm outside diameter) through an intubation tube was tried. A large bronchial cast, 17 cm in length (Fig. 1), was aspirated and her cardio-pulmonary arrest was improved dramatically. The aspirated bronchial cast was composed of coagulation and purulent discharge. Microscopic examination of the large cast showed hyalinized aggregates of fibrin containing red blood cells, a moderate number of neutrophils, and a few gram-negative bacteria, including *Aeruginosa*. However,



Fig. 1. Seventeen-centimeter length of hemorrhagic cast aspirated by bronchoscope.

because of severe hypoxemia (PaO_2 32 mmHg, PaCO_2 152 mmHg, pH 6.86 and HCO_3^- 26 mEq/liter) mechanical ventilation was obliged and she was successfully weaned off the ventilator in 10 days. During mechanical ventilation, five times of bronchial toilets by bronchoscopy were done and massive bloody sputa occupied in bronchial trees were aspirated, and sputum volume decreased day by day. The 10th day after admission the intubation tube was taken out and nasal oxygen supply was stopped the 12th day after admission. Two weeks after admission her arterial blood gas analysis showed PaO_2 71 mmHg, PaCO_2 45 mmHg, pH 7.40 and HCO_3^- 30 mEq/liter with room air breathing and she could walk inside the room.

Her inflammation signs just after admission were the following, body temperature 38°C , white blood cell count $20\,900/\text{mm}^3$, red blood cell count $275 \times 10^4/\text{mm}^3$, hemoglobin 8.8 g/100 ml, platelet count $31 \times 10^4/\text{mm}^3$, blood sedimentation rate 65 mm in one hour and 111 mm in 2 hours and C-reactive protein test 5.4 mg/100 ml. *Aeruginosa* $\times 10^7$ cfu/ml was detected in sputum culture. Ceftazidime was sensitive to *Aeruginosa* and drip infusion of ceftazidime 1 g was administered twice a day for 3 weeks. No other organ abnormality was found. Her chest x-ray film showed bronchopneumonia in both lungs based on the diffuse infiltrated shadows with honeycomb appearances and tram signs and destroyed lung appearance. Fig. 2 shows chest x-ray film just before discharge. Her computed tomograph before discharge revealed bronchiectasis in both lungs with bullaes and fibrotic changes (Fig. 3). Spirogram before discharge shows restrictive and

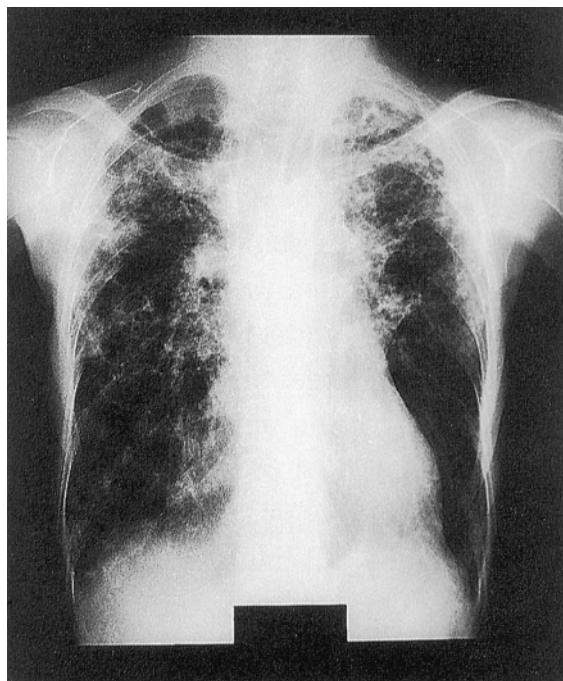


Fig. 2. Chest x-ray film taken after the patients became to a steady state. Fig. shows diffuse infiltrated shadows in both lungs with honeycomb appearances and tram signs and destroyed lung appearance.

