Medicinsko izvedenstvo pri poškodbah vratne hrbtenice

Medical expertise in cervical spinal injuries

Avtor / Author

Peter Kadiš[1,2]

Ustanova / Institute

[1]Splošna bolnišnica Slovenj Gradec, Oddelek za travmatologijo in ortopedijo, Slovenj Gradec, Slovenija; [2]Univerza v Mariboru, Medicinska fakulteta, Maribor, Slovenija

[1]General hospital Slovenj Gradec, Department of Traumatology and Orthopaedics, Slovenj Gradec, Slovenia; [2]University of Maribor, Faculty of Medicine, Maribor, Slovenija

Ključne besede:
Poškodbe, vratna hrbtenica, prometne nesreče, izvedensko mnenje

Key words:
Injuries, cervical spine, traffic accidents, expert opinion

Članek prispel / Received
09.02.2016
Članek sprejet / Accepted
25.04.2016

Naslov za dopisovanje / Correspondence
Dr. Peter Kadiš,
dr. med., spec. sodne medicine,
spec. splošne kirurgije,
Splošna bolnišnica Slovenj Gradec,
Gosposvetska 1, 2380 Slovenj Gradec
E–pošta: peter.kadis@siol.net

Izvleček

Poškodbe vratne hrbtenice so ene najpogostejših poškodb pri udeležencih v prometnih nesrečah in zato pogosto predmet obravnave na sodiščih v kazenskih in pravdnih postopkih. Za izdelavo izvedenskega mnenja o poškodbah vratne hrbtenice je potrebno v prvi vrsti pridobiti celotno poškodovančevo zdravstveno dokumentacijo vključno z originalnimi rentgenskimi posnetki in izvidi drugih preiskav, pri trajnih posledicah poškodb ali predhodnih okvarah vratne hrbtenice pa opraviti tudi zdravniški pregled poškodovanca. Še posebej pri blagih oblikah nihajne poškodbe vratne hrbtenice je zelo pomembno pridobiti tudi ustrezne podatke o mehanizmu poškodovanja in biomehaničnih parametrih, ki jih za prometne nesreče lahko poda strokovnjak tehnične stroke s področja raziskave prometnih nesreč.

Abstract

Cervical spinal injury is one of the most frequent injuries in traffic accidents and is therefore often dealt with in the courts in criminal and civil proceedings. To form an expert opinion on cervical spinal injuries, it is, primarily, necessary to acquire complete medical records of the injured person, including original X-ray images and other test results. To determine the permanent consequences of injuries or previous cervical spinal impairment, it is necessary for the injured person to undergo a medical examination. Especially in mild cases of whiplash injury, it is necessary to acquire appropriate data on the mechanism of injury and biomechanical parameters which, for traffic accidents, can be obtained from experts in the field of traffic accident research.

INTRODUCTION

Cervical spinal injuries are frequent, especially in road traffic accidents. Therefore, such injuries are frequently the subject of court proceedings and involve the work of medical expert witnesses, because they are a sign of traffic accident being caused by negligence. Technological advances in the manufacture of motor vehicles, with an emphasis on safety and protection of drivers and passengers from injuries in accidents, mean that cervical spinal injuries are becoming milder and the usual diagnoses are: neck muscle strain, neck tension or cervical spinal sprain. These injuries are undemanding in terms of treatment. However, they are demanding for estimation of the severity of bodily injury, the causal link between the traffic accident and the injury, and temporary and permanent health consequences for the injured, and forming an expert opinion. In mild cases of whiplash injury we do not have an appropriate objective basis to support the expert opinion. Therefore, health problems are predominantly of a subjective nature and unverifiable by clinical examination and imaging techniques. More severe cervical spinal injuries (e.g. vertebral dislocation, vertebral fracture, spinal cord injury, or injury of other neural structures) are usually well-defined by imaging and other examinations. They are clearly evident from the course of treatment, potential permanent consequences are tangible, and it is possible to confirm them objectively. (1, 2) In milder forms of whiplash injury, we cannot always objectively confirm the occurrence of injury and any health consequences; therefore, we must try and determine the mechanism of injury. In this regard, expert witnesses with research expertise in traffic accidents are of great help. They can determine the direction of bodily movement of the injured person at the time of the traffic accident; the direction of force applied to the injured person; the change in velocity of the vehicle in which the injured person was travelling; and the effect of impact acceleration (usually expressed according to g value). These findings best define the probability of cervical spinal injuries occurring. (3, 4)

