Oral, Poster Presentation Abstract

The 5th Pan Pacific Trauma Congress
The 32nd Annual Meeting of the Korean Society of Traumatology

June 22 (Thu.) – 24 (Sat.), 2017
Seoul National University Bundang Hospital,
Healthcare Innovation Park,
Seongnam, Korea

Giant Step toward Excellency of Trauma Care
Welcome Message

Ho-Seong Han  President of the Korean Society of Traumatology

As a president of Korea Society of Traumatology, I deeply appreciate all the participants joining this 5th Pan-Pacific Trauma Congress.

For last several years, we have put our whole effort in upgrading state-of-the-art trauma care, education program, and scientific knowledge in traumatology. We also devoted ourselves a collaboration between civil and military trauma system and as a result this congress is co-hosted with Armed Forces Medical Command for many years. And we also tried to have close cooperation with government to make our trauma care more faithful and trustful to our people. I sincerely appreciate all the efforts made by all the members of our society.

However, there are still a lot of works to do for the well-balanced maintenance of trauma care, and pride for trauma surgeons. I truly believe that these problems can well improved with our continuous efforts and dedication.

Thus, we are gathered here together to make a better understanding among us, and to set a higher standard for the treatment of our patients. These efforts will surely result in higher chance of survival in our patients, and eventually, better performance of our trauma care. Moreover, which is expressed as a "Giant Step toward Excellency of Trauma Care" slogan of this PPTC 2017, with our advanced skills, we will try to perform the best treatment for trauma patients in Korea.

All renowned trauma surgeons and experts have gathered here from overseas or domestically.

This conference will be giant step toward to excellency of trauma care.

I am also convinced that this conference will be best festive event for sharing cutting-edge knowledge and deepening our friendship as well.

I hope all of you to enjoy this meeting.
It is a great pleasure for me to co-host the 5th Pan-Pacific Trauma Conference with the Korean Society of Traumatology and to invite trauma experts in the Pan-Pacific region.

Armed Forces Medical Command, under close collaboration with the Korean Society of Traumatology, has been putting its utmost effort in enhancing the trauma-treating capabilities based on "Patient First". This conference would be a great opportunity for us to see our outcomes so far and check the direction we go.

Currently, the globe has confronted with diverse threats including mass disasters numerous terrorism. In particular, the Pan-Pacific region is faced with frequent natural disasters such as earthquakes, volcanic eruptions, typhoons and also threats from North Korea. Close collaboration and active response between relative institutions are inevitable to minimize the damages from those disasters and threats.

In this point of view, the theme "Step by Step" of this year’s conference is meaningful to achieve people's health and national safety as common goals. As this conference makes academic exchanges between experts of both military and civilian possible, I believe it will be a great opportunity to develop the bond of sympathy and reinforce the mutual collaboration system that achieves the common goals. In addition, I am expecting that the development of traumatology in military medicine through this conference can be a great help to the establishments of Armed Forces Trauma Center and truthful medical support system.

Thank you.
## Program at a Glance

### 22 June (Thu.)

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<thead>
<tr>
<th>Time</th>
<th>1F. Main Auditorium</th>
<th>1F. Seminar 1,2</th>
<th>4F. Small Auditorium</th>
<th>4F. Seminar 5</th>
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<td>09:00-10:30</td>
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<td>5th NICE (Nurse Intensive Care Education) Course</td>
<td>4th Military Trauma Nurse Education Session</td>
<td>Military EMT Seminar</td>
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<td>10:30-12:00</td>
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<td>7th TREE (Trauma Registry for Expert &amp; Educator) Course</td>
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### 23 June (Fri.)

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<tr>
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<td>14:10-15:50</td>
<td>Japan–Korean Symposium 1 Trauma System</td>
<td>Symposium 1 Treatment of Vulnerable Orthopedic Trauma Patients</td>
<td>Symposium 2 Bleeding Control in Pelvic Fracture</td>
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<td>16:10-17:50</td>
<td>Japan–Korean Symposium 2 Surgery and ICU Care in Polytrauma Patients</td>
<td>Symposium 3 Trauma in Special Population</td>
<td>Symposium 4 Common Questions about Neurotrauma: Non-Neurosurgeon’s View</td>
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<td>18:00-</td>
<td>Gala Dinner : 7F. Bulgok Hall</td>
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# Program at a Glance

## 24 June (Sat.)

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<td>10:50-12:30</td>
<td>Symposium 3</td>
<td>Trauma Management Update</td>
<td>Symposium 6 Medical Treatment Guidance Committee</td>
<td>Symposium 7 Nursing Roles in Trauma Center</td>
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<td>Symposium 8</td>
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<td>Oral Presentation 3</td>
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<td>15:30-17:00</td>
<td>Symposium 10</td>
<td>Current of Trauma Center : Still Much to Be Improved</td>
<td>Oral Presentation 4</td>
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<td>Oral Presentation 6</td>
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<td>17:00-17:30</td>
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<td>Award &amp; Closing</td>
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*The session with this headphone sign will be translated.*
Oral Presentation

Oral Presentation 1 – Seminar Room #4

Date: June 24, 2017 (Sat.) 10:50–12:30

Moderators: Kyuseok Kim (Seoul National Univ. Bundang Hospital), Bo-Ra Seo (Mokpo Hankook Hospital)

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<th>Time</th>
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<tr>
<td>10:50–11:04</td>
<td>Risk Factors Affecting Severe Traumatic Brain Injury in Motor Vehicle Collision</td>
<td>Ji Min Kim¹, Sang Chul Kim¹, Kang Hyun Lee², Ho jung Kim³</td>
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<td>Chungbuk National University Hospital¹, Yonsei University Wonju Severance Christian Hospital², Soonchunhyang University Bucheon Hospital³</td>
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<td>11:04–11:28</td>
<td>Validation of Korean Criteria for Trauma Team Activation</td>
<td>Minhyuk Bang, Kyoung-Chul Cha</td>
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<td>Yonsei University Wonju College of Medicine, Wonju</td>
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<td>11:28–11:42</td>
<td>Correlation between the Pre-hospital Korea Triage and Acuity Scale and the Korea Triage and Acuity Scale (KTAS)</td>
<td>Sil Sung, Kang Hyun Lee, Oh Hyun Kim, Hyun Youk, Hee Young Lee, Chan Young Kang</td>
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<td>11:42–11:56</td>
<td>Pancreatic Fistula and Mortality After Surgical Management of Pancreatic Trauma: Analysis of 81 Consecutive Patients During 11 Years at a Korean Trauma Center</td>
<td>Wu Seong Kang, Yun Chul Park, Young Goun Jo, Jung Chul Kim</td>
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<td>11:56–12:10</td>
<td>Analysis of Treatment Results of Orthopedic Trauma Surgeon at the Korean-Type Regional Trauma Center</td>
<td>Yong-Cheol Yoon, Jungnam Lee, Sung Youl Hyun, Jae-Ang Sim</td>
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<td>Gachon University Gil Medical Center</td>
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<td>12:10–12:24</td>
<td>PARK Formula Can Replace “Guide to Medical Certificate” Published by the Korean Medical Association in Decision of Treatment Duration</td>
<td>Chan Yong Park, Kwang Hee Yeo</td>
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Oral Presentation

