

# FATAL ASPIRATION OF GRAIN CORN - CASE REPORT

## AUTHORS

Juković F.<sup>1</sup>, Matejić S.<sup>2</sup>

<sup>1</sup> General hospital the City of Novi Pazar, Serbia

<sup>2</sup> Medical Faculty, University of Pristina, Kosovska Mitrovica, Serbia

## CORRESPONDENT

Fehim Juković

General hospital  
the City of Novi Pazar,  
Republic of Serbia  
mican.dr@eunet.rs

## SUMMARY

**Introduction:** Asphyxiation by aspiration- inhalation of foreign bodies is a form of violent mechanical asphyxia and can occur at any age, most commonly in children and the elderly. In children up to third age choking is a significant cause of morbidity and mortality. Mortality due to aspiration of foreign bodies is higher in children because of the relatively narrow airways and less developed protective mechanisms. The size, type, shape and place of obstruction with foreign body leads to the diversity of clinical picture.

**Case report.** We present the case of a 15 month-old girl, who was found by her mother in her house in a village, lying down, cyanotic, collapsed, without breathing. Autopsy showed that the cause of death was acute respiratory obstruction with impacted grains of corn in two places, on the larynx entrance and in the right bronchus.

**Conclusion.** The diagnosis of death by asphyxiation due to aspiration of foreign bodies is set at autopsy, when the place of airway occlusion is found. If a foreign body was removed during providing assistance, the diagnosis would be made based on medical records or history data of persons who were provided assistance. In cases of sudden deaths of young children, in order to clarify pathophysiological mechanism and mode of death in each case, a pathologist should always keep in mind the possibility of aspiration of foreign bodies, and in accordance with this, carefully apply appropriate autopsy techniques to locate the place of obstruction, with special regard to local finding in airways.

**Keywords:** forensic medicine, foreign body, asphyxiation, autopsy findings.

## SRPSKI

### FATALNA ASPIRACIJA KUKURUZN OG ZRNA - PRIKAZ SLUČAJA

Juković F.<sup>1</sup>, Matejić S.<sup>2</sup>

<sup>1</sup> Zdravstveni centar, Novi Pazar

<sup>2</sup> Medicinski fakultet, Univerzitet u Prištini, Kosovska Mitrovica

#### SAŽETAK

**Uvod:** Udušenje aspiracijom - udisanjem stranog tela (engl. *choking*) predstavlja vid nasilne mehaničke sufokativne asfiksije i može se javiti u bilo kojem životnom dobu, najčešće kod dece i starijih. Kod dece do 3. godine života predstavlja značajan uzrok morbiditeta i mortaliteta. Stope smrtnosti usled aspiracije stranih tela su veće kod dece zbog relativno uskih disajnih puteva i nedovoljno razvijenih zaštitnih mehanizama. Veličina, tip, oblik i mesto zaglavljivanja stranih tela dovode do raznolikosti kliničke slike.

**Prikaz slučaja.** Prikazujemo slučaj devojčice 15 meseci starosti, koju je majka zatekla u u kući na selu, u ležećem položaju, modra u licu, klonula i bez disanja. Obdukcija je pokazala da je uzrok smrti opstrukcija disajnih organa stranim telom - impaktiranim zrnima kukuruza na dva mesta: na ulazu u grkljan i na desnom bronhu.

**Zaključak.** Dijagnoza asfiksije usled aspiracije stranog tela postavlja se obdukcijom, kada se u disajnim organima pronađe mesto okluzije, a ukoliko je prilikom pružanja pomoći strano telo uklonjeno, dijagnoza se postavlja na osnovu medicinske dokumentacije ili anamnestičkih podataka od lica koja su pružala pomoć. U slučajevima iznenadnih smrti male dece, kako bi se pojasnio patofiziološki mehanizam i načina umiranja u svakom konkretnom slučaju, obducent treba uvek imati na umu mogućnost aspiracije stranih tela, i u skladu sa tim pažljivo primeniti odgovarajuću obdukcionu tehniku radi određivanja mesta opstrukcije disajnih puteva, uz posebno obraćanje pažnje na lokalni nalaz na disajnim organima.

