

# İSTANBUL'DA ASPİRASYONA BAĞLI ERİŞKİN ÖLÜMLERİ

## Aspiration Deaths among Adults in Istanbul

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Asil H, Özdemir Ç, Üzün İ, Kar H, Gülmen MK. Aspiration deaths among adults in Istanbul. Adli Tıp Bülteni 2013;18(1):13-19.

### ÖZET

Katı gıda aspirasyonu nadir olmakla birlikte alkol ya da ilaç etkisi altında olan insanlar ile merkezi sinir sistemi fonksiyonlarında yetersizlik olan komadaki hastalarda daha yaygındır. Otopsi sırasında solunum yollarında az miktarda gıda maddesinin saptanması agonal veya erken postmortem geçişler nedeniyle gerçek vital aspirasyonu göstermez.

Bu 10 yıllık retrospektif çalışmada Adli Tıp Kurumu Morg İhtisas Dairesinin 1995–2006 yıllarını kapsayan kayıtları incelenerek yaşları 23 ve 78 (45.43±14.61) arasında değişen, adli tahkikat ve postmortem incelemeler sonucunda ölüm sebebi aspirasyon olarak raporlanan 21 erkek ve 4 kadın olguya ait veriler sunulmuştur. 13 olgu herhangi bir görgü tanığı olmadan olay yerinde bulunmuştur. Bir cinayet olgusu dışında bütün ölümler kaza orijinelidir. Toksikolojik incelemelerde 7 olguda kan alkol düzeyi 161 ile 339 mg/dL arasında, 5 olguda ise morfin türevleri, benzodiazepin ve barbitürik asit türevleri, toluen ve aseton türevleri belirlenmiştir. 14 olguda gıda, 3 olguda sakız, 7 olguda mide içeriği ve 1 olguda bez parçası aspire edilmiştir.

Aspirasyon olgularında, hikayenin, elbiselerdeki kusmuğun, yakın çevrenin, toksikolojik incelemelerin delilleri hiçbir şekilde otopsi bulguları kadar önemli değildir.

**Anahtar kelimeler:** Erişkin, aspirasyon, ölüm, otopsi

### ABSTRACT

Massive aspiration of food is rare, but most common in people under the influence of alcohol or a drug and comatose patients who have impaired functioning of the central nervous system. The finding of small amounts of food material in the airway at autopsy does not indicate the true vital aspiration because of agonal or even early post-mortem overflows. The autopsy reports and other investigation data of adults, with a final diagnosis of death secondary to aspiration between the period January 1996 – December 2005 were presented

In our 10 year retrospective study the autopsy reports and other investigation data of 21 male and 4 female cases was presented with a final diagnosis of fatal aspiration in age from 23 to 78 years (45.43±14.61) from the records of Morgue Specialization Department of the Council of Forensic Medicine between the period of 1996–2005. 13 cases found death at the scene without an eyewitness. All deaths were accidental in manner except one homicide. Toxicological analysis revealed blood alcohol concentration levels between 161 and 339 mg/dL in 7 cases. Morphine metabolites, benzodiazepine and barbituric acid derivatives, toluene and acetone were detected in 5 subjects. Aspirated materials were food in 14 cases, chewing gum in 3 cases, gastric content in 7 cases and a fabric gag in one case.

The history, other evidence of external vomit on the clothing or immediate surroundings and toxicological analysis are by no means as significant as autopsy findings especially in cases of aspiration.

**Key words:** Adult, aspiration, death, autopsy

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\*This study was presented as a poster in IAFS 2008, New Orleans, USA.

Geliş tarihi: 28.03.2014 Düzeltme tarihi:21.04.2014 Kabul tarihi:12.05.2014

## INTRODUCTION

The aspiration of a wide variety of materials causes mechanical asphyxia as a result of obstruction of the airways. The impaction of a bolus of food or some other foreign body in the larynx leaves no doubt about the cause of death. This is rare, but most common in people under the influence of alcohol or a drug and comatose patients who have impaired functioning of the central nervous system. But the role of aspirated fluids such as water and gastric content is more debatable. Aspiration of gastric content is often a feature of the terminal phase of asphyxia when respirations are irregular and gasping and when consciousness is lost (1,2).