Oral Presentation 2 – Seminar Room #2

Date: June 24, 2017 (Sat.) 13:30-15:00

Moderators: Jun-Dong Moon (Kongju National Univ.), Kyung Hag Lee (National Medical Center)

13:30-13:44  
**OP 2-(1)** Analysis of Death by Traffic Accident Using In-Depth Investigation Data of Emergency Rooms  
Hae-Ju Lee, Sang-Chul Kim, Sung-Man Jeon, Hun Kim, Seok-Woo Lee, Jung-Soo Park  
Chungbuk National University Hospital

13:44-13:58  
**OP 2-(2)** Comparison of Injury Patterns And Interaction between Near-Side and Far-Side occupants in Motor Vehicle Side Collisions  
ChanYoung Kang¹, KangHyun Lee¹, OhHyun Kim¹, Hyun Youk¹, HeeYoung Lee¹, JunSeok Kong², Sil Sung², HoJung Kim², SangChul Kim³, YoungHan Youn⁴  
Wonju College of Medicine, Yonsei University¹, Soonchuhayang University Bucheon Hospital², Chungbuk University Hospital³, Korea University of Technology & Education⁴

13:58-14:12  
**OP 2-(3)** A Comparative Study on the Injury Characteristics of Vehicle Speed and Vehicle Type to Elderly and Non-Elderly in Pedestrian Traffic Accident  
Joon Seok Kong¹, Kang Hyun Lee¹, Oh Hyun Kim¹, Hee Young Lee¹, Sil Sung¹, Chan Young Kang¹, JaeKon Shin²  
Yonsei University Wonju College of Medicine¹, Korea Automobile Testing & Research Institute²

14:12-14:26  
**OP 2-(4)** Comparison of the Injury Characteristics between the Elderly and the Non-elderly according to Collision Direction on Motor Vehicle Accident Occupants  
Sil Sung¹, Kang Hyun Lee¹, Oh Hyun Kim¹, Hyun Youk¹, Hee Young Lee¹, Chang Young Kang¹, Joon Seok Kong¹, Ho Hung Kim², Sang Chul Kim³, Young Han Youn⁴  
Wonju College of Medicine, Yonsei University¹, College of Medicine, Soon Chun Hyang University Hospital¹, College of Medicine, Chungbuk National University¹, Korea University of Technology & Education⁴

14:26-14:40  
**OP 2-(5)** Comparison of Clinical Characteristics and Mortality Pattern between Old Age Group and Non Old Age Group in Trauma Patients  
Cho Dae Hyun¹, Hong Tae Hwa³, Lee Jae Gil¹  
Yonsei University College of Medicine¹, The Catholic University of Korea Uijeongbu St. Mary’s Hospital³

14:40-14:54  
**OP 2-(6)** Introduction of Mobile Trauma Unit in the Regional Trauma Center  
Seok Jeong Yang, KyuHyouck Kyoun¹  
Ulsan University Hospital
Oral Presentation

Oral Presentation 3 – Seminar Room #4

Date: June 24, 2017 (Sat.) 13:30-15:00

Moderators: Do Joong Park (Seoul National Univ. Bundang Hospital), Oh Hyun Kim (Yonsei Univ. Wonju College of Medicine)

OP 3-(1) 13:30-13:44  Analysis of Cultivator-Related Trauma Cases in a Regional Trauma Center in the Rural Area of Gyeongbuk Province
Ulkang Hwang¹, Seokhwa Youn¹, Chanyoung Park²
Andong Medical Group Hospital¹, Pusan National University Hospital²

OP 3-(2) 13:44-13:58  Analysis of Mortality and Preventable Death Rate of Trauma Patients in Single Center Experience
Young Un Choi, Jae Gil Lee
Yonsei University, College of Medicine

OP 3-(3) 13:58-14:12  Mortality Reduction of Major Trauma Patients after Setting up Level 1 Trauma center
Young-il Roh, Oh Hyun Kim
Yonsei University Wonju College of Medicine

OP 3-(4) 14:12-14:26  The Relationship between CDC Field Triage and Injury Severity Score
Kang Kook Choi, Byung Chul Yu, Gil Jae Lee, Min A Lee, Dae Sung Ma, Sung Youl Hyun
Gachon University Gil Medical Center

OP 3-(5) 14:26-14:40  Characteristics of Patients Admitted Trauma ICU with ISS <15 Versus Patients Admitted General Ward with ISS >15: the Definition of Severe Trauma Need to be Changed
Byungchul Yu, Jungnam Lee, Mina Lee, Kangkook Choi
Gachon University Gil Hospital
Oral Presentation 4 – Seminar Room #1

Date: June 24, 2017 (Sat.) 15:30–17:00

Moderators: Young Hoon Yoon (Korea Univ. Hospital), Bo-Ra Seo (Mokpo Hankook Hospital)

15:30–15:44  
**Analysis of Mortality and Epidemiology in 2617 Cases of Traumatic Brain Injury: Korean Neuro-Trauma Data Bank System 2010–2014**  
Ki Seong Eom1,2, Seong Keun Moon1, Korea Neuro-Trauma Data Bank Committee KNTDBS1,2  
Wonkwang University Hospital1, Korean Neurotraumatology Society2  

15:44–15:58  
**Treatment Outcome of Traumatic Brain Injury Patients Using Doctor-Helicopter Transport System: Preliminary Report During 1 Year**  
jungho yun, sangkoo lee, chunsung cho  
Dankook University Hospital

