

## Fatal asphyxia by complete laryngeal obstruction due to chewing-gum aspiration in an adult woman.

### Case Report

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**Abstract:** In the present study, a 42 y.o. woman lethal case by aspiration of a foreign body is reported. During the autopsy, a large chewing-gum piece was found above the *aditus ad laringem*, so as to completely obstruct its access, causing a lethal respiratory insufficiency. The anatomopathological exam of the lungs showed the signs of acute asphyxia. The toxicological analyses of blood and urine samples were negative for drugs and/or ethanol. An accurate literature study allowed to show that this case represents the second lethal event related to the aspiration of a chewing gum in an adult subject, and the first related to the complete obstruction of the *aditus ad laringem*.

**Key Words:** lethal asphyxia, complete laryngeal obstruction, choking, chewing-gum

As widely known, asphyxia by choking is caused by the introduction of a foreign body into the respiratory tract, able to obstruct the air passage. Asphyxia by choking is widely discussed in literature [1-2]. It regards mainly food (death by cud), or foreign bodies inhaled by infants (i.e.: buttons, coins, balls, etc.) or by elderly subjects (i.e.: partial denture), although it can occur at any age [3-7]. Though being a dangerous event, the obstruction of the airways by foreign body is rarely mentioned in current medical textbooks or journals, and remains a largely uninvestigated cause of lethal asphyxia in adults. In this respect, specific risk factors have been identified, such as neurological and/or psychiatric diseases, consumption of central depressant drugs or inhibiting the pharyngeal or coughing reflex, age, irregularities of the teeth, loss of consciousness, cranial or facial trauma [8-10].

The diagnosis of death by choking is based on the detection of the generic signs of asphyxia, on the identification of the foreign body obstructing

the airways and on the exclusion of other causes of death. The context of the event is needed to give a coherent explanation.

In the present study, a lethal asphyxial event by aspiration of a piece of chewing-gum is reported. The accurate analysis of Literature shows that cases of choking by chewing-gum are very rare [3-4]: Njau described a fatality resulted from the partial obstruction of the extent of the trachea [3]; the study of Haftoura et al. regards a non-lethal case of choking by a pre-operative piece of chewing-gum adhering to a well-functioning endotracheal tube [4].

The case here reported regards a singular case of complete obstruction of the *aditus ad laringem* due to the accidental aspiration of a large piece of chewing-gum.

#### Case report

The present case regards a 42 y.o. woman found dead by her son, in a supine position, at the bottom of the stairway to her apartment. About 15

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minutes before, the woman had left her apartment saying to her son that she'd return soon after.

Despite the early emergency care intervention, she was pronounced dead.

#### *Autopsy findings*

The corpse was refrigerated until the autopsy was conducted about 36 hours after the lethal event. Intense hypostases were present at the face, neck and at the anterior-superior chest.

The external examination showed: sub-conjunctival petechiae, the absence of numerous teeth of the superior mandibular arch and the marked alteration of the lower arch teeth, that were weakly fixed to the jaw; a lacerated and contused wound, about 3 cm long, at the left parietal-occipital region of the head, whose inspection did not reveal any underlying cranial fractures.

At autopsy, a large sub-galeal haemorrhagic infiltration correspondent to the area of the lacerated and contused wound was noticed, whereas cranial fractures were excluded.

Once removed the skullcap, that had no traumatic lesions, the brain showed slight increase in volume, oedema, intense and wide blood vessel congestion and white matter petechiae. No traumatic injuries were noticed even at the cranial base.

The inspection of the thorax revealed hyper-expansion and congestion of the lungs, whose compression showed crackling and leaking of frothy haematic liquid; numerous sub-pleural and sub-epicardial petechiae were also perceptible.

At the dissection of laryngo-tracheal tube, a large piece of chewing-gum (about 2,5 x 3 cm) completely adhering to the aditus ad laringem was found, so that it was totally occluded (Fig. 1, 2). The internal examination of the other districts was unremarkable.

#### *Histological features*

Lung tissues for light microscopic examinations were fixed in 10% (w/w) neutral buffered formaldehyde solution and stained with hematoxylin–eosin.