**Ključne reči:** sudska medicina, strano telo, asfiksija, obdukcioni nalaz

## INTRODUCTION

We Asphyxia - aspiration can be defined as a lack of oxygen (hypoxia) and accumulation of carbon dioxide (hypercapnia), either due to injuries or illness. Aspiration - inhalation of foreign bodies is a common cause of violent mechanical asphyxia, and can manifest either as a blockage of the larynx and throat (*obturatio laryngopharingis*) or as a blockage of the trachea and bronchi (*obturatio tracheo-bronchialis*)<sup>[1]</sup>. Inhalation of foreign bodies is not uncommon, and the list of foreign bodies that enters airways due to an accident is a very diverse and wide. Foreign bodies can enter the respiratory system when there is an obstacle and blockade the normal course of breathing reflexes, such as sudden aspiration in the course of eating, playing or laughing<sup>[2]</sup>. In childhood, entering of foreign bodies in the respiratory system is almost always accidental, and often fatal, because the protective reflex, considering anatomical and physiological characteristics and specificis in children, is not as efficient as in adults. Young children are at risk because they have a habit of placing toys and solid objects from the environment in the mouth and, due to the anatomy of the upper respiratory tract and physiological specificits as insufficient coordination swallowing reflex, aspiration of foreign bodies can be fatal events, especially in children under the age of three years. Not only as a cause of death, aspiration is of great importance as a vital reaction<sup>[3]</sup>. Children up to age of 3 are at increased risk of death due to aspiration of foreign bodies, given the tendency to put everything in mouth, and because of the way they're chewing food. Because they have not grown molars, they reflexively use their incisors; objects and fragments of food can then suppress to the back, so that the swallowing reflex is activated with a tendency of inhaling foreign body<sup>[4]</sup>. In particularly high risk are children during the second year of life, until they sprout teeth - about 10 to 14 months, and before the outbreak of the first molars, at the end of the second year of life. This means that they are able to bite off pieces of solid food before they can effectively chew<sup>[5]</sup>.

## CASE REPORT

Girl aged 15 months played in the house which is located in the countryside; after a while, mother found her lying on the floor with head back, blue in the face, and when she raised her, she saw that the child is not crying or breathing. The mother later gave the fact that the baby fell off the table. Transport from the village to the hospital took about 30 minutes, where the pediatrician when receiving and reviewing the child noted unconsciousness, lack of pulse, heart beat and breathing, cyanosis of the lips. Despite intensive resuscitation measures death was declared with suspected brain injuries as the cause of death, primarily due to the data obtained from the mother, and the local findings on the head in the form of two surface wounds with bruises in the right parietal bumps and swelling of soft tissues in the same place. An autopsy was performed the next day. In the external findings classic signs of asphyxia, well expressed burial spots, cyanosis of mucous membranes, conjunctival petechiae were found. Examination of the oral cavity established the presence of 4 incisors in both the upper and in the lower jaw. Internal review of the body showed that the brain was normal, with no injuries, and the bones of the skull were whole. However, during the dissection of the airways two

grains of corn were found. One was at the entrance of the larynx between the epiglottis and the back of the throat, covering the entrance to the larynx (Figure 1), while the other maize grain were embedded in the initial part of the right bronchus, or the tip of a narrow part directed downwards - to the right lung and a flat part upward toward the bifurcation so that it is completely closed the lumen of the right bronchus in the form of plug (Figure 2). Distal of the grain the right bronchial lumen was filled with spumous liquid content; right lung showed signs of emphysema, a left lung was livid color and edematous. Superior, ie. wider parts of both maize grain were uneven surface, corroded (Figure 3). There was no violation of the mucous membranes of the mouth, throat or respiratory system. Other internal autopsy report showed the usual signs of asphyxia (liquefied blood, congestion of organs and tissue swelling, petechiae on serous membranes).

