

CASE REPORT

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Unusual explanation for the death of a car passenger

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Abstract After collision of a car with the left rearside against a steel mast the 19-year-old front seat passenger was found comatose on the seat. CT imaging showed a depression fracture parietal on the left with an intracerebral haemorrhage on the opposite side. The cause of the injury was unknown to the surgeons at the time of operation. Despite neurosurgical intervention the patient died 24 h after the accident. The post-mortem showed an additional depression fracture at the base of the skull in the right temporal region arousing suspicion of an impalement injury. Only inspection of the car by the forensic pathologists revealed the gas pressure telescopic shock absorber to be the cause of the head injury.

Key words Traffic accident · Head injury · Impalement · Gas pressure telescopic shock absorber

Introduction

Head injuries in traffic accidents are frequent and the different mechanisms for their occurrence have been described. Case histories of impalement injuries of the head due to a traffic accident, however, are rare [1, 4, 6, 7, 8]. At the Institute of Forensic Medicine at the Martin Luther University Halle-Wittenberg two cases of such a mechanism of injury have been observed within a short time.

In the first case, a cyclist rode into thin iron rods which projected from the load of a vehicle. These rods pierced the face and penetrated into the brain. Astonishingly the man was still able to react. He was able to move some me-

ters and asked for help. When he died shortly afterwards, the entry site of the deep impalement injury was not recognized as such.

The second case is evident from the following case history.

Case report

A car overtook three other vehicles at a speed of about 100 km/h in the inner city. The car became unstable, rotated in a clockwise direction about its vertical axis and crashed with the left rear against a steel mast. Thereby, the rear of the car was massively compressed and deformed. The car driver suffered only from slight abrasions and was conscious and responsive. The front seat passenger, however, remained unconscious (Glasgow coma scale: 3 points). Both persons had been fastened by waist belts. The emergency doctor found a defect of the skin at the back of the head on the left with emerging brain pulp. The patient having a stable circulatory system, was taken to the neurosurgical clinic. In connec-



Fig. 1 CT imaging of an intracerebral haemorrhage temporo-parietal on the right

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tion with the head injury the CT imaging showed a depression fracture parietal on the left and an intracerebral haemorrhage on the opposite side temporal-parietal on the right (Fig. 1). The volume of the haemorrhage was only about 25 ml. An operation was indicated to care for the large laceration with leaking brain pulp. The depressed bone fragments were removed. From the depth a coagulated haematoma issued which was also removed by suction. Peculiarly there was severe bleeding from the depth of the right hemisphere, which could not be related to the accident mechanism and the isolated depression fracture on the left. During the following hours the comatose state remained unchanged and brain death was diagnosed finally.

At the autopsy a funnel-shaped tract of about 13 cm in length and up to 4 cm wide with brain tissue debris was discovered. This tract began at the depression fracture and continued from the left posterior parietal brain diagonally downwards via the middle line up to the right temporal pole. At the end of this channel the leptomeninges, the dura mater and also the sinus sigmoideus were torn. The tract terminated at the opposite base of skull (Os temporale on the right) in a round depression of about 1.3 cm in diameter and 4 mm in depth and a fracture line running in frontal direction (Fig. 2). The autopsy established an isolated impalement injury 13 cm in depth, but at first there was no explanation for this injury by the accident mechanism and the situation inside the car. In order to clarify the injury mechanism, the forensic pathologists inspected the car. It was found that at the left tailgate support, a gas pressure telescopic shock absorber was torn off and bent inside the car in the direction of the front seat passenger. This telescopic shock absorber showed blood and tissue traces over a length of 12 cm. The point of impact showed a deformed spiral thread piece with a di-



Fig. 2 Depression fracture at the base of the skull in the right temporal region

ameter of about 1.2 cm. Because of both the position and measurements inside the car the torn-off shock absorber was thus identified as the part which had caused the depression fracture and the injury to both brain halves and also another depression fracture to the base of the skull on the right-hand side.

Discussion

Impalement injuries in road traffic accidents occur rarely and in most cases the thorax is affected by the impact of vehicle loads moving forwards [3, 5, 9]. Wojahn [11] reported a fatal injury of the chest by a gear lever fitted to the steering wheel. Although only a circular wound of about 8 mm in diameter could be seen externally, the patient died shortly after admission to hospital. Post mortem examination showed an injury where the left lung and the aorta were penetrated.

Cranial impalement injuries are rare in general. Evans and Richmond [2] reported the death of a 29-year-old man who fell from a ladder holding a screwdriver with his teeth while working. They stressed the value of a complete postmortem examination. Although the fall was witnessed and the man received surgical treatment, the cause of death was only discovered at autopsy.

Watson and Goldstein [10] described the case of a 35-year-old man who was assaulted with a 3-wood golf club over 2 h. The head of the club broke off, making the shaft a sharp object and penetrated the face.

Despite the high percentage of head injuries in traffic accidents there are only a few case histories of impalement injuries to the head in road traffic [1, 4, 6, 7, 8]. Ahmad [1] reported a fatal injury of a young man, whose vehicle drifted off the road due to his alcohol consumption. A broken pole pierced the skull above the left eye cavity and penetrated the cerebellum up to the brain stem.

Gögler [4] reported a case where the knob of the gear stick (about 6 cm) pierced the skull. These fatal impalement injuries of the head of car passengers have been observed mainly all due to frontal impact as a result of the unprotected projecting parts of the car (e.g. the gear stick). These mainly took place in the 1960s.

The interior of the car in modern vehicle construction has been improved which has resulted in more safety (e.g. in the course of a skid). However, in the individual cases we must not ignore serious impalement injuries to the head which at first sight are not obvious. The ability to react may exist and after quick and effective treatment even seemingly hopeless cases may be recovered in depending on the localisation of cranial impalement injuries. Survived impalement injuries of the skull e.g. by a metal rod from the back compartment of the car, by a rail fence and a garden rake have been reported [6–8].

In our case, by the impact of the car rear after skidding the telescopic shock absorber of the tailgate support had been broken off bent inwards and penetrated the skull at a length of at least 13 cm. Because of the counter-movement of the body produced by inertia at the end of the skid movement this part of the car was obviously pulled out of the head again. Thus an open skull-brain trauma with

emerging brain pulp and impression fracture on the left parietal was apparent at first sight. The cause of the bleeding from the depth of the right temporal flap could not be found. Only inspection of the car by the forensic pathologists revealed the gas pressure telescopic shock absorber as the cause of the head injury.

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