

Fatal Suffocation in Plastic Bag

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The recent increasing use of thin plastic sheeting in the manufacture of wrappers and bags for various purposes has resulted in an increase in the number of deaths from suffocation by articles made of this material. The following case reports elucidate various aspects that should be considered in the investigation of the causes of death in such cases.

Case 1. A 79-year old widower, living alone, was found dead on a sofa at home. His head was in a plastic bag, the mouth of which had been puckered around the neck, where it was tightly fastened by a strongly knotted tie. A few fine drops of water were seen on the inner wall of the bag. The body was dressed in a shirt, pullover, trousers, socks and shoes. The clothes showed nothing remarkable, and the home was tidy. A farewell letter was found.

The interpretation of the findings at the necropsy was difficult owing to advanced autolysis. Small, scattered areas of punctate haemorrhages were seen in the left conjunctiva and under the visceral pleurae. The heart weighed 580 g, and showed left sided enlargement. The right lung weighed 810 g, the left lung 740 g. A moderate amount of oedematous fluid oozed from the cut surface of the lungs. Other organs examined showed nothing remarkable.

Histological examination was not done because of advanced autolysis.

Case 2. A 27-year old married man was found dead in a toilet, locked from the inside. His head was in a plastic bag, the mouth of which was fastened tightly around the neck by a piece of string. Small drops of water were seen on the inner wall of the bag and about 40 ml of pale, yellow somewhat cloudy fluid. The body was dressed in shirt, pullover, and jacket, a pair of long plastic overalls and stockings. The shoes and the drawers had been taken off and were on the floor. His trousers were hanging over a washing basin.

He left behind no letter, and subsequent police investigation failed to reveal the cause of suicide.

Necropsy showed no signs of external violence except for a slight discolouration of the skin in the left temporal region. The conjunctivae showed only few small bleedings as did the inner side of the scalp, while numerous small bleedings were found under the pericardium and the visceral pleura. The right lung weighed 430 g; the left lung, 620 g. A large amount of oedematous fluid oozed from the cut surface of the lungs. Other organs examined showed nothing remarkable.

The prepuce of the penis was drawn back and between it and the glans were a few loose pubic hairs.

Histological examination of the lungs revealed local emphysema and pronounced stasis and, in some areas, oedematous fluid and red blood cells in the alveoli. The heart muscle showed mild fibrosis around the vessels, but no certain changes of the muscle cells in specimens stained with haematoxylin-eosin or Mallory's PTAH. Neither were any changes seen with certainty in the diaphragmatic musculature.

Cases 3 and 4. Two siblings, a youth aged 19 and a girl aged 11, were found dead in their beds at home. Both were dressed in their nightwear. Their heads were in plastics bags, the mouths of which were fastened tightly around the neck with a string. The body of the mother, who had committed suicide by hanging, was also found in the flat. Her wrists showed several incisions, and a bloodstained razor blade was found beside her. In a farewell letter the mother had written that the children had not noticed anything because she had first given them sleeping powders and then placed the plastic bags over their heads. For some time before the suicide the mother had been deeply depressed.

Necropsy of the youth showed a few small haemorrhages under the visceral pleurae and the pericardium and under the mucosa at the root of the tongue. On the other hand, no such bleedings were found in the conjunctivae. The right lung weighed 720 g; the left lung 700 g. The organs showed considerable stasis, but otherwise nothing remarkable.

Chemical examination demonstrated barbituric acid derivatives in the blood in a concentration of 4,0 mg/100 ml and in the liver in a concentration of 3,4 mg/100 g. There were no traces of nicotine, ethyl alcohol, methyl alcohol, acetone, acetaldehyde, ether, organic polyhalogen compounds or cyanides.

Necropsy of the girl revealed a few subepicardial and subpleural haemorrhages and a few larger intrapulmonary haemorrhages. But no haemorrhages were seen in the conjunctivae, under the endocardium, under the mucosa of the tongue or in the thymus. The organs showed marked stasis but otherwise nothing remarkable. The right lung weighed 170; the left lung 170 g.

Chemical examination disclosed barbituric acid derivatives in the blood in a concentration of 2,4 mg/100 ml and in the liver in a concentration of 2,5 mg/100 g. No traces of nicotine, ethyl alcohol, methyl alcohol, acetone, acetaldehyde, ether, organic polyhalogen compounds or cyanides were demonstrated.

