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Unusual Form of Accidental Mechanical Asphyxia

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This brief case report shows an unusual form of accidental atypical strangulation. A 46-year-old male became trapped between the rims of an automatically closing door during his hopeless effort to enter a supermarket at night. The victim's neck was violently pressed by the edges of the automatic door. From external observation we found an incomplete ligature mark and numerous small abrasions in the neck. On autopsy we found typical signs of asphyxia and fractures of the hyoid-laryngeal complex and bruising of the soft tissues of the neck. The subsequent toxicology was negative with the exception of alcohol level. We came to the common conclusion of a double form of mechanical asphyxia – atypical violent strangulation and atypical hanging. The third highly likely contributory factor of death was direct stimulation of the baroreceptor nerve endings in the left carotid sinus and left carotid sheath. In recent literature, there have been presented only a few cases describing this manner of asphyxia and death.

Key words: Accidental asphyxia – strangulation – hanging

CASE REPORT

A 46-year-old man from Kazakhstan who lived in a refugee camp 40 km from the scene of death was found in the entrance hall of a supermarket pressed between the rims of an automatically closing door at 11:55 p.m. The rim of the door was violently and partly opened by the thief. During the opening of the locked door, the man inserted his right arm and head into the space between the door edges, and then the high pressure exerted by the door entrapped the above body parts. He had called for help, as a witness stated. The alarm was immediately activated. Acting alone, the witness was un-

Figure I. The original position of the deceased at the time of death before releasing. The compression of the neck by rims of the automatically closing is illustrated .



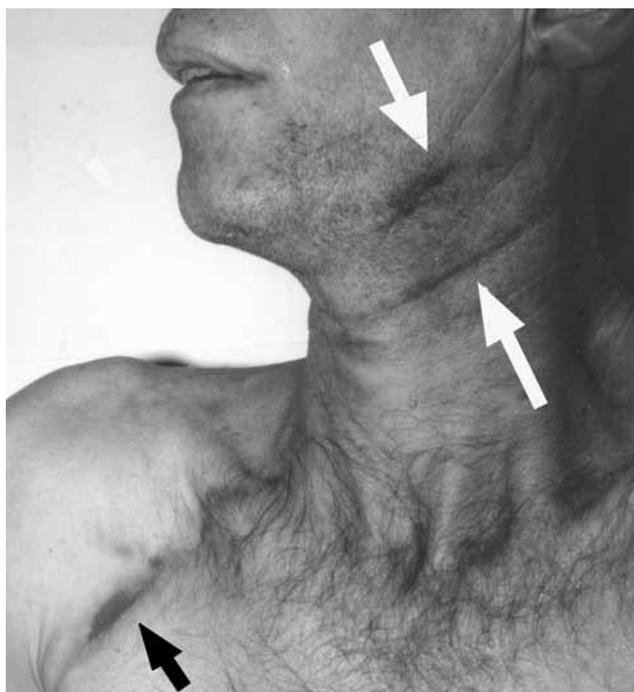
ble to rescue the man from the grasp of the door. The victim was still alive at this time, but when the police patrol reached the scene of the accident in five minutes, the man's neck was being gripped by the door very tight (Figure I.) and he showed no signs of life. The death had to come suddenly, because after the rapid release and opening of the

door, the resuscitation of the victim was ineffective and the doctor was only able to confirm his demise. Our head medicolegal examiner visited the scene of death at 1:00 a.m.; his conclusion was "violent traumatic strangulation due to the squeezing of vital neck structures by rims of the door" („garrote"). The general cause of death was – „mechanical asphyxia". There was no evidence of homicide and no evidence of the action of another person. The manner and the time lapsed since death was in accordance with the statement of the eyewitness.

AUTOPSY FINDINGS

The complete forensic autopsy was performed the following day, at 08:00 a.m. at the Department of Forensic Medicine. By external observation we found deep purple *livor mortis* over the dorsal side of the body with small hemorrhages in the region of the spots (*vibices*). The *rigor mortis* was detectable in all muscle groups. Frank congestion and cyanosis were evident on the face. The left conjunctiva was completely suffused, whilst the right conjunctiva was pale. There were violet bruises on the left ear and on the tip of the nose. Also, small bruises were observed on the knees. On the left side of the neck, we descri-

Figure II. Tram-like (parallel) abrasion on the left side of the neck and abrasions in the right clavicular region of a 46-year-old male (arrows), who was entrapped and pressed by the edges of the automatically closing door. Abrasions together constitute an incomplete ligature mark.



bed two parallel abrasions above the laryngeal prominence (incomplete ligature mark 20 x 10 mm a 50 x 5 mm, Figure II.). Over the right clavicular region, there was situated an interrupted rectangular abrasion (Figure II.). All abrasions were red-brown in color and showed a vital reaction. The mucosa of the lips and mouth did not show hemorrhagic infiltrates or lacerations. We did not identify any saliva thread or emission of semen at the scene of death or during autopsy. Similarly, we excluded engorgement of the corpora cavernosa of the penis.