The histological exam of the lung samples revealed massive emphysematous areas with rupture of the septa, alternated with peribronchial alveoli plugged by erythrocytes and hemosiderophage hystiocytes; abundant cellular debris, constituted by degenerated lining epithelium and mucous, were noticed in the bronchial and bronchiolar terminal branches.

#### *Toxicological analyses*

The analyses were performed on blood and urine samples collected during the autopsy, using an Agilent Technologies (AT) 6890N gas chromatograph coupled to a AT 5973 Inert Mass Selective Detector (MSD), equipped with AT 7683 Series autosampler, operating in the EI mode (70 eV) with SIM monitoring. The operating system was commanded by an HP Compaq d530SFF computer and managed by MSD Chemstation Software.

An EVDX-5MS cross-linked fused-silica capillary column (25 m, 0.20-mm i.d.) with a 0.33- $\mu$ m film thickness (Agilent) was linked to the Mass Selective Detector (MSD) through a direct capillary interface.

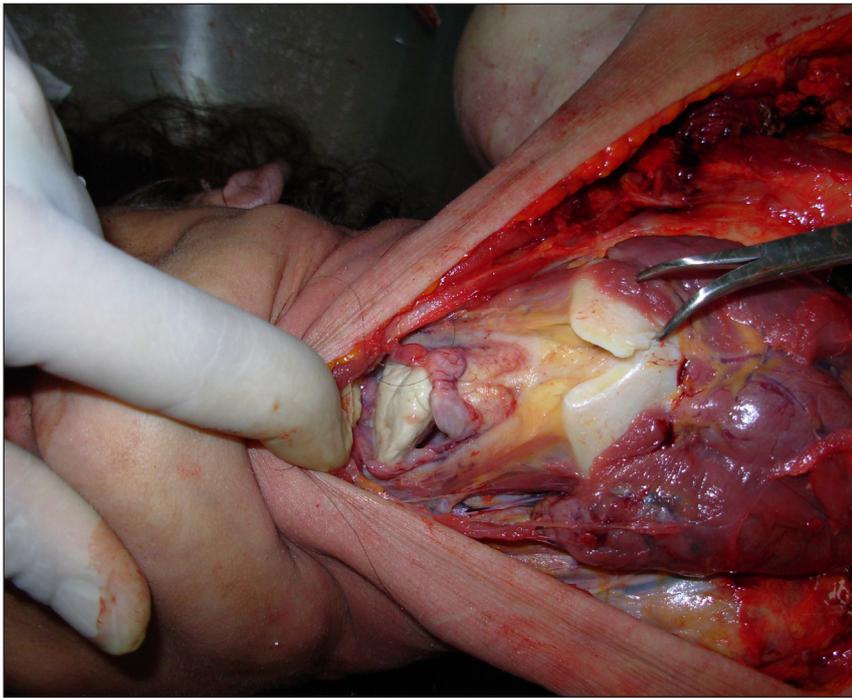
The toxicological results were negative for psychotropic, antidepressants and sedatives drugs, as well as for other organic nitrogen toxic xenobiotics. The search for ethylic alcohol and other volatile organic solvents (i.e.: ethylic ether, chloroform, petrol, etc.) was negative too.