Aspiration of food material or gastric content in a different extent can be observed in a great number of criminal, accidental and suicidal deaths, but also in a wide range of deaths from natural causes. Gastric content is commonly found in the larynx, trachea and bronchi at autopsy and the differentiation between agonal or even postmortal overspill from true vital aspiration without clinical or other witnessed evidence is difficult and sometimes impossible (3,4). The significance of small amounts of food material in the airway at autopsy is low, but occlusion of the small airways, mainly the membranous and respiratory bronchioles, partial or total filling of bronchiolar lumen and the alveolar spaces with food or gastric content are typical morphologic findings (5).

The aim of this study is to identify some features and risk factors of fatal aspirations among adults in Istanbul, Turkey.

## MATERIAL and METHOD

In this retrospective study, we reviewed the data of the Morgue Specialization Department of the Council of Forensic Medicine which is the unique autopsy center of Istanbul City, with a population of more than 10 million, and investigates all suspicious deaths in this region. In addition, the biological samples of the corpses autopsied at the incident site are transferred for toxicological and histopathological screening, and in turn the report describing the findings to clarify the death and the details of the unusual event are delivered to local judicial authorities.

The autopsy reports and other investigation data of adults, with a final diagnosis of death secondary to aspiration between the period January 1996 – December 2005 were presented. These cases were retrospectively evaluated according to age, gender, incident site, how the

event happened, risk factors, and postmortem examination findings including autopsy, histopathology, toxicological analysis and the cause of death. The details of the occurrence of incidents and the treatment were obtained from the Public Prosecutor's Office. This study was made possible by the patronage of Education Commission of Council of Forensic Medicine.

## RESULTS

We identified 25 cases with a final diagnosis of fatal aspiration between 1996 and 2005. 21 cases were male (84%) and 4 were female (16%) with a median age of 44 from 23 to 78 years (mean±STD: 45.43±14.61). 13 cases were found death at the scene without an eyewitness. History of psychiatric disease in 4 cases, alcohol dependence in 1 case, thinner dependence in 1 case, and hemiplegia in 1 case have been taken prior to autopsy. Signs of external vomit were present in 3 cases (Cases 2, 7, and 23). The age and the gender of the cases, incident site, course of incident, and risk factors are listed in Table 1.

All cases underwent autopsy and examined histopathologically except cases 1, 2, 5, 10, 11, 17, 18, 20, and 22. Aspirated materials were food in 14 cases, chewing gum in 3 cases, gastric content in 7 cases and a fabric gag in one case. All the subjects underwent toxicological screening and analysis revealed blood alcohol concentration levels between 161 and 339 mg/dL in 7 cases. Morphine metabolites, benzodiazepine and barbituric acid derivatives, toluene and acetone were detected in 5 subjects. Detailed postmortem findings are presented in Table 2.

Multiple bruises, rib fractures, and signs of manual strangulation were determined in case 11 and the manner of death was homicide. In the light of findings obtained from all postmortem examinations and investigation data, all other 24 deaths were accidental in manner.

## DISCUSSION

Wick et al. reported nearly equal number of male and female cases (6), but male predominance in our study is compatible with other studies in the literature (3,7). The median age of 200 cases investigated by Berzlanowich et al is 65, and 53% of the cases were over 65 years (7). Elderly distribution is clear in the study of Dolkas et al with a median age of 73 years (8). The mean age of the adults in series of Wick et al is 68.9 years with a range of 30 to 96 years. The fact that the most of the victims were

Table 1. The age, gender, incident site, course of incident and risk factors of the cases.