During the internal observation of the body, we found blackish hemorrhagic infiltration in the left temporal pericranial tissues and small petechial hemorrhage under serous membranes of the lungs (*Tardieu's spots*). We found *Tardieu's spots* also in the subendocardial region at the base of the posterior wall of the heart. Other asphyxia-related internal findings were as follows: deep venostasis of the internal organs, general fluidity of blood, hemorrhagic edema of the lungs, an increased secretion in the trachea and edema of the brain. During the dissection of the neck we observed *Prinsloo-Gordon* bleeding behind the esophagus and trachea [7], a simple fracture of the left great horn of the hyoid bone with remarkable hemorrhage at the point of the fracture, and a fracture of the left superior horn of the thyroid cartilage with small hemorrhage in its surroundings. The internal examination of the neck also revealed two interesting findings – a small bruise in the clavicular insertion of the left *musculus sternocleidomastoideus* and hemorrhage in the soft tissues in the region of the bifurcation of the left carotid artery. Natural diseases or any other contributory or causative factors related to the death were excluded.

TOXICOLOGICAL AND BIOCHEMICAL INVESTIGATION

In the victim's blood we determined the alcohol level of 1.75 g/kg and in urine, the level of alcohol was found to be 2.82 g/kg (two independent methods were used to confirm the results). Other toxicological investigations of the blood, urine and vitreous fluid performed using routine methods were negative. We did not determine histamine or serotonin in the area of skin containing the ligature mark.

DISCUSSION

This case is interesting because of the probable combination of two basic mechanisms of external asphyxia – violent gripping or claspings of the neck by

an external force (no ligature was used, thus we do not apply the term “strangulation” or “strangling”; a more suitable term is “garrote”) and, secondly, after the loss of the muscle tonus, consequent atypical incomplete hanging in a semi-kneeling position. During the first stage of entrapment of the victim, only nonvital parts of the body were squeezed, such as the right shoulder and the left side of the head (hemorrhagic infiltration of the soft tissues in the left temporal region). At this moment, the victim was still able to call for help. At the second stage, due to the victim’s movements, restlessness and fear, the external pressure of the automatic door rims pressed further towards each other, applying an extremely strong force to the left part of the neck and to the right clavicular region, causing fatal consequences within seconds. The neck showed an incomplete ligature mark (the above-mentioned two parallel abrasions), external and internal observation revealed signs of mechanical asphyxia. The cause of death was a combination of ischemia of the brain due to compression of the carotid arteries, and obstruction of breathing thanks to obstruction of the larynx. The “atypical strangulation” and “atypical hanging” were proven by the typical lesions of the hyoid-laryngeal complex and soft tissues of the neck. We supposed that some form of vagal reflex was able to contribute to the death. The death of the victim had occurred suddenly and immediately within seconds of compression of the victim’s neck and owing to this reason, we presumed a contributory “reflexive mode of death” – stimulation of the baroreceptor nerve endings in the left carotid sinus and left carotid sheath. The presence of the other traumatic lesions (abrasions and bruises) in the face, trunk and legs may be explained by the victim’s effort to rescue himself from the entrapment of the automatically closing door. If the causative dominant fatal factor was “atypical strangling”, “hanging” or “reflexive death”, we were unable to determine and confirm the fact by means of medicolegal autopsy. In our archives there is present only one similar case, when the victim ran into a two-branch bifurcation of a tree whilst running, thus the death had occurred due to the combination of “atypical strangling” and “hanging”, as in the above-described case.

CONCLUSION

To the best of our knowledge, in recent medicolegal literature, only few similar cases of “atypical mechanical asphyxia” have been reported [1; 3; 4-6; 9]. Our case was unusual thanks to the combination of “external asphyxia” and probable “reflexive mode of death”. At the same time, we would like to warn

of the real danger from violent entrapment of some vital part of the human body by the rims of an automatically closing door anywhere [4].

ACKNOWLEDGEMENTS

We would like to express our gratitude to Charles Pirsell (from Canada) for final correction of the text.

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This article has never been published anywhere. This case was only presented on The Postgraduate Meeting in Forensic Pathology (Prag, 2005). Second revised version with figures.

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