Medical experts do their work in criminal proceedings as well as in civil and other proceedings in accordance with the provisions of Paragraph 1 of Article 264 of the Criminal Procedure Act. These provisions state that, in bodily injuries, experts do their work in such way that they examine the injured person, and if that is not possible or needed, the injured person is examined on the basis of medical documentation or other filed data. (5) The work of an expert witness regarding bodily injuries is usually done after treatment of the injury is complete. Therefore, medical examination of the injured person is not very revealing, especially in those with minor injuries that have healed without permanent consequences. However, medical examination is necessary in cases of permanent consequences and when the injured person has a pre-existing impairment in the cervical spine or neck. Expert opinions are based on appropriate data about a traffic accident and the physical injuries of the injured person. These data are most frequently acquired from case files and medical records. while the opinion is being made, only necessary to be acquired from a personal physician of the injured and other healthcare facilities where the injured has been treated due to traffic accident injuries. In minor forms of whiplash neck injury in traffic accidents, it is necessary to obtain the opinion of an expert witness with research expertise in traffic accidents. (3)

Case file data

To form their expert opinion, expert witnesses review case files to acquire information about an event and the alleged manner in which the bodily injury occurred. From case files, experts can also acquire information on the place and time that the injured person sought medical help (e.g. in criminal matters, from a physical injury notification). It is appropriate for the court to gather all the necessary medical records before ordering the work of an expert witness. If that is not possible, the court should obtain as accurate data as possible about the healthcare facilities where the injured person was treated, and data aboutthe personal physician of the injured person, which facilitates acquisition of all necessary medical records by the expert witness. It is necessary to emphasise that, in such a case, the court is, by an order or decision of the court, obliged to authorise an expert for the ac-

quisition of medical records. Upon hearing from the injured person in court, an expert can determine any health difficulties that the injured person had when the injury occurred and potential permanent consequences of the injury. This is important in forming expert opinion in civil litigation (restitution) cases. In cases of injury in traffic accidents, it is necessary, before ordering the work of a medical expert witness, to acquire appropriate expert opinion from an expert in traffic accident research.

Medical records

It is the duty of every medical expert witness in estimating bodily injuries to acquire complete existing medical records in connection with the traffic accident injury, in case such records are not already included in a submitted case file. A prerequisite for an expert to acquire such records is the appropriate authorisation of a court order or court decision to appoint an expert. The court should as accurately as possible state which medical records an expert should obtain and from which providers of healthcare services. If a case file does not contain adequate data on place of treatment of the injury, an expert is compelled to obtain such data directly from the injured person, although one should be aware that such data could be incomplete or even misleading in favour of the injured person. Medical records of cervical spinal injuries generally cover medical reports of outpatient examinations, and records of hospital treatment and diagnostic testing.

An expert has no influence on the quality of data in medical records and on the scope of completed medical examinations, because an expert opinion is formed after treatment is completed. For qualitative and objective work of an expert witness to be as accurate as possible, anamnestic data are indispensable (statements of the injured on his/her health problems). Physician's findings from clinical examination of the injured person and appropriate scope of diagnostic imaging and other procedures are indispensable. Among anamnestic data, especially significant pieces of information are current health difficulties upon seeking medical help, manner and time of injury, time of beginning of health problems after injury and their development until consulting a physician, data on potential prior similar injuries, and data on potential prior health difficulties with the cervical spine. (2, 6) Upon medical examination, physicians should record in medical reports any findings regarding potential visible signs of injury that are rare in cervical spinal injuries, and mostly limited to pain in head and neck posture, tenderness to the touch, decreased range of motion of the cervical spine, tension of erector spinae muscles and other neck muscles, and neurological deficits in the limbs. (1, 6) It is necessary to emphasise that stated medical findings are not entirely objective, because they are dependent on cooperation of the injured person and experience of the physician in treatment of cervical spinal injuries. This is especially true for pain and tenderness to touch and movement, decreased range of motion, muscle tension and neurological deficits. Therefore, it is necessary to evaluate them in the context of other findings when making an expert opinion. According to existing guidelines for the treatment of cervical spinal injuries, it is necessary to perform basic radiographic examinations of the cervical spine, including plain radiography of the entire cervical spine in two projections and targeted open mouth odontoid view. With the persistence of difficulties, it is necessary to carry out functional studies of the cervical spine during forward and backward bending of the head and other specialised studies of the cervical spine. (7) In suspected cases of severe cervical spinal injuries or uncertainties in plain radiographic studies, it is necessary to perform computed tomography of the neck and upper thoracic spine. In suspected spinal cord injury or severe soft tissue injury, magnetic resonance imaging of the cervical spine is also necessary. Upon evident neurological impairment of the lower or upper limbs during treatment of cervical spinal injury, electromyography of the upper or lower extremities is done, to determine the extent of impairment of individual nerve structures. (6) To form an expert opinion, all medical reports of diagnostic imaging procedures must be directly reviewed by an expert, who must verify the accuracy and objectivity of the diagnoses made during treatment.