Case	Age / Gender	Incident site	Risk factors	Course of incident
1	28/Female	Home	-	Found death without an eyewitness.
2	48/Male	Street	-	Found death without an eyewitness.
3	35/Male	Street	-	Found death without an eyewitness.
4	36/Male	Psychiatry clinic	Psychiatric disease	Found death without an eyewitness.
5	44/Male	Empty building	-	Found death without an eyewitness.
6	29/Male	Car	-	Coughing, writhing after drinking alcohol.
7	63/Male	Home	-	Living alone, found death without an eyewitness.
8	48/Male	Street	-	Found death without an eyewitness.
9	35/Male	Home	-	Coughing, writhing, dead on arrival at hospital.
10	56/Male	Home	Alcohol dependence	Gasping, coughing, dead on arrival at hospital.
11	78/Male	Home	-	Bruised and choked by a murderer.
12	48/Male	Home	-	Found unconsciousness, dead on arrival to hospital.
13	23/Male	Home	Thinner dependence	Held upside-down, dead on arrival at hospital.
14	43/Male	Psychiatry clinic	Psychiatric disease	Gasping, cyanosis, while eating, unconsciousness, no response to cardiopulmonary resuscitation
15	30/Female	Home	-	Gasping, cyanosis, pieces of chewing gum were removed while intubating.
16	37/Male	Shipyards	-	Found death without an eyewitness.
17	49/Male	Street	-	Found death without an eyewitness.
18	26/Male	Home	-	Coughing, writhing while eating, dead on arrival to hospital.
19	40/Female	Home	Psychiatric disease	Found death without an eyewitness.
20	46/Male	Home	Hemiplegia	Living alone, found death without an eyewitness.
21	60/Male	Office	-	Found death without an eyewitness.
22	56/Male	Railway station	-	Coughing, writhing while going to office.
23	62/Male	Street	-	Found death without an eyewitness.
24	40/Male	Subway station	Psychiatric disease	Coughing, writhing in the subway.
25	75/Female	Retirement home	-	Found unconsciousness, dead after 2 days in hospital.

Table 2. Nature of foreign bodies, obstruction degree, other postmortem finding of lung, and toxicological analysis from investigation data and autopsy records. (TBb: trachea, main bronchi, peripheral bronchi. GC: gastric content CG: chewing gum. CB: chewed bread. TA: toxicological analysis).

Case	Aspirated material	Autoptic-histopathological findings of lung and toxicological analysis
1**	GC	GC filling TBb, subpleural petechiae, edema, morphine metabolite (260 ng/mL in blood, 612 ng/mL in urine)
2**	GC	GC filling TBb, edema, hyperemia, morphine metabolite (522 ng/mL in urine)
3	GC	GC occluding the airway at rima glottis and non occlusive GC in TBb, subpleural petechiae, edema, morphine metabolite (2760 ng/mL in blood), morphine metabolite (52900 ng/mL), benzodiazepine derivative (735 ng/mL), barbiturate derivative (419 ng/mL) in urine
4	GC	GC in trachea and solid semi ingested food particle in right bronchus, subpleural petechiae, hyperemia, barbituric acid derivate (762 ng/ml in urine)
5**	Food	Bullous emphysema, larynx completely occluded with an unspecified food particle, food particles in main bronchus, hyperemia, edema, alcohol (184 mg/dL in blood)
6	GC	GC filling trachea, right and left main bronchi, hyperemia, subpleural petechiae, edema, old and fresh bleeding, alcohol(168 mg/dL in blood)
7	GC	GC fully filling trachea and main bronchi, hyperemia, old and fresh bleeding, alcohol (339 mg/dL in blood)
8	CB	CB occluding larynx and upper trachea, mouth filled with same material, subpleural petechiae, edema, hyperemia, old and fresh bleeding, alcohol (290 mg/dL in blood)
9	Food	Unspecified food particles in TBb, subpleural petechiae, edema, hyperemia, intra-alveolar bleeding, alcohol (161 mg/dL in blood)
10**	Meat	Larynx completely occluded with a piece of meat, food particles in TBb, subpleural petechiae, edema, alcohol (278 mg/dL in blood)
11**	Fabric gag	Larynx completely occluded with a piece of egg size fabric gag, fracture in cornu of cartilagio thyroidea with ecchymosis, TA negative
12	GC	GC filling bronchi and peripheral bronchi, subpleural petechiae, edema, hyperemia, TA negative
13	Food	Leaven like food particle occluding the airway completely under epiglottis, subpleural petechiae, hyperemia, edema, old and fresh bleeding, toluene and acetone peaks (2,5 mg/dL in blood)
14	Food	Unspecified food particles in TBb, edema, hyperemia, intra-alveolar bleeding. (A bended empty cigar box and unspecified stopper were also found in stomach.), TA negative
15	CG	Two pieces of 0.4 cm diameter CG above rima glottis and one piece of CG in upper trachea, edema, hyperemia, intra-alveolar bleeding, TA negative
16	Macaroni	Three pieces of 1 cm diameter macaroni at bifurcation, occlusive food particles in main bronchi, subpleural petechiae, edema, hyperemia, intra-alveolar bleeding, TA negative
17**	Lahmacun*	Lahmacun* obstructing larynx completely under epiglottis, subpleural petechiae, edema, TA negative
18**	Meat	A piece of meat obstructing larynx completely under epiglottis subpleural petechiae, edema, hyperemia, TA negative
19	Food	Mashed potatoes like food obstructing oropharynx and larynx completely, left main bronchi completely obstructed with the same food material, subpleural petechiae, edema, hyperemia, intra-alveolar bleeding, TA negative
20**	CG	Larynx occluded with CG completely, TA negative
21	CG	Conic shaped CG in right bronchus, TA negative
22**	Pide*	Pide* occluding larynx completely, subpleural petechiae, edema, TA negative
23	Food	Larynx occluded with unspecified food, edema, hyperemia, old and fresh bleeding, alcohol (249 mg/dL in blood)
24	CB	Larynx occluded with CB, small particles of same food in trachea, bullous emphysema of both apex, subpleural petechiae, edema, hyperemia, old and fresh bleeding, Chlorpromazine and biperiden in urine
25	Food	Cheese like food filling right main bronchi and peripheral bronchi, edema, hyperemia, intra-alveolar bleeding, TA negative