#### **Discussion**

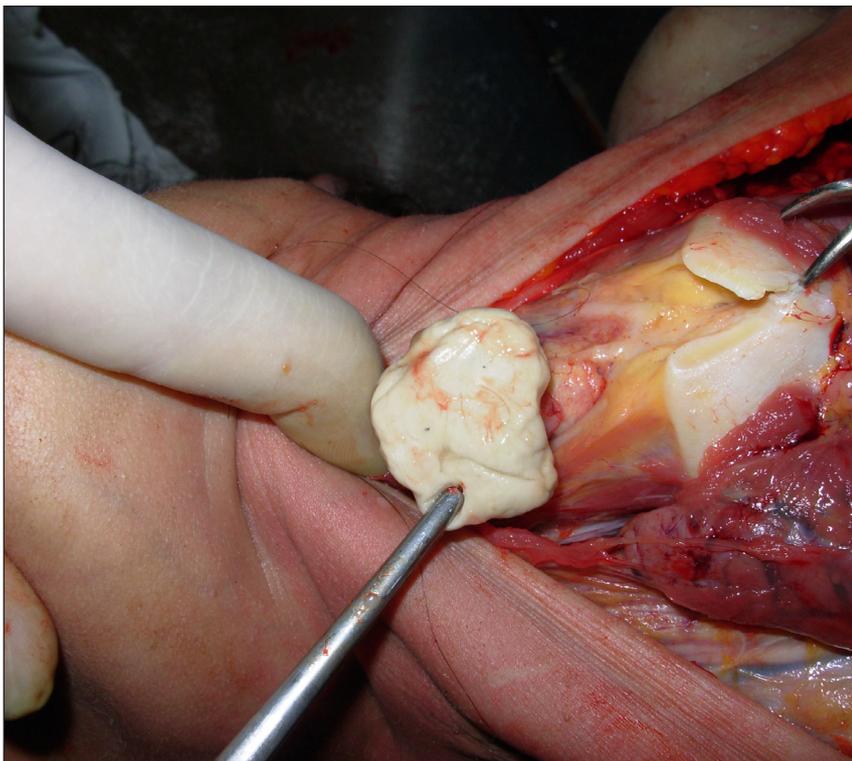
As well known, choking is a form of mechanical asphyxia caused by the aspiration of a foreign body able to obstruct the airways. Choking can be defined as typical or atypical depending on the capacity of the foreign body to completely or partially occlude the airways, respectively.

The typical form of choking is generally caused by any object able to adapt and completely obstruct the air passage (i.e.: meat or vegetable food, etc.). In the atypical form of choking, the foreign body is characterized by a well defined shape (i.e.: buttons, coins, balls, etc.), not necessarily correspondent to the airways profile and often not able to obstruct it completely. In both cases, the spasm of the larynx contributes to the asphyxial mechanism. The effort of yelling or swallowing eases the penetration of the foreign body in the air passage, whilst coughing reflex become inefficient and fading [11].

When a complete obstruction occurs, the external resuscitation techniques may be useless, being unable to ventilate the lungs. Only once the foreign body has been removed, a rapid intubation allows pulmonary ventilation, whilst the obstruction at laryngeal level may be treated only by a prompt tracheotomy. Anyway, the timing of care intervention must be very quick, because irreversible brain damage or death may occur even 5-10 minutes after



**Figure 1.** The piece of chewing-gum found on the *aditus ad laringem*.



**Figure 2.** The piece of chewing-gum after extraction from the *aditus ad laringem*.

the beginning of mechanical obstruction [3, 12-15].

In the present case, the correct evaluation of the lethal event was very difficult. The external examination of the corpse showed only a lacerated and contused wound at the left parietal-occipital region of the head, without cranial fracture: it was

a lesion consistent with an accidental fall to the ground, but certainly not able to cause the death.

The autopsy resolved the doubts about the mechanism of decease: the finding of a large chewing-gum adherent to the aditus ad laringem, obstructing totally the access to the larynx, together with coherent pathological signs (massive pulmonary emphysema, sub-serous petechiae, etc.), allowed to make diagnosis of lethal asphyxia by typical choking [10].

The reconstruction of the dynamics of the event was difficult too. The finding of a lesion at the postero-lateral region of the head allowed to hypothesize that the woman fell before the chewing gum was inhaled.

The onset of an acute and violent respiratory distress (i.e.: by accidental airways obstruction) would lead to lean the body forward; therefore, if the choking had occurred prior to the fall, the woman would have reasonably shown the lesions at the anterior or facial region of the head, because the fall would have been likely to forward.

Instead, the evidences gathered in this case seem to be more consistent with the hypothesis that the woman may have lost balance on the stairs and fallen back to the ground, getting a lacerated and contused wound at the left parietal-occipital region of the head.

Because of the trauma, it is likely that the chewing gum in the mouth of the woman has accidentally

slipped into the back of the pharynx and has been inhaled. The foreign body would have adhered to the aditus ad laringem because of its plasticity, clogging it as consequence of the negative pressure exerted at each inspiratory act. So, the complete obstruction of the air passage determined the acute asphyxia leading to death.

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