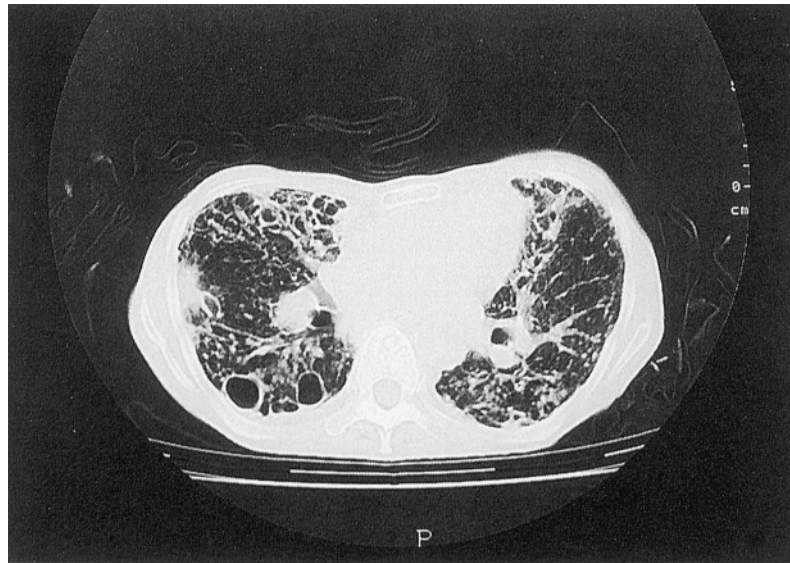


Fig. 3. Computed tomography of the chest taken after the patient became to a steady state. Fig. shows bronchiectasis in both lungs with bullae and fibrotic changes.

obstructive impairments with vital capacity (VC) 1.0 liter (45% predicted), forced vital capacity at one second (FEV_1) 0.7 liter and forced vital capacity percent ($FEV_1\%$) 70%.

She had been diagnosed with bronchiectasis in her 5th decade and suffered from chronic airway infection for more than ten years. However, this was the first episode of emergent deterioration, loss of consciousness and cardio-pulmonary arrest. She was discharged 7 weeks after the emergent admission and is followed in the outpatient department.

DISCUSSION

A bronchial cast occupying a central airway was supposed to make our patient in this report suffocate and induce cardio-pulmonary arrest (Fairshter et al. 1979). A surprising number of diseases may be complicated by bronchial cast formation (Fairshter et al. 1979). In some cases, bronchial cast formation has been observed in patients suffering from primary diseases of organ systems other than the lung. In most cases, the underlying disease is a primary respiratory problem. Therefore, therapy for large bronchial casts should include (1) specific measures to treat the underlying pulmonary condition, i.e., antibiotics for pneumonia, and (2) maneuvers designed to remove or facilitate the expectoration of bronchial casts. Thus, bronchoscopy, bronchial lavage, mucolytic drugs, hydration, and chest physiotherapy, all have been advocated for the treatment of retained bronchial secretions. These maneuvers are all nonspecific in the sense that they apply to a variety of disease states of differing causes.

Large bronchial casts are a rare symptom and a recent report shows child cases (Seear et al. 1997). Acute mortality of this disease, however, is high. An emergency bronchoscopy is needed to rule out this possibility, especially in

patients complicated with chronic pulmonary infection. There are little published data concerning the removal of large bronchial casts by bronchoscopy. Due to size, inspissation, and/or diphtheritic properties, unusually large bronchial casts may be more difficult to remove than the purulent secretions ordinarily associated with pulmonary infections and/or respiratory failure. Large bronchial casts are not often removed by bronchofiberscopy, possibly because of adherent properties of the casts. Therefore, the utility of bronchoscopy in cleaning large bronchial casts is somewhat uncertain (Fairshter et al. 1979). The cast in this report is one of the largest casts, reported in literature dealing with patients saved from asphyxia.

As general health has improved, more recent reports of bronchial casts often associate with bronchial casts in patients with asthma or allergy (Sanerkin et al. 1966). However, some authors have observed that patients often have no predisposing factors other than a recent respiratory tract infection (Bowen et al. 1985; Liston et al. 1986). Although the exact mechanisms are not known, casts are considered to be made in an inflammatory process composed mainly of fibrin and a dense eosinophilic inflammatory infiltrate (Seear et al. 1997). Excessive mucus production is also a feature of the present case with bronchiectasis. The mechanism of mucus hypersecretion is not known, but it is thought that a combination of mucus cell hyperplasia and serous-to-mucous-cell metaplasia involves in this process (Berthold and Basbaum 1991). The present patient suffered excessive sputa during exacerbation but not during the relief of symptoms. The present case suggests that large bronchial casts, although rare, should be considered in patients with acute exacerbation of excessive sputa.

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