실사고 Ⅰ

정면충돌에서 착좌이탈자세 탑승자 외상성 뇌손상 위험 분석

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Risk Factors Affecting the Presence of Traumatic Brain Injury in Motor Vehicle Occupants Engaged with Out-of-Positioned in Frontal Crashes

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Key Words : Traumatic brain injury(외상성 뇌손상), Motor vehicle occupants(탑승자 교통사고), Frontal crashes(정면충돌), Unrestrained(벨트미착용), Out-of-position(착좌자세이탈), Korea in-depth accident study(한국형 자동차사고 인체상해 자료구축)

ABSTRACT

The purpose of this study is to analyze the risk factor for TBI occurrence in frontal crashes. This is a retrospective observational study based on Korea In-Depth Accident Study (KIDAS) database. The data were collected from January 2011 to October 2021 who visited the trauma center located in four different sites. We selected 1,374 adult patients (driver and passenger) aged 18 years old or older which engaged in frontal Among the total patient data, the incidence of non-TBI (n=808, 56.4%) patients was approximately 1.3 times higher than TBI patients (n=625, 43.6%). The risk of TBI was about twice higher in male (n=412, 67.7%) compared to female patients (n=197, 32.2%), which showed a statistically significant difference (P=.023). According to the different seating positions, the driver (n=482, 79.1%) had a 4 times higher probability of TBI than the passenger (n=127, 20.9%). The windshield Impact against occupants' head region was numbered as 14.1% (n=194) in frontal crashes. In addition, the probability of occurrence of TBI in the occupants who collided with the windshield was nearly 2.5 times higher in the belted occupants compared to unbelted occupants (p <.001). A logistic regression analysis was performed on the risk of TBI injury. Compared to passengers wearing only belts, unbelted with airbag deployed (OR:1.435, 95% CI: 1.009-2.041), belted with airbag deployed (OR: 1.715, 95% CI: 1.315-2.237), and unbelted with no airbags (OR: 1.395, 95% CI:1.022-1.904) showed a higher TBI risk. On the other hand, the risk of the passenger seat occupant was lower than that of the driver (OR: 0.766, 95% CI: 0.592-0.993). Also, it was confirmed that the risk of TBI increases when it collides with the windshield (OR: 1.545, 95% CI: 1.114-2.141). The result presents that the major cause of TBI risks in motor vehicle collisions was occurred by windshield impact in unbelted drivers.

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벨트 미착용 탑승자 정면충돌사고에서 정면 에어백 전개의 따른 흉부상해 분석

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Analysis of Thoracic Injuries Due to Frontal Airbag Deployment in a Frontal Collision of Unrestrained Occupants

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Key Words : Thoracic injuries(흉부손상), Frontal collision(정면충돌), Unrestrained occupant(벨트 미착용 탑승자), Frontal airbag(정면에어백), Motor vehicle collision(교통사고)

ABSTRACT

In a frontal collision, it is known that the seatbelt and frontal airbag reduce occupant thoracic injury. However, various results have been reported on the airbag effectiveness of unrestrained occupants. In this study, the effect of frontal airbags on reducing thoracic injury was investigated for unrestrained occupants in a frontal collision. The study used the Korean In-Depth Accident Study (KIDAS) database. We selected 1615 occupant patients who visited the hospital due to a frontal collision. The patients were seated in the first rows. As a crash object, types other than vehicle collision and fixed wall were excluded. The patients were classified into two groups according to their AIS score in the thorax region. The severe group has an injury score of over 3, and the non-severe group has an injury score of under 2. The occurrence rate of severe thoracic injury is 18.8% for occupants in a frontal collision. There is no rate difference by gender. Mean value of age is 47.0 years, and the value increases by 4 years in the severe group. Mean value of BMI is 24.09, and it belongs to normal weight. BMI was not related to severity. Driver had a higher incidence of severe thoracic injury. Unrestrained occupants accounted for 31.1%. However, the proportion increases by 5.4% in the severe group. Total deployment rate of frontal airbag is 49.0% and the rate decrease 3.3% in the unrestrained occupant. Mean value of delta-V is 30.33kph, and the value increases 6.78kph in the severe group. The thoracic injury risk in frontal collision increases in the situation of aging, unrestrained occupant, driver, and high delta-V. However, it is necessary to study the deployment rate of the frontal airbag in the same delta-V situation in the future.