15:58–16:12  
**Radiologic Findings and Patient Factors Associated with 30-Day Mortality after Surgical Evacuation of Subdural Hematoma in Patients Less Than 65 Years Old**  
Je-II Ryu1, Yu-Deok Won1, Myung-Hoon Han1, Jin-Hwan Cheong1, Jong-Hoon Song2, Ki-Chul Park2, Hyun-II Kim3  
Department of Neurosurgery, Hanyang University Guri Hospital1, Department of Orthopedic Surgery, Hanyang University Guri Hospital1, Department of Surgery, Hanyang University Guri Hospital3

16:12–16:26  
**Does Initial Activation of Neurosurgeon have an Effect on Severe Trauma Treatment? : For Traumatic Brain Injury (TBI) patients**  
Taekyoo Lim, Wookyung Kim  
Gachon University Gil Medical Center

16:26–16:40  
**Minor Head Injury with Post-Concussion Syndrome in Korea**  
Ji Young Lee, Young Hoon Yoon  
Guro Korea University Medical Center

16:40–16:54  
**Analysis of the Factors to Predict Cervical Spine Injury on Motor Vehicle Accidents**  
Hee Young Lee1, Kang Hyun Lee1, Oh Hyun Kim1, Woo Jin Jung1, Hyun Youk1, Sil Sung1, Chan Young Kang1, Joon Seok Kong1, Jong Chan Park2, Ji Hun Choi3  
Yonsei University Wonju College of Medicine1, National Forensic Service2
Oral Presentation 5 – Seminar Room #2

Date: June 24, 2017 (Sat.) 15:30–17:00

Moderators: Yong-Cheol Yoon (Gachon Univ. Gil Hospital), Sung-Hyuck Choi (Korea Univ. Guro Hospital)

15:30–15:44 Relations between Fitting or Shell Type of Bicycle Helmet and Head Injury 059
Kun Hwang1,2, Yeong Seung Ko1,2, Yun Moon Jeon1,2
Inha University School of Medicine1, Inha University Hospital2

15:44–15:58 Multimodal Treatment for the Severe Bleeding Pelvic Fracture 061
Kang Kook Choi, Byung Chul Yu, Gil Jae Lee, Min A Lee, Dae Sung Ma, Jung Nam Lee
Gachon University Gil Medical Center

15:58–16:12 Factors Predicting the Need for Hemorrhage Control in Blunt Pelvic Trauma 062
Myoung Jun Kim, Seung Hwan Lee
Yonsei University College of Medicine

16:12–16:26 The Results of Membrane-Induced Osteogenesis in Posttraumatic Bone Defects 063
Jin-Kak Kim, Jae-Woo Cho, Ki-Ho Moon, Beom-Su Kim, Do-Hyun Yeo, Jong-Keon Oh
Korea University Guro Hospital

16:26–16:40 The Incidence of and Factors Affecting Fixation Failure after Open Reduction of Symphyseal Diastasis 064
Joon-Woo Kim, Chang-Wug Oh, Kyeong-Hyeon Park, Jeong-Woo Kim, Jung-Won Han
Kyungpook National University Hospital
Oral Presentation

Oral Presentation 6 – Seminar Room #4

Date: June 24, 2017 (Sat.) 15:30–17:00

Moderators: Namyeol Kim (Korea Univ. Guro Hospital), Seon Hee Kim (Pusan National Univ. Hospital)

15:30–15:44  Experience of Emergency Department Thoracotomy in Single Institution
OP 6-1
Dae Sung Ma, Seok Joo, Sung-Jin Kim, Kang Kook Choi, Jungnam Lee, Sung Youl Hyun, Yang Bin Jeon
Trauma Center, Gachon University Gil Medical Center

15:44–15:58  Immediate Post-Laparotomy Hypotension in Severe Traumatic Hemoperitoneum
OP 6-2
Kang Kook Choi, Byung Chul Yu, Gil Jae Lee, Min A Lee, Dae Sung Ma, Jung Nam Lee
Gachon University Gil Medical Center

15:58–16:12  Adult Respiratory Distress Syndrome in Trauma Patients Requiring Extracorporeal Membrane Oxygenation: A Case Series
OP 6-3
Cho Dae Hyun, Lee Jae Gil
Yonsei University College of Medicine

16:12–16:26  Rib Fixation for a Patient with Severely Displaced and Overlapped Costal Cartilage Fractures: A Case Report
OP 6-4
Soon-Ho Chon1, Sung Ho Han2, Jae Gul Kang2, Min Koo Lee3, Oh Sang Kwon2, Kyoung Hwan Kim2, Jung Suk Kim2, Hohyoung Lee2, Jong Hyun Lee1
Cheju Halla Hospital1, Cheju Halla Hospital2

16:26–16:40  Epidemiology of Burn Patients in Military
OP 6-5
Jangkyu Choi, Hyun Chul Kim
The Armed Forces Capital Hospital

16:40–16:54  Risk Factors for Delirium in Patients with Abdominal Trauma
OP 6-6
Young Goun Jo, Yun Chul Park, Wu Seong Kang, Jung Chul Kim
Chonnam National University Medical School
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<th>Experiences of Post–Traumatic Hepatic Complication after Massive Blunt Liver Injury</th>
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<td>So Ra Ahn, Dong Baek Kang</td>
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<th>PP-3</th>
<th>Clinical Role of Emergent Interventional Procedures for Traumatic Injuries in a Regional Trauma Care Center</th>
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<td>Chang Ho Jeon¹, Chang Won Kim¹, Hoon Kwon¹, Hyun Min Cho², Jae Hun Kim², Chan Yong Park²</td>
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<tr>
<td>Pusan National University Hospital¹, Pusan National University Hospital²</td>
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<th>Comparison of Prognosis in Emergency Operation: Blowout Fracture with Extraocular Muscle Limitation and Diplopia in a Pediatric Population</th>
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<th>Analysis of Korean Trauma Data Bank for 2 Years of a Single Trauma Center in Rural Area</th>
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<th>Traumatic Retropharyngeal Hematoma: Confession of Wrong Decisions with a Case</th>
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<td>Seung Je Go¹, Young Hoon Sul¹, Jin Bong Ye¹, Jin Young Lee¹, Dong Hee Ryu², Moo Seop Lee³</td>
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<td>Chungbuk National University Hospital¹, Chungbuk National University Hospital², Chungbuk National University Hospital³</td>
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<td>Department of Trauma Surgery and Surgical Critical Care, Pusan National University Hospital, Busan¹, Nutritional Support Team, Pusan National University Hospital, Busan²</td>
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Focused Training Center for Trauma, Korea University Guro Hospital, Korea University College of Medicine, Department of Neurosurgery, Korea University Guro Hospital, Korea University College of Medicine, Department of Orthopedic Surgery, Korea University Guro Hospital, Korea University College of Medicine