The histological findings were the same in both cases. The lungs were markedly congested, and in some areas the alveoli contained oedematous fluid. There were a few, scattered small emphysematous areas. The liver, kidneys, and spleen showed signs of marked acute stasis. The muscle cells in the heart and the diaphragm exhibited no definite changes.

It is clear from the cases described above that suffocation in a plastic bag does not cause any characteristic morphological changes. The petechial haemorrhages in the conjunctivae, in the skin of the face, thymus, subpericardially, subpleurally and in the oral and nasal mucosa otherwise seen in fatal suffocation are extremely scanty. It was therefore thought worth while to ascertain whether also animals suffocated in plastic bags show only slight and scanty changes post mortem.

Animal Experiments

Three adult rats were placed in separate plastic bags from which most of the air was afterwards expressed. The bags were then sealed. The first few minutes the rats were unquiet, scratched the bag but made no attempt to bite their way out. After a short while they became much quieter, they breathed quickly and irregularly and died after 20, 30 and 60 minutes, respectively. It should be observed that the animal that survived for 60 minutes had a larger amount of air at its disposal because expression of the air from the bag had been less complete.

Post mortem examination revealed small haemorrhages in the lungs in one of the animals, but otherwise nothing remarkable.

The only histological abnormalities were the above mentioned small haemorrhages in the lungs. Specimens of the diaphragm and heart were stained with both haematoxylin-eosin and Mallory's PTAH and showed no changes.

Discussion

Deaths of children from suffocation by obstruction of the oral and nasal cavities with some soft material producing no local external injury have long been known. In Japan, for example, children have been intentionally suffocated in this way with thin, wet tissue paper placed over the nostrils (HARBITZ). Also thin rubber sheeting and several other similar sorts of material covering the mouth and nostrils have been known to cause fatal suffocation. In recent years a number of deaths in infants have been caused by suffocation by plastic material and parents have been warned against allowing the children to come into contact with such material (CONLEY, ZACHAU and JENSEN, JEFFREY). When plastic sheeting comes into contact with the face, it adheres to it partly because of respiration and partly because of static electricity arising on movement of the plastic material (CONLEY, JEFFREY). It is postulated that if the plastic sheeting is not removed within 1 min the child will die (JEFFREY).

As to such deaths in adults, some have been classified as suicide and others as accidental in association with autoerotism (DUMOND, PROTEAU, TABBARA and DEROBERT, HUNT and CAMPS, POLSON). As a rule, the decision must be based on circumstantial evidence. In case 1 reported above it was obviously a case of suicide, while the circumstances in the second case suggested an accident of the autoerotic type.

Fatal autoerotic accidents by suffocation in a plastic bag are difficult to explain. It appears strange that the subject cannot free himself. It is not known how quickly a subject loses consciousness and dies. If the plastic bag has been tied around the neck by cord or the like, one might imagine the possibility of strangulation. Cases of self-strangulation have recently been discussed by GORMSEN. But the absence of marked bleedings due to congestion in the skin of the head, conjunctivae and the nasal and oral mucosa in our case 1 argues against such a possibility. In case 2, interpreted as an autoerotic accident, the patient had no cord around his neck. That static electricity should cause the plastic sheeting to adhere so tightly to the nose and mouth that it cannot be torn off at the beginning of suffocation sounds less likely.

The animal experiments do not lend support to the view that death occurs very rapidly. But the animals soon lost consciousness, though, of course, the volume of air available was comparatively larger than that in a plastic bag covering the face of a human being, since only part of the air in the bag could be expelled. In addition the animals fur contains

a considerable amount of air. The difference will, of course, be still greater if the bag adheres to the subject's nose and mouth.

A few cases have been published where death was due to suffocation in a plastic bag containing or filled with some toxic substance. Thus, HIRTH described a chemist who first placed a cloth moistened with chloroform in the plastic bag. The dose of chloroform was, however, so little that death was ascribed to suffocation and not to intoxication with chloroform. We have seen a similar case where a man placed a plastic bag over his head and conducted coal gas into the bag. Since death was due to intoxication with coal gas the case was not included in the present investigation.