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CDC Code 기반 차량외부파손 매트릭스에 따른 탑승자 중증손상 분석

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Analysis of Occupant Severe Injury According to Vehicular Crash Deformation Matrix based on CDC Code

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Key Words : Crash(정면충돌), Crash deformation matrix(차량파손 매트릭스), Collision deformation classification code (충돌유형분류코드), Injury outcome(인체손상), KIDAS(Korean In-Depth Accident Study)

ABSTRACT

The purpose of this study was to analyze injury severity outcomes according to vehicular crash deformation matrix who engaged with of motor vehicle crashes. We used the Korea In-Depth Accident Study Database (KIDAS) collected from patients who visited five different trauma centers from January 2011 to June 2022. The population was selected as adult occupants aged older than 18 years old. We defined the severe injury outcome as an Injury Scale (AIS) of more than 3. Out of a total of 4,636 crash injured patients, we analyzed 1,237 patients who engaged with multi-deformations of vehicular exterior deformations using the Longitudinal axis(X), Lateral axis(Y), and vertical axis(Z). In general, the incidence of severe injury outcomes according to the deformation extent were statistically significant in sex, age, seat position, seat belt, frontal airbag, and vehicle type (p<0.05). Also, in case of lateral deformation, a sex, age, height, seat belt, frontal airbag, side airbag, collision object, road category, and road type showed significance (p<0.05). Though the increasement of lateral deformation showed higher proportion of severe injury (MAIS3+), however, the statistical results had no statistically significant (p=0.58). On the other hand, the vertical deformation affected severely injured occupants in age, frontal airbag, vehicle type, collision object, and road type (p=0.05). This study suggests that the MAIS3+ injured occupants has affected by different results engaged with various vehicular crash deformations in real-world accidents.

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TRISS Method를 이용한 iGLAD 기반 사고유형별 탑승자 생존확률

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Occupant's Survival Probability according to Accident Type based iGLAD using the TRISS Method

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Key Words : TRISS(Trauma Score and Injury Severity Score), iGLAD(Initiative for the Global harmonization of Accident Data), Accident Type, Survival Probability

ABSTRACT

Purpose: The purpose of this study is to determine occupant's survival probability according to accident type based iGLAD(Initiative for the Global harmonization of Accident Data) using the TRISS(Trauma Score and Injury Severity Score) method.

Method: Among a total of 4,636 cases of KIDAS data collected from 2011 to June 2022, 3,335 cases were used for analysis, excluding cases that met exclusion criteria. TRISS is the survival probability of a trauma patient calculated through a regression equation using the injury mechanism, age, RTS, and ISS. The survival probability has a value of 0 to 1, and the predicted number of survivors can be calculated by summing the survival probability for each accident type.

Result: The most common accident types(iGLAD accident Code number) were 141(N=460), 681(N=268), 602(N=165), 321(N=129), and 301(N=132). And, the accidents with the fewer predicted survivors compared to the number of accidents were in the order of 141 (438/460), 681 (257/268), 602 (158/165), 761 (124/129), and 609 (33/37). The number of accident types in which the predicted number of survivors was less than the total number of occupant was 141(number of predicted survivor/total number of occupants, 438/460), 681(257/268), 602(158/165), 761(124/129), 609(33/37).

Conclusion: The types of accidents that occurred the most and had fewer predicted survivors compared to the total number of occupants were 141, 681, and 602. Therefore, we recommend that we discuss these accident type before other accident types.

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응급실 손상 DB를 활용한 개인형 이동장치 탑승자 사고의 상해 특성

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The Characteristics of Injured by Personal Mobility Devices in EDIIS DB

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ABSTRACT

최근 공용으로도 이용할 수 있는 개인형 이동장치 이용률이 증가하며, 다양한 탑승자 사고가 발생하고 있다. 본 연구에서는 응급실 손상 DB를 활용하여 개인형 이동장치 탑승자의 상해 특성을 알아보고자 한다.