Figure 1. Maize grain at the entrance of larynx

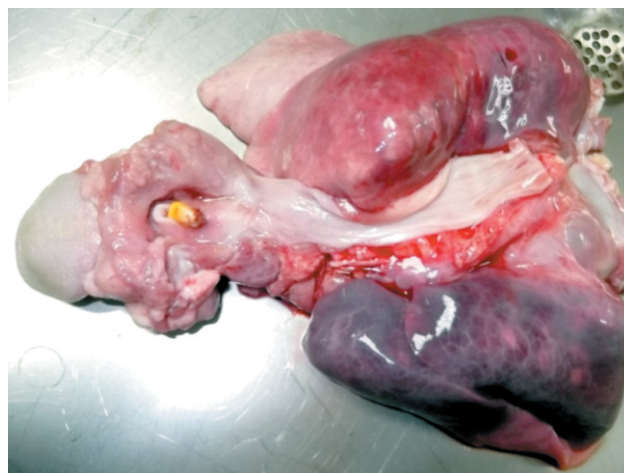


Figure 2. Wedged maize grain in right bronchus

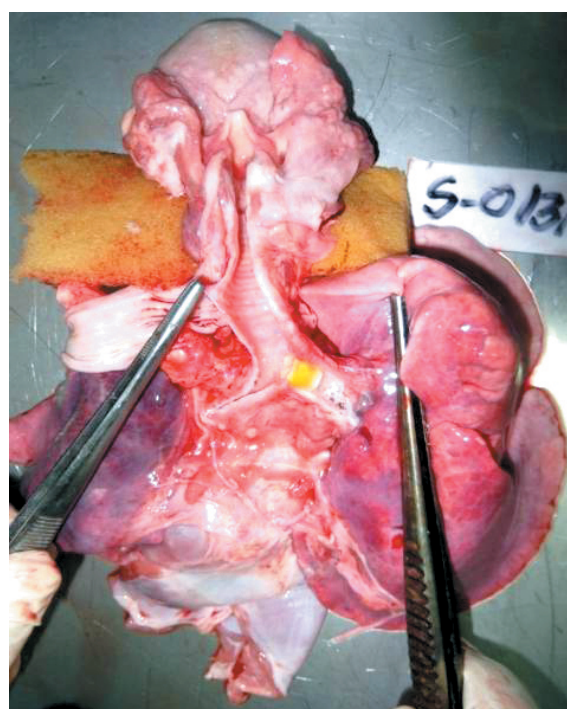


Figure 3. Removed, corroded both corn grains



In addition to the two grains, a few more, lesser corroded grains of corn were found in the stomach, where was no other content. The cause of death was asphyxia due to obstruction of the respiratory foreign body (two grains of corn).

## DISCUSSION

Death due to aspiration - inhalation of foreign bodies can be the result of hypoxia due to occlusion of the airways, with classic signs of asphyxiation, cyanosis and petechiae, when the victim struggles for breath, or a reflexively - due to neurogenic cardiac arrest and catecholamine response due to increased adrenal secretion<sup>[6, 7]</sup>. Except foreign bodies, anorganic and organic origin, asphyxia may be the result of disease. Epiglottitis is the most common natural cause of asphyxia due to obstruction of the upper airways, and it may be angina Ludowici (rapid spread of bacterial infection from the sublingual and submandibular space), anaphylaxis with laryngeal edema, and diphtheria<sup>[8]</sup>.

Once aspirated, foreign bodies can subsequently change the position or move distally, especially after spontaneous attempts or external manipulation attempt to remove the object, after pounding on the back of the patient, or attempt to cause coughing and vomiting. This can lead to delayed obstruction. Inhaled plant material can swell over the next few hours or days, which can cause coughing, wheezing, shortness of breath, loss of air and cyanosis. The size, shape,

type and location of jamming of foreign bodies are responsible for the variability of the clinical picture; items that cause an obstruction in the larynx and trachea are potential life danger, a smaller items that stick distally and which remain undiagnosed for some time, can cause serious complications, including pneumonia, atelectasis, bronchiectasis<sup>[9, 14]</sup>. Other foreign objects, such as peanuts, beans and similar organic body can activate the acute inflammatory response to tissue swelling which can gradually deteriorate the degree of asphyxia. Hypoxia and increased carbon dioxide stimulates the respiratory center and run "fighting for air". As the process continues, cyanosis deepens, veins become too full, dotted petechial bleeding can occur in the skin, conjunctiva, the surface of the heart and lungs. In the end, the person loses consciousness, can occur convulsions, and terminal vomiting is a common. Typically, a child loses consciousness within 2 to 3 minutes, and death can occur within 4 to 5 minutes<sup>[10]</sup>.

The conclusion that the death was due to aspiration or inhalation of foreign bodies can be issued only if the airways, from the entrance to the larynx and distally from there, in some place completely occluded<sup>[11]</sup>. The diagnosis of fatal asphyxia due to aspiration of a foreign body is made on the autopsy, when site of occlusion airways is found and demonstrated. If the victim had occlusion of the airway and foreign body is removed during a medical intervention, so death occurs later, the only way to establish a diagnosis is on the basis of well-managed medical records, or interviews with persons who were the first to react<sup>[12]</sup>.