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Korea University Guro Hospital1, The Armed Forces Medical Command2

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Ulsan University Hospital, University of Ulsan College of Medicine

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JangHun Kim
Guro Hospital, Korea University Medical Center
Oral Presentation 1

June 24, 2017 (Sat.) 10:50~12:30 / 4F. Seminar 4

Moderators

Kyuseok Kim (Seoul National Univ. Bundang Hospital)
Bo-Ra Seo (Mokpo Hankook Hospital)
Risk factors Affecting Severe Traumatic Brain Injury in Motor Vehicle Collision

Ji Min Kim¹, Sang Chul Kim¹, Kang Hyun Lee², Ho Jung Kim³
Chungbuk National University Hospital¹, Yonsei University Wonju Severance Christian Hospital²,
Sooncheunhyang University Bucheon Hospital³

Objective: Traumatic brain injury (TBI) caused by motor vehicle collisions (MVCs) is a catastrophic event that leads to disabilities and mortalities. This study aimed to describe risk factors among patients who sustained severe TBI and to compare the effect of seat belt across the crush extent of vehicle.

Methods: The crash data were obtained from the Korea In-Depth Accident Study (KIDAS) for calendar years 2011-2016. KIDAS has collected data on injured occupants involved in MVCs who visited the 3 emergency medical centers via ambulances. Crush extent was classified into 1-2, 3-4, 5-6, and 7-9 according to the delta V at the time of collision. We calculated adjusted odds ratios (AORs) of risk factors for severe TBI (abbreviated injury score 2+, excluding ICD-10 code S06.0) using multivariate logistic regression analysis.

Results: Of the 2,710 occupants who were enrolled in MVCs, 354 occupants were sustained severe TBI. In univariate analysis, old-age, unbelted status, near side lateral collision, and higher crush extent were factors affecting severe TBI in MVCs. In multivariate logistic regression analysis, the AOR (95% CI) of unbelted status for severe TBI was 2.18 (1.70-2.81); that of near side lateral collision was 3.13 (1.79-5.48); that of crush extent 5-6 was 3.03 (1.58-5.78). In interaction analysis, preventive effects of seat belt were not significant over 7 crush extent of MVCs.

Conclusion: Unbelted status, higher crush extent, and near side lateral collision are risk factors
affecting severe TBI in MVCs, Seat belt has the limited-preventive effect for severe TBI over 7 crush extent, so safety improvement of vehicles and legislative efforts to limit speed are necessary to prevent severe TBI in MVCs.

**Keywords:** motor vehicle collisions, seat belts, traumatic brain injury
Validation of Korean Criteria for Trauma Team Activation

Minhyuk Bang, Kyoung-Chul Cha
Yonsei University Wonju College of Medicine, Wonju

Objective: In Republic of Korea, seven level I trauma center were in service from 2011 and they have been used common criteria for TTA. This criteria was based on field triage criteria for trauma patient of ACS-COT, but unlike this criteria, any of physiologic, anatomical and mechanism of injury criteria could be candidate for activating trauma team. This newly modified criteria have never been evaluated in aspect of patient safety and appropriateness for applying in our country. We conducted a study to validate the effectiveness of Korean criteria for trauma team activation and suggest modification for inappropriate factors.

Methods: This was a retrospective cohort study of trauma patients who were admitted to the emergency department of level I trauma center during the study period from June 2016 to November 2016, 1,628 trauma patients were visited our emergency department and 739 of them were candidate for trauma team activation so that all of them were included.

Results: The individual predictors that TTA criteria were related to the severe injury trauma (ISS > 15) are as following. The univariate logistic regression revealed that airway obstruction/respiratory distress, intubated patients, RR 29/min in adult, SBP < 90mmHg in adult, HR > 100/min in adult, GCS < 0.05). And the flail chest, open or depressed skull fracture and pelvic bone fracture were related to severe injury trauma with on anatomy criteria (p-value < 0.05).
Conclusion: Korean criteria for trauma team activation showed lower over-triage and similar under-triage rate than them of other countries. Modification of current criteria to two-tier system with special considerations would be more effective in aspect of optimal patient care and medical resource utilization.
Correlation between the Pre-Hospital Korea Triage and Acuity Scale and the Korea Triage and Acuity Scale (KTAS)

Sil Sung, Kang Hyun Lee, Oh Hyun Kim, Hyun Youk, Hee Young Lee, Chan Young Kang
Wonju College of Medicine, Yonsei University

Objective: While emergency patient triage system is effective when the pre-hospital triage acuity scale is linked with the in-hospital triage acuity scale, however, the 119 emergency medical triage system and the Korea Triage and Acuity Scale (KTAS) are not linked in Korea. This study aimed to investigate the correlation between the two triage systems and to utilize the results as basic data for the future development of a pre-hospital triage system.

Methods: Among the 1,114 patients who visited a regional emergency medical center by a 119 ambulance from April to May 2016, we analyzed the correlation between the pre-hospital and in-hospital triage systems based on the general characteristics of the patients and their reason of hospital visit (non-trauma or trauma).

Results: The total number of patients was 1,028; the mean age was 56.4 ± 22.7 years and 596 (58.0%) were male. Upon reclassifying the pre-hospital triage and in-hospital triage systems into three levels, of the 420 patients (57.6%) in level 1 of the pre-hospital triage, 37 (8.8%) were reclassified as the lowest level (level 3) in the in-hospital triage, and of the 289 patients (28.1%) in level 3 of the pre-hospital triage, 79 (27.3%) were reclassified as the highest resuscitation level in the in-hospital triage. The kappa coefficient in evaluation of agreement between the two triage systems was very low at 0.211 (95% CI 0.164-0.258), and the kappa coefficient of the paramedic category was 0.232 (95% CI 0.161-0.303).
Conclusion: There is a low agreement between the pre-hospital triage system and the in-hospital triage system. There is a need to develop a pre-hospital triage system based on the KTAS.
Introduction: Pancreatic trauma is infrequent because of their central deep anatomical position. This contributes to a lack of surgeon’s experience and many debates exist about its standard care. This study aimed to investigate the surgical management of pancreatic trauma and its morbidity.