2019년 1월부터 2020년 12월까지의 Emergency Department-based Injury In-depth Surveillance (EDIIS) 자료를 이용하였다. 본 연구에 포함된 개인형 이동장치 탑승자는 411명이었으며, 그중 92.2%가 전동 킥보드였고, 전동 휠, 전동 스케이트보드 순으로 분류되었다. 사고의 유형은 다음과 같이 세 그룹으로 정의하였다. 충돌없이 갑작스러운 움직임에 의한 손상이나 끼임, 압궤 등 기타 손상을 입은 경우를 충돌없는 기타 사고로 정의하였고, 충돌물체 있음, 충돌없이 전복·전도로 정의하였다. 결과변수로 중증손상 유무를 EMR-ISS 점수가 25점 이상인 경우를 중증손상이라고 정의하였다.

대상자로 분류된 개인형 이동장치 탑승자는 남성이 69.3%로 많았고, 연령대는 20대(37.7%) 다음으로 19세 미만의 그룹이 22.3%로 많았다. 탑승자 전체 중 운전자인 경우가 97.8%로 대부분을 차지하였으며, 음주한 경우가 25.1%였다. 손상 시 활동은 여가활동인 경우가 71%로 가장 많았고, 손상 발생 계절은 가을(39.4%), 여름(29.7%), 봄(20.2%), 겨울(10.7%) 순이었다. 운수사고 당시 상대편은 충돌없이 전복·전도된 경우가 46%로 가장 많았고, 충돌없이 갑작스러운 움직임에 의한 손상이나 끼임, 압궤 등 기타 손상을 입은 경우가 32.1%였다. 충돌물체가 있는 경우에는 사륜 이상의 소형 탈 것(승용차 등)이 12.2%로 다음을 차지하였다. EMR-ISS가 25점 이상인 중증손상 그룹에서는 각 손상 부위 발생률이 머리(88.9%), 흉부(16.7%), 복부(11.1%), 목(9.3%) 순으로 높았다(p<0.001, 복의 p=0.013).

머리손상은 충돌없는 기타 사고 그룹에서 다른 그룹에 비해 높은 비율을 보였고(76.5%, p=0.045), 복부손상과 하지손상은 충돌물체가 있는 그룹에서 높았다(복부; 10.3%/p=0.018, 하지; 34.5%/p=0.004)), 상지손상은 충돌물체가 없는 전복·전도 사고에서 38.6%로 높은 비율을 보였다(p=0.042). 개인형 이동장치의 유형별로 탑승자의 상해 부위와 유형 등의 특성을 분석할 수 있도록 지속적인 연구가 필요하겠다.

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어린이 통학 탑승차량 사고 특성에 관한 연구

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A Study on the Accident Characteristics of School Boarding Vehicles

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ABSTRACT

While there are buses and vans with more than 11 seats as school boarding vehicles, recently there is a trend to commute to school using vehicles within 10 seats such as passenger cars and SUVs. Therefore, the number of children visiting the emergency department is increasing due to traffic accidents. Nevertheless, car seats and seatbelts, which are necessary safety devices for children, are not installed or applied for vehicles with 11 seats or more. A multicenter cross-sectional study was conducted using emergency department-based injury In-depth surveillance (EDIIS) registry in Korea between 2011 and 2020. As the subjects of this study, a total of 14,145 patients were 13 years old or younger, and suffered from traffic accident in school boarding vehicles. In addition, vans or bus were classified into vehicle with 11 or more seats, and passenger cars or SUVs were classified into vehicle with 10 or less seats. And these two groups compared general characteristic each other, and analyzed the trend of application of safety devices, and injured information of each body regions. The number of accidents involving boarding vehicles was 7,708 (54.5%) on weekdays, 6,948 (49.1%) from noon to 18:00, and 8,828 (62.4%) were found to be the most common on national roads. The rear collision was 1,356 (9.6%) with the highest in types of collision. Among vehicle occupants with 11 or more seats, 37 cases (3.3%) were not wearing seat belts, 260 cases (23.1%) were not wearing car seats, and 260 cases (23.1%) were wearing both seat belts and car seats, showing the lowest proportion. However, there was no difference between the two groups in clinical outcomes such as traumatic brain injury, intensive care hospitalization rate, and in-hospital mortality. In this study, it was confirmed that there was a difference in demographic characteristics between children in two types of school boarding vehicles. Through this study, institutional and operational supplementation such as installation of car seats and seat belts is necessary to protect children from traffic accidents, and children should be properly protected by design of accident prevention and safety management systems in school vehicles.

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