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Unusual head and neck injury in elevator: autopsy study

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SUMMARY
Industrial injuries related to auto-load-carrying vehicles were not frequently reported in the literature. Presented case was, 31-year-old male furniture worker. Deceased was found in awkward position in furniture workshop. Victim was observed on his knees in front of the elevator, head and neck lodged within openings of the elevator, and head and neck structures compressed-guillotined by the lower platform of the elevator were detected. We presented rare case of head and neck compression by elevator.

Key words: head – neck – accidents – elevator – autopsy

Neobvyklé poranění hlavy a krku ve výtahu

SOUHRN
Průmyslová poranění spřízněná s úrazy dopravními prostředky nebyla v literatuře často zmiňována. Prezentován případ 31-letého muže, pracovníka s nábytkem. Zemřelý byl objeven v atypické pozici v dílně s nábytkem. Oběť byla nalezena na kolenou, čelem do výtahu, hlava a krk byly mezi dveřmi uvnitř výtahu, struktury hlavy a krku byly smáčknuty a odděleny jako gilotinou dolní deskou zdviže. Byl prezentován případ komprese hlavy a krku výtahem.

Klíčová slova: hlava – krk – nehody – výtah – pitva

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Industrial injuries related to auto-load-carrying vehicles such as elevators, despite were interesting cases, small numbers of cases have been reported in the literature (1–6). In the cases of head and neck compression, injuries were often identified in the upper part of skull. Skull base fractures, cervical spine, spinal cord injury, subarachnoid hemorrhages, contusions of the brain were reported to occur in the literature (7,8). In the presented case the force causing the head and neck compression was distinctly determined by the autopsy and crime scene investigation.

CASE REPORT

Victim who was found dead in workplace was 170 cm tall, 75 kg in weight, 31-year-old male furniture worker. Crime scene investigation documents exposed that the victim was found in awkward position in furniture workshop by his colleagues. Deceased was found on his knees in front of elevator with closed doors, head and neck lodged within openings of the the empty glass screen of the elevator, hands based on the elevator door were inspected (Figure 1), head and neck structures compressed-guillotined by the lower platform of the elevator were detected (Figure 2). After crime scene investigation autopsy was ordered by prosecutor. On autopsy, macroscopic external examination presented deformation of the lower jaw, crepitus on palpation, 4 cm in diameter ecchymosis on mentum, 17x12 cm wide ecchymosis on the anterior of the neck, initiating bilateral from the ramus of the mandible, continuing circumferentially to the back of the neck area with laceration of cervical C1 vertebrae and spinal cord were detected, injured posterior fossa structures of the skull, wide brain and cerebellum tissue defect were observed (Figure 3). Posterior fossa skull bone defect measured 13x11x8 cm, laceration of the brain stem at cerebellopontine angle, widespread subarachnoid hemorrhage, cervical C 1, C 2 vertebrae fracture and widespread damage of the spinal cord were determined on dissection. Histopatological microscopic investigation revealed, subarachnoid-intraparenchymal hemorrhage, contusion of central nervous system. After analysis of blood, urine and organ samples with systematic toxicological investigation methods none of the substances screened for were detected. Death was reported as head and neck trauma by elevator compression.

DISCUSSION

Industrial injuries related to auto-load-carrying vehicles such as elevators, despite were interesting cases in terms different branches of medicine, small numbers of deaths have been reported as the subjects of scientific publications (1–6). Examination of different aspects of the security issues of load-carrying vehicles which are indispensable facilities for modern times, provides a significant contributions in term of industrial and environmental safety (1,2,3,4,9).

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Figure 1. Head and neck lodged within openings of the elevator.



Figure 2. Head and neck structures compressed by the elevator platform.



Figure 3. Injured head and neck structures.

Investigators from United States detected 17,000 serious accident per year in the study regarding the deaths and injuries involving elevators and escalators, besides half of the deaths were associated with persons working in the vicinity of the elevators and escalators (2). Among load carrying vehicles related deaths, falling down from an open elevator shaft was the frequently reported reason, other commonly seen cases were collapses, crashes and electrocutions (2,5). Between the presented cases in the literature, accidental hanging in the elevator (3), mechanical neck compression by hydraulic lift (4) and traumatic asphyxia due to compression of garbage container in elevator (6) were available as interesting reports. Similar to the presented case accidental in origin deaths consist the great part of the cases (1,3,6), on the other hand suicides were also reported (4). Compression between elevator platform and the elevator doors different from the presented case was investigated in repairman (2), predominantly extremity injuries were determined, whereas head and neck portion traumas were rarely reported to occur (1,2). Relationship between head traumas and upper cervical injuries have not been exposed in detail in the medical literature (7). Besides a high neurological deficit risks, researchers claimed high death rates in injuries of occipitocervical region (8). Approximately in the one third of patients with traumatic injury of the upper cervical vertebrae, it was also noted severe head trauma (7). Authors stressed that similar to the reported case, patients with upper cervical injury appeared to develop an extra risk of suffering skull base fractures, traumatic subarachnoid hemorrhage, and contusional brain haemotoma (7,8). Especially in terms of industrial engineering, particularly important for the improvement of security systems of automatic load-carrying vehicles, the use of qualified personnel, regular checking of electrical and other systems of elevators was stated to be important in reducing risks working environment (1,2,9). On the other aspect mechanical and technical investigations are stated as necessary to be performed in concert with crime scene investigation and autopsy (5,9).

Fatal elevator accidents are of great importance from medico legal aspects, besides are also significant for evaluation of working conditions, working tools and determination of preventable work-related accidents.

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