Method: We reviewed trauma registry of our institution from Jan 2006 to Dec 2016. Grade of pancreatic injury, surgical management, morbidity, mortality and other clinical variables were analyzed. The postoperative pancreatic fistula (POPF) was defined by International Study Group of Pancreatic surgery (ISGPS) definition.

Result: A total of 26072 trauma patients admitted to the emergency department were analyzed. 114 (0.44%) patients were identified pancreatic trauma, 81 patients underwent laparotomy (2 pancreaticoduodenectomies, 2 pancreaticogastrostomies, 41 peripancreatic drainages, 34 distal pancreatectomies, 9 Damage control surgeries). The incidence of POPF was 38.3%. Overall mortality was 8.8%. In multivariate analysis, pancreas injury grade (≥ 4) (AOR [adjusted odds ratio] 4.071, p=0.029) and preoperative peritonitis sign (AOR 2.903, p=0.039) were independent risk factors for POPF. Pancreas injury grade 5 (AOR 33.308, p=0.031) and associated abdominal injury (Organ injury scale ≥ 4) (AOR 40.686, p=0.016) were independent risk factors for mortality.

Conclusion: Pancreatic injury grade was a significant risk factor for both POPF and mortality. Preoperative peritonitis was a significant risk factor for POPF. Associated abdominal organ injury was a significant risk factor for mortality.
Objective: The regional trauma centers are operated by general surgeons, thoracic surgeons, orthopedic surgeons and neurosurgeons, and many of my trauma patients are orthopedic trauma patients. The purpose of this study is to analyze the treatment outcome of orthopedic trauma specialists at the trauma center of Korea.

Methods: From March 2014 to December 2016, ISS score of 15 points or more, who visited the trauma center of Gachon University Gil Hospital, was compared with the group treated by trauma orthopedic specialist (Group A) and orthopedic department surgeon (Group B). We retrospectively analyzed the time of visit to emergency room, the decision time for treatment, the length of time from emergency room to operation room, the number of operations per patient, duration of intensive care unit, complication and mortality.

Results: A total of 352 patients were enrolled in the study, 103 patients in group A and 249 in group B were treated. Doctor response time was 7 minutes in Group A and 32 minutes in Group B. The time required for emergency operation from the emergency room to the operating room was 2 hours and 20 minutes for the group A and 8 hours and 10 minutes for the group B. The number of operations per patient was 1.8 in group A and 2.3 in group B. The mean duration of ICU hospitalization was 8.5 days for group A and 12.2 days for group B.
Conclusion: Orthopedic trauma specialists are able to treat patients with serious trauma immediately, and also can organize consultation with other specialists in the trauma center, effectively treat systemic trauma. It is expected that it will play a big role in the fast rehabilitation of health and the health insurance finances.
Objective: Many surgeons find it difficult to determine the proper ‘treatment duration’ when issuing “medical certificates” in trauma patients. The author attempted to find a method to easily obtain the ‘treatment duration’ by using the globally available Abbreviated Injury Scale (AIS) in the trauma era.

Methods: From January 2014 to April 2017, 39 of the patients treated by the author requested a “medical certificate” including ‘treatment duration’. The following PARK Formula was applied to these patients and their ‘treatment duration’ was analyzed and compared with the ‘treatment duration’ recommended in the “Guide to Medical Certificate” published by the Korean Medical Association (KMA).

\[
PARK\ Formula\ (AIS) = (AIS \times 2) \sim [(AIS \times 2) + 2]
\]

For example, if PARK Formula is applied to trauma patients with AIS 3, the ‘treatment duration’ is 6 to 8 weeks.

Results: Of the 39 patients, 36 (92.3%) had a ‘treatment duration’ consistent with PARK Formula. The remaining 3 patients (1 for 1 week, 2 for 2 weeks) showed less ‘treatment duration’ than PARK Formula. On the other hand, only 22 patients (56.4%) were matched with the PARK Formula when compared with the ‘treatment duration’ recommended from the KMA Guide. The remaining 17 patients (2 for 1 week, 11 for 2 weeks, 4 for 4 weeks) showed less ‘treatment duration’.
duration’ than PARK Formula,

**Conclusion:** It is very easy and simple to determine ‘treatment duration’ by applying PARK Formula when issuing medical certificate in trauma patients. KMA may need to seriously consider the transition to a "Guide to Medical Certificate" using PARK Formula so that surgeons can easily determine the ‘treatment period’ in trauma patients,
Oral Presentation 2

June 24, 2017 (Sat.) 13:30-15:00 / 1F. Seminar 2

Moderators
Jun-Dong Moon (Kongju National Univ.)
Kyung Hag Lee (National Medical Center)
응급실 손상심층조사 자료를 활용한 교통사고사망자 분석

Hae-Ju Lee, Sang-Chul Kim, Sung-Man Jeon, Hun Kim, Seok-Woo Lee, Jung-Soo Park
Chungbuk National University Hospital

Objective: 최근 교통관련 법률에 의한 규제, 첨단자동차 개발, 교통안전교육을 위한 노력으로 국내 운수사고 사망자수가 지속적으로 감소하는 추세이나 아직도 매년 4천명 이상의 사망자가 발생한다. 국내 교통사고사망자 자료를 분석하여 교통사고 사망자 감소 및 교통사고 예방을 위한 전략을 수립에 활용하기 이 연구를 진행하였다.

Methods: 2011년 1월부터 2015년 12월까지 응급실 손상심층조사 사업 대상 병원에 내원한 손상환자 중 교통사고로 인하여 응급실내에서 사망하거나 입원한 후 사망한 환자를 대상으로 하였다. 연령, 손상기전, 시간(요일, 월), 발생장소, 발생시 활동, 차량사고 기전, 손상기전에 따른 손상부위 및 진단명 등의 교통사고 사망자의 특징을 분석하였고, 차량 사고 신고기진은 23개 병원 중 교통사고 심층조사 대상병원인 8개 병원에서 자료를 통해 분석하였다.