Perusal of the literature failed to reveal any report of a case in which a plastic bag had been used for the purpose of murder. In the above cases 3 and 4 the mother had evidently first given the children some sleeping powders and, after they had fallen asleep, placed plastic bags over their heads. It is not known in what way she gave the sleeping powders. The stomachs were found to contain bits of oranges but no particles resembling rests of tablets. It had obviously not been difficult to get the 19-year old youth to swallow the relatively large amounts of sedative that he must have taken. There is no reason to believe that the children had committed suicide. It cannot be excluded that the children had died from barbituric acid poisoning because the concentrations found were so high that they were probably lethal. Judging from the mother's farewell letter, however, she had placed the plastic bags over the children's heads as soon as they had fallen asleep, so that the cause of death was at any rate suffocation. Such cases are very difficult, because the cause of death cannot be revealed at post mortem examination, if the murderer has removed the plastic bag after the victim has died. As pointed out by HUNT and CAMPS and apparent from the cases described here evidence of asphyxia, i.e. small bleedings in the conjunctivae and under the serous membranes, are sometimes only slight or missing. Such small haemorrhages (seen after strangulation and often after hanging) are believed to be due not directly to the asphyxia but rather to the increased venous and capillary pressure caused by the physical strain due to the exertion necessary to overcome the obstruction, especially when there is simultaneous compression of the neck veins (HUNT and CAMPS).

Also the histological changes in these cases are unspecific and are confined to stasis, often with conspicuous pulmonary oedema. But such changes are seen also in subjects who have died from quite different causes. Analysis of a large series of cases where death was due to strangulation invariably showed marked pulmonary oedema with considerably increased weight of the lungs. The more striking changes described in less acute suffocation, e.g., necrosis of the cardiac and diaphragmatic musculature (AHLSTRÖM), vacuolar degeneration of the liver, cellular

changes in the brain (MUELLER), occur only when asphyxia is really prolonged. Not even in the experimental animal that survived 60 min were any changes of this type seen in the diaphragmatic or cardiac musculature, so that one can hardly expect to find any in human beings suffocated in a plastic bag, where death most probably occurs much sooner.

In all of the cases small drops of water were found on the inner surface of the bag. To ascertain the significance of these drops, plastic bags were placed over the heads of some subjects after death, before the body had become cold. Fine drops of water of the same type regularly appeared on the inner surface of the plastic bag. Such drops may thus not be regarded as evidence that the bag has been placed over the head before death.

Summary

Some deaths caused by suffocation in a plastic bag are described and certain aspects to be considered in the evaluation of these cases are discussed. It is stressed that these cases do not usually show marked signs of asphyxia, i.e., petechiae in the usual sites.

Zusammenfassung

Einige Todesfälle durch Erstickung im Plastikbeutel werden beschrieben und verschiedene Gesichtspunkte bei der Beurteilung dieser Fälle besprochen. Bei der Sektion sind meist keine ausgeprägten Anzeichen für Erstickungstod zu finden.

References

- AHLSTRÖM, C. G.: Experimentelle Untersuchung über Zwerchfellveränderungen bei langsamer Erstickung. *Dtsch. Z. ges. gerichtl. Med.* **35**, 105 (1941/42).
- CONLEY, B. E.: Danger of suffocation from plastic bags. *J. Amer. med. Ass.* **170**, 1667 (1959).
- DUMONT, G., J. PROTEAU, W. TABBARA et L. DEROBERT: Mort par asphyxie dans un sac en matière plastique au cours d'une masturbation. *Ann. Méd. lég.* **42**, 477 (1962).
- GORMSEN, H.: Nordisk Rättsmedicinsk Förenings Handlingar. Oslo 1965.
- HARBITZ, F.: Laerebok i Retsmedicin. Oslo 1935.
- HIRTH, L.: Suicid durch Erstickung im modifizierten Rückatmungsversuch. *Ärztl. Wschr.* **41**, 919 (1958).
- HUNT, A. C., and F. E. CAMPS: Plastic-bag suicide. *Brit. med. J.* **1962 I**, 378.
- JEFFREY, F. W.: Death from plastic films. *Canad. med. Ass. J.* **81**, 687 (1959).
- MUELLER, B.: Gerichtliche Medizin. Springer 1953.
- POLSON, C. J.: The essentials of forensic medicine. Oxford: Pergamon Press 1965.
- ZACHAU, B., u. J. JENSEN: Kvaelningsdödsfald hos børn i de første 3 leveår. *Ugeskr. Læg.* **123**, 1049 (1961).

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