

Massive Powder Aspiration in a Toddler

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We report a case of aspiration of calcium carbonate powder by a toddler. Bronchoscopic removal of aspirated contents resulted in favourable outcome.

Key words: *Massive powder aspiration, Respiratory failure, Toddler accidents.*

Toddlers and even infants, while enjoying their newfound freedom of movement are frequently at risk of accidental injury caused by household items. We report a young boy who accidentally aspirated and was severely asphyxiated by aspiration of a massive amount of 'kolam' (limestone) powder used commonly in Tamilnadu for drawing floral and other designs on the space leading to their house.

Case report

An 18-month-old male child accidentally tripped and fell backwards while running

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carrying a bag containing nearly ½ kg of kolam powder. The contents of the bag fell heaped on his nose and face, he became unresponsive and was unable to breathe for a few seconds. Choking cough, labored noisy respirations, vomiting and cyanosis followed. He did not develop any seizures. He was brought to the emergency department of our hospital three hours after the aspiration.

On examination, he was a well nourished child, had central cyanosis and gasping, irregular respirations. He had severe supra-sternal and intercostal retractions. There was no stridor. The chest was hyperinflated and silent bilaterally on auscultation. He was drowsy but arousable with a Glasgow coma scale of 11/15. His heart rate was 160 per minute, respiratory rate 36 per minute, and blood pressure was 82/60 mmHg.

He was intubated and endotracheal suction performed to remove frothy secretions containing chalky white powder. Stomach wash was given with saline. He was mechanically ventilated while awaiting bronchoscopy. Despite high peak inspiratory airway pressures, feeble breath sounds were heard anteriorly with no breath sounds posteriorly. A chest X-ray resembled a bronchogram with the trachea and bronchi being clearly outlined by the calcium content of the inhaled powder (*Fig. 1*). He was given nebulised terbutaline, intravenous aminophylline infusion 0.6 mg/kg/h, 10 mg/kg of hydrocortisone bolus and subsequently 10 mg/kg/day in four divided doses. Parenteral cefotaxime and metronidazole were also administered.

Bronchoscopy done 30 minutes after admission using a rigid bronchoscope yielded inhaled kolam powder in the trachea and both major bronchi. There was edema and redness of the bronchial mucosa. The bulk of the



Fig. 1. Chest X-ray following powder aspiration.



Fig. 2. Chest X-ray 3 weeks after discharge.

aspirated chalky material was removed by bronchial lavage with normal saline and suction using a wide bore suction catheter. The remaining clumps sticking to the bronchial walls were removed with an extraction forceps. Two mL of adrenaline 1:2,00,000 dilution was instilled locally in each major bronchus and trachea to reduce post-bronchoscopic bleeding and reactive bronchospasm.

Following bronchoscopic lavage, the patient was ventilated mechanically for 15 hours during which period chest physiotherapy followed by endotracheal suctioning was carried out every 15 minutes. The air entry in the lower lobes improved significantly following the bronchoscopy and later he showed clinical improvement. Serial arterial blood gas estimation revealed moderate metabolic acidosis that resolved within a few hours of mechanical ventilation. Repeat skiagram six hours after bronchoscopy showed evidence of bronchiolar obstruction with perihilar flaring. He was weaned off oxygen over the next 24 hours and discharged on the fourth day. Biochemical analysis confirmed the aspirated powder to be calcium carbonate.

At discharge, the child had regular

respirations at a rate of 38 per minute with no chest recession or hyperinflation and vesicular breath sounds were audible equally. On follow-up at two and six weeks after discharge, he was asymptomatic with no recurrence of respiratory distress. The chest radiograph at discharge and at follow-up (Fig. 2) showed normal lung markings. His serum calcium was 9.4 mg/dL, serum phosphorus was 5.8 mg/dl and serum alkaline phosphatase was 313 U/L at follow up. Ultrasound abdomen showed no evidence of nephrocalcinosis or urinary tract lithiasis and urinary spot calcium/creatinine ratio was 0.173.

Discussion

Accidental aspiration of food objects such as nuts and seeds are common in young children and may result in death if not promptly removed. Inedible objects such as balloons(1), coins, pills, sticks, safety pins, ball bearings, metallic objects, marbles, and baby powder may also be fatally aspirated.

Though aspiration of 'kolam' powder is uncommon, there are reports of massive talcum powder aspiration from the West(2-4). Consequences of massive powder aspiration vary from being asymptomatic to more

severe complications such as mild to severe aspiration pneumonia(2), adult respiratory distress syndrome(5), severe bronchiolar obstruction, massive bronchitis with pulmonary edema, atelectasis and compensatory emphysema, acute respiratory insufficiency/failure needing tracheotomy and mechanical ventilation(4), progressive diffuse pulmonary fibrosis(3), and increased mortality (23%). Outcome and prognosis depend on the time interval between the occurrence of the accident and the hospitalization of the child or institution of appropriate mode of therapy(4).

Calcium carbonate is insoluble in water, but absorbs water and tends to form thick flakes on mixing with water(6). This probably resulted in difficulty in clearing the aspirated material from the airways in our patient .

An important point to note is that there is usually a characteristic silent period of several hours between the initial event of powder aspiration and onset of severe respiratory distress. This asymptomatic period can lead to wrong parental and medical decisions resulting in increased morbidity and mortality. The best results in treatment are obtained by immediate intubation and bronchial wash even in the absence of respiratory symptoms. Artificial ventilation may be necessary to overcome very high airway resistance as encountered in our patient. Corticosteroids and bronchodilators may be helpful(4).

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