Results: 5년간 응급실 손상 심층조사사업에 참여한 20여 개 병원에서 수집한 총 103,080건의 사고에서 사망환자는 4137명(4.0%)으로 교통사고 발생 건수는 경제활동 연령인 인구인 20대에서 50대까지 전반적으로 높았고, 교통사고 사망자수는 연령대별로는 70대, 50대, 60대, 40대 순으로 많았고, 사망분율은 고연령 일수록 높아 90대, 80대, 70대, 60대 순으로 보였다. 손상기전별로는 보행자(42.6%), 차량탑승자(22.7%), 오토바이(18.7%), 자전거(6.5%) 순이었는데, 사망자분율은 농업용 특수 차량(7.3%)이 가장 높았다. 월별로는 행락객이 많은 10월, 시간별로는 퇴근시간인 5-7시 사이에 사망자분율이 가장 높았고, 일반도로, 여가활동, 차량교통사고에서는 정면충돌에서 사망자분율이 가장 높았다. 차량교통사고에서는 두부, 흉부 복부가 사망의 주요 손상 원인부위이다. 자전거, 오토바이,
보행자에서는 두부가 사망의 주요 손상부위이었다.

**Conclusion:** 교통사고 사망자 감소를 위해서는 보행자 사고, 노령인구 대상의 중재전략이 필요하며 교통사고 사망예방을 위해서는 두부손상 보호를 위한 기술 개발 및 장비 착용이 중요하다.
Comparison of Injury Patterns and Interaction between Near-Side and Far-Side Occupants in Motor Vehicle Side Collisions

ChanYoung Kang¹, KangHyun Lee¹, OhHyun Kim¹, Hyun Youk¹, HeeYoung Lee¹, JunSeok Kong¹, Sil Sung¹, HoJung Kim², SangChul Kim³, YoungHan Youn⁴
Wonju College of Medicine, Yonsei University¹, Soonchuhayang University Bucheon Hospital², Chungbuk University Hospital³, Korea University of Technology & Education⁴

Objective: The purpose of this study is to determine how the injury patterns and interaction between near side and far side occupants in motor vehicle side collisions is different.

Methods: This study was conducted as a retrospective study and analyzed data of side collision registered in KIDAS(Korea In Depth Accident Study) database from Jan, 2011 to Jul, 2017.

Results: There were a total of 210 near side occupants, of which 90 were passengers and 101 were not, and a total of 157 far side occupants, 81 of which were passengers and 61 were not. ISS(Injury Severity Score, median[IQR]) of the near side occupants was 5[2-13], which was higher than the 3[2-9] of the far side occupants(p<0.05). The rate of severe injury(≥AIS3) in thoracic injury and lower limb injury in near side occupants were 46.8% and 22.0%, which was higher than 30.2% and 4.5% in far side occupants(p<0.05). The median of head injuries in the absence of a passenger was 2[1-2], which was higher than 1[1-2] in the presence of a passenger(p<0.05). However, when only the far side occupants was analyzed, the median of abdominal injuries in the presence of a passenger was 1.5[1-2], which was higher than 1[1-1] in the absence of a passenger(p<0.05). The multiple logistic regression showed that the severe injury in the side collision was 2.5 times higher in the near side collision than in far side collision(p<0.05).

Conclusion: The near-side occupant has a higher severity of chest and lower limb injury than the far-side occupant in motor vehicle side collisions. The severity of head injury is higher in the absence of a passenger regardless of the near and far side collisions, and the severity of abdominal injury is higher in the presence of a passenger in the far side collisions,
A Comparative Study on the Injury Characteristics of Vehicle Speed and Vehicle Type to Elderly and Non-Elderly in Pedestrian Traffic Accident

Joon Seok Kong¹, Kang Hyun Lee¹, Oh Hyun Kim¹, Hee Young Lee¹, Sil Sung¹, Chan Young Kang¹, Jae Kon Shin²
Yonsei University Wonju College of Medicine¹, Korea Automobile Testing & Research Institute²

Objective: The purpose of this study is to investigate the effects of vehicle speed and vehicle type on the injury characteristics and severity of the elderly and non-elderly groups in pedestrian traffic accidents.

Methods: The subjects of this study were 70 patients who visited a level 1 trauma center in a traffic accident in a city from January to December in 2014. To categorize elderly and non-elderly aged group, elderly patients were classified as aged over 65 and non-elderly patients were defined as under 65 years old. Patient information was assessed using the Abbreviated Injury Score(AIS) and the Injury Severity Score(ISS).

Results: In the pedestrian traffic accidents, the vehicle type in elderly patients occupied Sedan 9 (47.4%), SUV 3(15.8%), Light Truck 4(21.1%), Van 2(10.56% (7.9%), Light Truck 2(5.3%), Van 4 10.5%), Bus 1(5.3%). For non elderly patients in vehicle type has shown in Sedan 26(68.4%), SUV 3(2.6%) and two-wheeled vehicles(5.3%). In this study, Sedan type vehicles accounted for the highest proportion for both elderly and non-elderly patients. The elderly patient's AIS median score shown higher rates in upper extremities(p=0.007) and lower extremities(p=0.045) than non-elderly patients. In addition, the percentage distribution of AIS score above 3 points was higher in elderly (58.3%) than non-elderly(11.1%) at lower extremities(p=0.004). In order to compare the injury rates of the elderly and non-injured patients effected by speed conditions, the velocity category
was classified in every 5 km/h per unit. The distribution of occupation rate of more than 3 points in the speed range from 25 km/h to below 30 km/h has appeared as 71.4% for elderly and 8.3% for non-elderly patients, which elderly patients had statistically significant difference (p=0.010).

**Conclusion:** In conclusion, the elderly in pedestrian traffic accidents had higher severity of injuries than non-elderly patients.
Objective: The current standard of elderly people is different from each other, so we want to investigate the effect of the risk of trauma on the age of elderly people.

Methods: It was analyzed data of collision direction on motor vehicle accident occupants registered in Korea In Depth Accident Study database from Jan, 2011 to Jan, 2017. The collision direction was classified as front, side, rear collision, rollover, and multiple collision. In order to compare the damage characteristics of the elderly patients and non-elderly patients, the ages of the elderly patients were divided into three groups: 55 years old, 65 years old and 75 years old.

