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Case Report

Rare Case of Fatal Aspiration with Barium Sulfate

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Abstract

Relevance: In the domestic specialized literature, information on cases of fatal aspiration by barium sulfate is scarce and fragmentary; a small number of works are devoted to them.

Description of the Expert Case: A patient suffering from Alzheimer's disease and dysphagia aspirated a large amount of barium sulfate during a medical procedure. Immediately after the procedure, she died. During the forensic medical examination of the corpse, the presence of a suspension of barium sulfate in the lumens of the larynx, trachea, main, lobar, segmental, lobular bronchi and in the lumen of most alveoli was established, signs of rapid death.

Conclusion: This observation supplements the information about rare cases of aspiration asphyxia with barium sulfate. Factors that may affect the outcome of aspiration are the patient's previous clinical condition and the volume and concentration of barium sulfate used.

Keywords: Barium Sulfate; Aspiration; Alzheimer's Disease; Dysphagia

Introduction

Barium sulfate is a heavy inorganic metal used as a contrast agent to improve imaging of the gastrointestinal tract by increasing x-ray absorption. It has no pharmacological activity, nor is it absorbed or metabolized in the body. It is excreted unchanged in the feces. Barium sulfate is widely used as a contrast agent for imaging radiological studies of the gastrointestinal tract [1,2].

Domestic papers describing the causes, clinical picture, cases of recovery and fatal cases of barium aspiration in the study of the available specialized literature have not been found. There are many foreign works on this subject [1-5].

Expert observation

Circumstances of injury

An 85-year-old patient suffering from Alzheimer's disease and dysphagia was admitted to a hospital with signs of bowel obstruction. On examination, an infiltrate on the right flank of the abdomen and painfulness along the course of the large intestine were palpated. An examination, conservative treatment, including barium passage through the gastrointestinal tract, and control of tests were prescribed. Immediately after the barium passage procedure, the patient's condition sharply deteriorated and he developed respiratory failure. Resuscitation measures had no effect; the patient was pronounced dead.

Results of a forensic examination of a corpse

The mouth was ajar. On the face, in the area of the mouth and left cheek, the skin was covered with dried white masses in a front-to-back direction. In the esophagus there was a large amount of white semi-liquid masses. Its mucous membrane was grayish, longitudinally folded. The entrance to the larynx was free, the vocal cleft was gaping. Lumen of larynx, trachea, main, lobular, segmental and lobule bronchi were completely filled with white semi-liquid masses. The lungs were somewhat enlarged in size, irregularly thickened to the touch. Under pulmonary pleura on all surfaces there were detected frequent focal fields of white substance of irregular oval and rounded shape, sized from 0.5x0.4 cm to 1x0.7 cm and with diameter from 0.5 cm to 1 cm, as well as scattered pinpoint bright red hemorrhages. Tissue of lungs on sections was motley due to the clearly visible contrasting pattern of airways to the smallest elements of bronchial tree visible to naked eye, white on reddish-brown background. Walls of crossed bronchi without visible changes, their lumens were filled with white liquid masses. A significant amount of reddish frothy fluid dripped from the surfaces of the lung incisions upon pressure, white semi-liquid masses were released from the bronchi. Swelling of the brain, full-blooded internal organs, pinpoint bright red hemorrhages in the connective membranes of the eyelids, in the thickness of the soft tissues of the head, in the mucous membranes of the renal pelvis, under the epicardium were found.

Results of histological examination

Forensic histological examination of the lung slices showed that the bronchi and lumen of most alveoli contained crystalline white-grayish transparent structures (Figure 1 a, b), venous and capillary vessels were full of blood, most vessels had leucostases in their lumens.

Figure 1: The presence of whitish crystalline structures (barium sulfate) in the alveoli of the lungs (a - increase 10x4, b - increase 10x40).

Forensic diagnosis: aspiration asphyxia due to closure of the airways with barium sulfate suspension (presence of barium sulfate suspension in the lumen of the larynx, trachea, main, lobule, segmental, lobule bronchi and in the lumen of most alveoli, signs of a quick death).

Discussion

Barium aspiration is usually accidental. M. Jackson., *et al*. [6] indicate that aspiration of small amounts of the substance during diagnostic procedures is common and has no clinical significance.

However, the aspiration of large amounts of barium sulfate is potentially life-threatening. Risk factors for aspiration include altered consciousness level, upper airway dysfunction, structural esophageal disease, malignant airway neoplasms and iatrogenic airway disorders (e.g., intubation and endoscopy), in 20%, esophageal obstruction caused by tumors, and in 8% esophageal obstruction by a foreign body; In addition, gastroesophageal reflux, a recent history of esophageal surgery, hiccups, and vomiting may also increase the risk of barium aspiration. Infants and young children are also at high risk for barium aspiration [1,2,4,6,7].

Conclusion

This observation adds to the evidence of rare cases of aspiration asphyxiation with barium sulfate. A patient with Alzheimer's disease and dysphagia aspirated large amounts of barium sulfate during a medical procedure. Her death occurred immediately after the procedure. A forensic medical examination of the corpse confirmed the presence of barium sulfate suspension in the lumen of the larynx, trachea, main, lobular, segmental, lobular bronchi and in the lumen of most alveoli, signs of rapid death. Factors that may affect the outcome of aspiration are the patient's previous clinical condition and the volume and concentration of barium sulfate used.

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Conflict of Interest

The authors have no competing interests to declare.

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