Examination of the injured person

Medical examination of minor cervical spinal injuries that heal without any permanent consequences, and are entirely healed by the time of forming an expert opinion, is of limited value, because it is not possible to obtain additional information that could be useful in making an expert opinion. However, medical examination is urgently needed in all cases in which treatment is not finished. It could be that either the injury left permanent consequences on health condition of the injured or also in such cases when there have existed prior chronical health difficulties with cervical spine in the injured and it is their delimitation of health difficulties connected to the current injury .

In such cases, the injured person undergoes clinical examination in accordance with the rule that it is necessary to clearly distinguish in a medical report between objective findings of an examination and health difficulties that are stated by the injured person. During such examination, there is an occasional need for additional procedures to which the person under examination must agree. A court must give prior approval for such procedures because they incur some expenses and there is also a risk to the person under investigation.

Objectification of bodily injury

The basic question that an expert must answer in assessing bodily injuries is whether the injured person has suffered an injury and what kind of injury it is. In cervical spinal injuries, on the basis of complete medical records, expert witnesses generally do not have major difficulties in the objectification and estimation of the severity of injuries, such as fractured vertebrae and cervical vertebrae dislocation, ligament injury with spinal instability, obvious spinal cord injuries, and injury to other neural structures. Considerable difficulties occur in evaluation of milder forms of whiplash injury, which are defined in medical records as neck muscle strain (distensio) or distorsio of the cervical spine. The stated injuries are expressed predominantly as subjective health difficulties by an injured person, and it is impossible to objectify them without a completed clinical examination and additional tests. Upon medical examination, the injured person usually reports tingling in the upper limbs, neck and occiput and neck stiffness; they may also report that the cervical spine, back muscles and head motion are tender to the touch. Also tension (spasm) of back and other muscles in the cervical area and upper part of the spine can be determined. Movements of the neck can be reduced by pain and the sense of touch can be disrupted in the upper limbs (sensibility deficits). (2) The stated findings upon clinical examination are also not entirely objective. Cooperation of the examinee is necessary, which is not always guaranteed for various reasons; mostly aspiration of financial compensation, and appropriate experience of the physician and accuracy upon examination are needed. Radiological diagnostic procedures and other imaging techniques in cervical spinal injuries generally do not show alterations, and mostly describe straightening of the natural curvature of the cervical spine (lordotic straightening), which is a non-specific sign of injury. Treatment that is prescribed for minor cervical spinal injuries is exclusively symptomatic and directed towards reducing health difficulties (e.g. rest, analgesic drugs, pain relief with physical therapy, and occasionally Schantz collar), over which it is impossible to have appropriate control. The injured may or may not comply with treatment, but above all, it is not especially burdensome for them, and this is one reason why it is not possible to make a conclusion about the severity of bodily injury on the basis of prescribed treatment. (2) Some criteria have been developed worldwide for evaluating the extent of whiplash injury of the cervical spine, on the basis of expression and time of occurrence of described subjective or semi-subjective health problems. The best known criteria are the Quebec Classification, which divides degrees of injury into five categories (WAD 0–IV), and Erdman Classification of injuries, which includes three degrees of severity. However, these classification schemes cannot confirm with certainty the existence of minor whiplash cervical spinal injury. (8, 9)