Results: 1,591 patients were included in the study. In the AIS2, only the 65 year old group showed the difference of the median value between the elderly and non-elderly. In the AIS3(Chest), the median values of the elderly and non-elderly groups were 55, 65, and 75 years old (p < 0.05). The ISS showed higher median in the elderly than in the non-elderly in all three groups (p < 0.05). The mortality rate was significantly different only in the 75 year old group. 75 years old was taken as the criteria of the elderly and reanalyzed the damage characteristics by traffic accident direction. When AIS3 (Chest) was analyzed in the frontal collision, there was a difference in the median of the elderly and non-elderly (p < 0.05). When ISS was analyzed in rollover the severity of the elderly (Median[IQR]) was 75 [44-75] higher than that of non-elderly (8 [3-16]) (p < 0.05).

Conclusion: As the age standard of the elderly increases, it is appropriate to divide it by 75 years according to the injury site characteristics, severity, and mortality. The risk of injury to elderly patients due to the accident mechanism is high in forward collision and rollover.
Objective: The aim of this study is to compare the clinical characteristics and mortality pattern of old age group and non old age group in trauma patients.

Methods: We analyzed retrospectively from January 2014 to April 2016 trauma patients admitted to the single trauma center in Seoul, Korea. The patients divided in both groups, a old age group and an non old age group on the basis of an age of 65. The variables related with trauma were extracted and examined.

Results: Of 613 patients, 128 were classified as the old age group. The geriatric group had a higher rate of female than the non old age group (p=0.01). The most common mechanism of injury in the non old age group was driver traffic accident (23.9%). The average of ISS is higher in old age group (17.3±11.42 vs. 14.0±11.17, p=0.003). The mortality rate was higher in old age group (14.8%) than in non old age group (5.4%) (p=0.001). The major causes of death were different in both group; bleeding (old age group) vs. brain damage/sepsis or multiorgan failure (non old age group). The mortality rate increased steeply from 45 to 54. While pedestrian traffic accident was the major cause of death in the geriatric group, falls in the adult group accounted for the first cause of death.
**Conclusion:** The mortality rate is higher in the old age group and causes of accident and death are different in both groups. Therefore, these characteristics should be considered in the prevention of accidents and treatment in the emergency department of elderly trauma patients.
Objective: To improve of prehospital and interhospital management of trauma patient, the mobile trauma unit(MTU) was activated in the ulsan regional trauma center. This report is to introduce and share the experiences of MTU.

Methods: In October 2016, the MTU in the ulsan university hospital was initiated to transfer the severe injured trauma patient at the request of the National Emergency Management Agency or other emergent medical center. Two doctors and one nurse of trauma team went out as one unit of MTU.

Results: Twenty-one patients(10 males/11 females) were transferred by MTU. 12 patients were for prehospital and 9 cases were for interhospital transfers(Mean injury severity score = 21.7). There was no mortality during transportation or inhospital treatment.

Conclusion: In Korea, there is a gap of medical intervention during transportation of trauma patients. The mobile trauma unit can overcome this vulnerable point of trauma victims and could improve there morbidity and mortality.
Oral Presentation 3

June 24, 2017 (Sat.) 13:30–15:00 / 4F. Seminar 4

Moderators
Do Joong Park (Seoul National Univ. Bundang Hospital)
Oh Hyun Kim (Yonsei Univ. Wonju College of Medicine)
Oral Presentation 3 / OP 3–(1)

Analysis of Cultivator–Related Trauma Cases in a Regional Trauma Center in the Rural Area of Gyeongbuk Province

Ulkang Hwang¹, Seokhwa Youn¹, Chanyoung Park²
Andong Medical Group Hospital¹, Pusan National University Hospital²

Objective: To analyze the data of patients who suffered trauma in a cultivator accident and visited the trauma center in rural Gyeongbuk Province.

Methods: We retrospectively reviewed the medical records and Korean Trauma Data Bank data of 120 patients who suffered cultivator-related traumas and visited the rural regional trauma center in Gyeongbuk Province from January to December 2015.

Results: The age of the patients ranged from 35 to 96 years (mean, 70 years). Ninety-one (75.8%) patients were men, and twenty-nine (24.2%) were women. Most of the patients were in their 70s (46 men [50.5%] and 13 women [44.8%]). In total, 113 patients (94.1%) arrived at the regional trauma center by ground transport and 7 (5.9%) arrived by air transport. Ninety-eight patients (81.7%) were transported to the regional trauma center directly from the scene of the accident, and twenty-two (18.3%) were transferred from another medical institute. The mean time from the accident to arrival at the emergency department was 139 minutes, and only 46 patients (38.3%) arrived within 1 hour. Twelve (10.0%) patients died, including two deaths on arrival and two post-cardiopulmonary resuscitation (CPR) deaths in the emergency department. All deaths were of male cultivator operators. The causes of death were shock (hypovolemic, traumatic, or septic), subdural hematoma (open), hemothorax, rhabdomyolysis, and pneumonia.
Conclusion: In rural areas such as Gyeongbuk Province, where older people often drive cultivators, there can be serious consequences when an accident occurs. Therefore, it is necessary to develop a transportation system to allow early treatment of cultivator accidents at the regional trauma center.
Analysis of Mortality and Preventable Death Rate of Trauma Patients in Single Center Experience

Young Un Choi, Jae Gil Lee
Yonsei University, College of Medicine

Objective: Injury severity score (ISS) and revised trauma score (RTS) are used to decide severity and evaluate prognosis.

Using this, we can calculate survival rate as trauma and injury severity score (TRISS) method.

Purpose of this study is to analyze the relationship between TRISS score and death rate in our centre for 2 years and patterns and association between death rate and mechanisms of trauma.

Methods: From January 2015 to December 2016, medical charts of 759 CP-activated trauma patients were reviewed.

IBM SPSS ver. 20.0 was used for statistical analysis.

Results: Trauma mechanism were traffic accident in 9 cases, fall down injury in 4 cases in 13 cases of dead patients whose TRISS score over 50%.

Causes of death were traumatic brain injury (TBI) in 4 cases, multi-organ failure in 4 cases, hypovolemic shock in 2 case, pulmonary fat embolism in 1 case and ARDS in 2 cases.

Conclusion: Preventable death rate was 27%.

Trauma mechanism were traffic accident in 9 cases, fall down injury in 4 cases in 13 cases of dead patients whose TRISS score over 50%.