over 65 year old, is the common point of postmortem studies of fatal adult aspirations, but it is noticeable that the number of cases over 65 years in the present study is only two, and the median and mean ages of the cases are 44 and 45.43 respectively.

The predominance of middle-aged males suggests the term café coronary which was coined by Haugen in 1963 (9). A large food bolus as a risk factor, obstructing larynx completely was found in 10 of our cases (cases 5, 8, 10, 13, 17, 18, 19, 22, 23, and 24). The aspirated materials were unspecified food in 7 cases, bread and traditional food made from leaven and mince in 4 cases, meat in 2 cases, chewing gum in 3 cases and gastric content in 7 cases (Table 2). According to Berzlanovich et al aspiration in the elderly, was characterized by a significantly higher on soft or slick foods, and was contrasted by young's who choked on large pieces of foreign material with a higher rate of alcohol concentration as observed in our cases 5,8,10, and 23 (7).

The finding of gastric content in the air passages is by no means as significant as the presence of freshly swallowed food, but the history, if available, is a better guide, unless the material is obviously partly or wholly digested. In the present study it is remarkable that 6 of 7 cases (86%) died due to gastric content aspiration, are under the influence of alcohol or another substance. One of the striking points of this study was that narcotic and sedative/hypnotic drug use seems to be the main risk factor for drug abusers and alcohol consumers. It is also important to underline the potential risks of chewing gums for elderly and patients with neurological disorders.

At the autopsy of case 14, a 43 year old male who was under the treatment in a psychiatry clinic, bended empty cigar box and unspecified stopper were found in stomach. There was a similar case, a schizophrenic woman with swallowing and aspiration of high number of foreign bodies in the literature (10).

Underlying neurological disorder is the major risk factor for aspiration, especially in the elderly (3,6,7,8). In our study, only one case had a clinical history of hemiplegia, four cases had psychiatric diseases and two of them were under treatment in different psychiatry clinics. One case had a history of thinner dependence that was confirmed by toxicological analysis. Although alcohol dependence were described in one cases prior to autopsy, toxicological analysis revealed that 7 cases were under the influence of alcohol with blood concentration levels between 161 and 339 mg/dL. Barbituric acid,

chlorpromazine and biperiden levels of cases 4 and 24 on toxicological screening can be explained by psychotropic medication, but positive levels for morphine metabolites, benzodiazepine and barbiturate derivates indicates a substance abuse in cases 1, 2 and 3.

In a recent study from Vienne Institute of Forensic Medicine, 63% of cases were eyewitnessed (4). In our study 13 cases (52%) were found death, and 2 cases (8%) were unconscious at the scene without an eyewitness. In our study 44 % of the fatal incidents occurred at home, 20% in street, 12% in other public areas, 8% in psychiatry clinics, 4% in retirement home. Education of public and raised awareness on importance of first aid treatment and simple maneuvers may be life-saving.

## CONCLUSION

Prescribing diets, limiting the size of particles to avoid aspiration or to remove easily by resuscitation especially for elderly with neurological disorders, in psychiatry clinics, retirement homes, and nursing institutes, may be preventative.

We hope the data of this study to improve the preventative measures for fatal aspirations especially in term of café coronary and help for community education.

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