Obviously, in this case the child during the game chewed and swallowed more corn grain, as evidenced by several ingested and found in the stomach. Developing and emerging incisors before molars in young children, allows nibbling but not chewing food, as it was in the present case because all the maize grain was smaller part corroded. When a grain of corn, the first inhaled and reached into throat, when trying to eject and activating the cough reflex, was additional inhaled, repressed and matured distal to the right bronchus, maize grain diameter was greater than the diameter of the lumen of the bronchi, causing wedge. After activation of protective mechanisms of the respiratory organs, especially intense coughing and subsequent attempts ejection of maize grain from the trachea, during episodes of deep breaths, following a second-corn kernel which was located in the oral cavity and pharynx previously corroded, with less powerful breath due to loss of power, it wedge at the entrance to the larynx, after which the child lost consciousness and died.

In the present case, each found grains of corn, for itself could cause respiratory obstruction and death, but in this case another grain of corn, which is inhaled and blocked the entrance to the larynx, accelerate the occurrence of death in a situation where it already existed blockade with the first grain at the level of the right bronchus. Asphyxia may occur and because indirect airway blockage, ie. because of pressure on the anterior side of epiglottis and closing the larynx entrance<sup>[13]</sup>.

## CONCLUSION

In cases of suffocation and acute respiratory insufficiency of small children, as well as emergency situations, regardless of the data obtained from relatives, doctors clinicians should bear in mind the possibility of foreign body



---

aspiration and asphyxia, and then to react accordingly to it as fastest as possible. At autopsy there is no specific findings indicating choking, other than verification of the presence of foreign bodies in the airways. Therefore, in the indicative cases, the pathologist should prepare and open the airways extremely careful in order to locate the exact site of obstruction by a foreign body, and also explained the mechanism of asphyxia. When a foreign body is found lodged in the larynx and lower, with its irritant effect it activate physiological protective mechanisms at the level of the larynx, especially intense cough reflex<sup>[14]</sup>. If a foreign

body stuck in the upper airway is not expectorated, a victim at the same time has in the mouth or throat pieces of food or other foreign body, it can block the protective mechanisms at the level of the epiglottis and vocal cords, and new aspirations and a new entrance of additional foreign bodies in upper airways can happen. This case shows the aspiration of two grains of corn in two different places in the airways, and explains with more details the phases of pathophysiological mechanisms of violent mechanical suffocative asphyxia.

---

## REFERENCES

---

1. Milovanović M. *Sudska medicina, medicinska knjiga* Beograd-Zagreb. 1985; 51.
2. Gupta AK, Parida PK, Bansal S, Kumar S. Tracheal Foreign Body: An Unusual History And Presentation. *The Internet Journal of Pediatrics and Neonatology*. 2005; 6 (1).
3. Madea B. *Handbook of Forensic Medicine*. Bonn, Germany; Wiley Blackwell. 2014; 407-409.
4. Basuttill A, Keeling WJ. *Paediatric forensic medicine and pathology*: Hodder Arnold. 2008; 331.
5. Byard RW. *Sudden death in infancy, childhood and adolescence*, 2nd ed. Cambridge: Cambridge University Press; 2004; 35.
6. Saukko P, Knight B. *Knight's forensic pathology*. Fourth edition. CRC Press-Taylor & Francis Group; 2016; 362.
7. Veljković S. *Nasilne asfiktične smrti*. CIBIF; 1999; 101-105.
8. Collins AC, Byard WR. *Forensic Pathology of Infancy and Childhood*, Springer reference; 2014; 210.
9. Chinski A, Foltran F, Gregori D, Passali D, Bellussi L. Foreign bodies causing asphyxiation in children: the experience of the Buenos Aires paediatric ORL Clinic; *The Journal of International Medical Research* 2010; 38: 655 - 660.
10. Barness GE, Spicer ED, Steffensen ST. *Handbook of Pediatric Autopsy Pathology*, 2nd ed; Springer. 2014; 688.
11. Di Maio DJ, Di Maio VJM. *Forensic pathology* 2nd ed. CRC Press. 2001; 255.
12. Prahlow J. *Forensic Pathology for Police, death investigators, attorneys, and forensic scientists*; Humana press; 2010; 408.
13. Nikolić S, Živković S. Choking on a grape: an unusual type of upper airway obstruction. *Forensic science, medicine and pathology*. 2013; 9:452-453.
14. Andrić PV, Nikolovski D. *Otorinolaringologija za studente medicine i stomatologije*, Univerzitet u Prištini. 1999; 248-251.