Diagnosis of minor whiplash injury of the cervical spine cannot be confirmed with certainty and one

cannot objectively estimate the effects of such an injury. Therefore, biomechanical analysis of cervical spinal injury is included when such injuries are evaluated, especially in traffic accidents where mostly minor forms of whiplash injury occur. With biomechanical analysis, it is necessary to determine the mechanism of injury and establish whether it was caused by sudden movement of the head and neck, and to determine the amount of force applied to the cervical spine. (10) In dealing with traffic accidents, the most appropriate predictive factors for the occurrence of cervical spinal injury are the change in velocity of a vehicle upon impact and acceleration forces on the body of the injured person. The direction of the acceleration forces and body motion of the injured person in the vehicle during collision is also important. (4, 11) All these data can only be calculated by expert technical analysis of a traffic accident. This is why an expert technical opinion of all whiplash injuries is a necessary precondition for forming a full medical expertise of bodily injuries.

Cases from practice

Case 1

The injured AA participated in a traffic accident as a driver of private vehicle in collision with another vehicle from the rear. Upon examination by a surgeon on the next day, the injured person reported pains in the neck, which started ~6 hours after the accident, and tingling in both upper limbs. Movements of the neck was inhibited by half of the normal range of motion in all directions; back and neck muscles were severely strained; but in physical neurological examination, there were no particular abnormalities. X-ray of the cervical spine revealed lordotic straightening, although there were no other particular abnormalities. A diagnosis of cervical spinal distorsion was made and soft Schantz collar, and symptomatic treatment and physiotherapy were prescribed. Health difficulties persisted for ~6 weeks, during which time, the injured person underwent two follow-up visits with a surgeon and five examinations with a personal physician.

In civil proceedings for compensation, an expert opinion from an expert in research of traffic accidents was obtained. It was found that there was a minor collision between the participating vehicles, if such a collision even occurred at all. The change in velocity of the vehicle of the injured person was a maximum of 4.2 km/h and medium acceleration at a maximum of 1 g. Upon collision, minor superficial damage to the car bumper of the vehicle of the injured person may have occurred, but other visible damage on the vehicle did not result from the traffic accident.

Review of the personal medical record of the injured person showed that he was involved in seven traffic accidents in the last 3 years and minor cervical spinal injuries were always established (strain of neck muscles, cervical spinal sprain).

Case 2

BB was involved in a traffic accident as a driver of a private vehicle in collision with another vehicle that came from behind. Upon examination by a surgeon on the next day, BB reported neck pains that began ~2 hours after the accident. Movements of the neck was slightly inhibited in extreme positions; tenderness of the spinous process of the cervical vertebra was present and back muscles were painful; but neurological deficits were not determined. X-ray of the cervical spine revealed lordotic straightening, but there were no other particular abnormalities. A diagnosis of neck muscle strain was made (distensio musculorum colli) and symptomatic treatment was prescribed. Health difficulties persisted for 3 weeks, and BB was examined twice by a personal physician.

From the data in the court record, it was evident that the traffic accident was a collision between a freight vehicle running into the back of the standing private vehicle of the injured person in front of an intersection. There was damage (deformation) to the entire rear end of the stationary vehicle and the driver's seat backrest was broken. An expert in traffic accidents gave the opinion that the impact speed of the freight vehicle was ~35 km/h, but other parameters (change in velocity, acceleration effect) were not given.

DISCUSSION

From the above cases, it is evident that both people were injured in traffic accidents as drivers of private vehicles upon rear-ended collision with another vehicle. Upon examination by a surgeon on the day after the accident, they reported subjective health difficulties associated with the cervical spine. They described a limited range of neck motion and tense and painful back muscles, which were not entirely objective findings, because they depended on cooperation of the examinee. X-ray examinations showed only lordotic straightening, which is not a specific sign of cervical spinal injury. On the basis of the examination findings, two diagnoses were made of minor whiplash injuries and appropriate treatment was prescribed to reduce the health difficulties of the injured people. According to present health difficulties, the injury in the first case seemed worse than in the second case. On the basis of such subjective and semi-subjective health problems it is, from a medical viewpoint, impossible to confirm with certainty cervical spinal injury and objectively evaluate health problems of the injured person. However, there is an urgent need to obtain additional data on the mechanics of the traffic accident and the forces exerted on the body of the injured person, which requires the cooperation of an expert in road traffic research. On the basis of the opinions obtained, it was possible to conclude that the injured person in the first case could not have experienced significant whiplash injuries, especially not with such pronounced and prolongated health problems. (12) With great probability, it is possible to conclude that the health problems were simulated because of a compensation claim, which was confirmed by the number of similar traffic accidents and health problems in the last 3 years. The impact force in the collision that affected the injured person in the second case was obviously greater, which may have resulted in whiplash injury. The health problems reported by the injured person in the second case were realistic in intensity as well as duration. This is why the described minor form of whiplash injury could be confirmed with high probability, as could the accompanying health problems.

CONCLUSION

The two cases from practice clearly show that, for expert opinion on the estimation of bodily injuries in all cases of minor forms of whiplash injury, it is necessary to obtain, besides adequate data from medical records of the injured person, appropriate data on the mechanism of the traffic accident. It is also necessary for a technical expert to study the biomechanics of the injury, because only those data can facilitate objectification of health problems of the injured person, and formation of an objective expert opinion. Experts must be aware that they are only assistants of the court and should present the dilemmas and limitations in forming their expert opinion about the presence and severity of injury. They should leave the court to deliver a verdict. It is inappropriate for the court to force an expert into making factual statements when this is not possible due to lack of objective facts and not to ignorance of the expert. In such a case, the dilemma cannot be resolved by bringing in another expert in the same profession, because he/she will have the same problems or limitations in forming an expert opinion.

REFERENCES

1. Kehler U, Arnold H. Verletzungen der Halswirbelsaule. In: Durst J, ed. Traumatologische praxis. Sttutgart – New York: Schattauer; 1997. p. 259-62.
2. Herman S, Triller K. Problematika nihajnih poškodb vratne hrbtenice. In: Komadina R, Strahovnik A, ed. Zbornik izbranih predavanj simpozija o poškodbah in okvarah hrbtenice. 5. Celjski dnevi; 2005 april 8.-9.; Celje, Slovenija. Služba za raziskovalno delo in izobraževanje Splošna bolnišnica Celja, učna bolnišnica MF v Ljubljani, Društvo travmatologov Slovenije, Združenje ortopedov SZD, Združenje za fizikalno in rehabilitacijsko medicino SZD; 2005.
3. Prestar J, Wildförster U. Zur gutachterlichen Problematik beim HWS-Schleudertrauma. Chir.praxis. 2003; 61: 493-504.
4. Dehner C, Kramer M, Hartwig E, Elbel M, Kinzl L. Is Delta-V a good parameter to describe the risk of cervical spine injuries due to whiplash?. 6th European trauma Congress, 2004 Praga, Czech republik.
5. Zakon o kazenskem postopku. Ur. l. 63/1994. Ur. l. 32/2007.
6. Mirza SK, Bellabarba C, Chapman JR. Principles in spine trauma care. In: Bucholz RW, Heckman JD, Court-Brown CM, ed.. Rockwood and Green's fractures in adults. Philadelphia: Lippincott Williams & Wilkins; 2006. p. 1401-34.
7. Komadina R, ed. Zbornik izbranih predavanj simpozija o nihajnih poškodbah vratne hrbtenice. Celje: Služba za raziskovalno delo in izobraževanje Splošne in učne bolnišnice Celja, Društvo travmatologov Slovenije, Ortopedsko združenje SZD; 1998.
8. Spitzer WO, Skovron ML, Salmi Lr, Cassidy JD, Duranceau J, Suissa S et al. Scientific monograph of the Quebeck Task Force on whiplash-associated disorders: redefining "whiplash" and its managment. Department of Epidemiology and Biostatistics, McGill University, Montreal, Quebeck Canada. Spine 1995; 20 (8 Suppl): 1s-74s.
9. Erdmann H. Versicherungsrechtliche Bewertungen des Schleudertraumas. In: Hohmann, Kuegellgen, Liebig, Schirmer ed. Neuroortopaedie 1. Berlin- Heidelberg-New York: Springer, 1983.
10. Pike JA ed. Neck Injury Biomechanics. SAE International, Warrendale US; 2009.
11. Castro WH, Schilgen M, Meyer S, Weber M, Peuker C, Wortler K. Do "whiplash injuries" occur in low-speed rear impacts?. Eur Spine J. 1997; 6: 366-75.
12. Burg H, Moser A. Handbuch Verkehrsunfallrekonstruktion Unfallaufnahme, Fahrdynmik, Simulation. Springer – Vieweg Verlag; 2009.