Main causes of death were traumatic brain injury (TBI) in 4 cases, multi-organ failure in 4 cases,
hypovolemic shock in 2 case, pulmonary fat embolism in 1 case and ARDS in 2 cases,

Non-traumatic mortality- ECMO 2 cases and fat embolism,

Limitation of this study is that pannel review was not progressed and pre-hospital phase factor was not considered,
Mortality Reduction of Major Trauma Patients after Setting Up Level 1 Trauma Center

Young-il Roh, Oh Hyun Kim
Yonsei University Wonju College of Medicine

Objective: Trauma systems have been shown to decrease injury-related mortality. The purpose of this study was to evaluate the change in mortality rate of major trauma patients (ISS > 15) between before and after establishment of Level I trauma center.

Methods: The study were conducted during 20 months and compared mortality rate by using Trauma Injury and Severity Score (TRISS) method each 10 months of before and after establishment of level I trauma center (October, 2013 to July, 2014 versus October, 2014 to July, 2015). Thus, study participants were divided into 2 groups such as non-trauma center group and trauma center group.

Results: Total number of participants was 541 and among them, 278 (51.5%) were visited after the trauma center. The Z and W statistics showed better outcome in the trauma center group than non-trauma center group. (Z statistic, 2.635 vs -0.70; P = 0.008 vs 0.483; W statistic, 4.640 vs. -1.20) There were also meaningful time reduction on both 'ER visit to emergency operation' time (versus 118.0 min 142.50 min, p= 0.020) and 'ER visit to admission of Intensive Care Unit' time (202.0 min versus 259.0 min p=0.035) in the trauma center group.

Conclusion: TRISS analysis revealed that the trauma center group was associated with significantly improved survival compared to THE non-trauma center group.
The Relationship between CDC Field Triage and Injury Severity Score

Kang Kook Choi, Byung Chul Yu, Gil Jae Lee, Min A Lee, Dae Sung Ma, Sung Youl Hyun
Gachon University Gil Medical Center

Objective: Korean trauma system has been organized recently. Prehospital transfer system is a one of the important components of trauma system, Korea is using the CDC field triage as a guideline for the trauma filed triage. However, there is no study about the relationship between the CDC filed triage and ISS in Korea.

Methods: We performed retrospective cohort study.

Results: 1524 patients were enrolled in this study from 2015.01.01-2015.06.30. Of these patients, 234 patients were 15 > ISS. 42% of the patients who satisfy CDC field triage were 15 > ISS.

Conclusion: The development of new field triage according to Korean-trauma characteristics is needed.
Characteristics of Patients Admitted Trauma ICU with ISS $\leq 15$ Versus Patients Admitted General Ward with ISS $> 15$: the Definition of Severe Trauma Need to be Changed

Byungchul Yu, Jungnam Lee, Mina Lee, Kangkook Choi
Gachon University Gil Hospital

Objective: The definition of severe injured patients is difficult to describe. Injury severity score (ISS) over fifteen is generally accepted in the trauma field globally, despite some limitations. We analyzed the patients admitted to a trauma center for three years.

Methods: A retrospective review of the data base from a single trauma center in Korea was conducted. For three years period, there were 8,884 trauma admissions. We analyzed trauma patients who admitted to trauma intensive care unit (TICU) with ISS15 as group 2.

Results: The number of patients was 968 in group 1 and 155 in group 2. Mean age, systolic blood pressure on admission, Glasgow coma scale (GCS) were not statistically different. In group 1, penetrating injury, red blood cell and plasma transfusion and trauma team activation were more frequent ($p < 0.05$). Mortality was higher in group 1 than in group 2 ($p = 0.015$).

Conclusion: ISS is generally good scoring system to predict prognosis. However, ISS could not indicate the severity of the trauma in some situations.
Oral Presentation 4

June 24, 2017 (Sat.) 15:30–17:00 / 1F. Seminar 1

Moderators
Young Hoon Yoon (Korea Univ. Hospital)
Bo-Ra Seo (Mokpo Hankook Hospital)
Objective: The aims of the Korean Neuro-Trauma Data Bank System (KNTDBS) are to evaluate and improve treatment outcomes for brain trauma, prevent trauma, and provide data for research. Our purpose was to examine the mortality rates following traumatic brain injury (TBI) in a retrospective study and to investigate the sociodemographic variables, characteristics, and causes of TBI-related death based on data from the KNTDBS.

Methods: From 2010 to 2014, we analyzed the data of 2617 patients registered in the KNTDBS. The demographic characteristics of patients with TBI were investigated. We divided patients into 2 groups, survivors and nonsurvivors, and compared variables between the groups to investigate variables that are related to death after TBI. We also analyzed variables related to the interval between TBI and death, mortality by region, and cause of death in the nonsurvivor group.

Results: The frequency of TBI in men was higher than that in women. With increasing age of the patients, the incidence of TBI also increased. Among 2617 patients, 688 patients (26.2%) underwent surgical treatment and 125 patients (4.7%) died. The age distributions of survivors vs. nonsurvivor groups and mortality rates according the severity of the brain injury, surgical treatment, and initial Glasgow Coma Scale (GCS) scores were statistically significantly different. Among 125 hospitalized nonsurvivors, 70 patients (56%) died within 7 days and direct brain damage was the most common cause of death (80.8%). The time interval from TBI to death differed depending
on the diagnosis, surgical or nonsurgical treatment, severity of brain injury, initial GCS score, and cause of death, and this difference was statistically significant.

**Conclusion:** Using the KNTDBS, we identified epidemiology, mortality, and various factors related to nonsurvival. Building on our study, we should make a conscious effort to increase the survival duration and provide rapid and adequate treatment for TBI patients.
Objective: There have been many changes in treatment paradigm of trauma patients since the introduction of the doctor helicopter transport system in our medical center. We evaluate the effectiveness of doctor helicopter transport system focused on traumatic brain injury patients.

Methods: Retrospective review of 376 patients who transported by doctor helicopter system between February 2016 and March 2017 at Dankook university hospital was performed. Of total 137 trauma patients, we included 45 patients having traumatic brain injury as main diagnosis. We reviewed the age, sex, Glasgow Coma Scale (GCS), diagnosis, operation, Injury severity score (ISS), Glasgow Outcome Scale (GOS) and time to surgery. We classified the patients in to three groups according to the extent of injury (Head Abbreviation injury score (AIS)), time to operation and appropriate treatment.

Results: Among 45 patients, there were 36 males and 9 females with an average age 60.3 years (range 3–84). The mean ISS was 24.5 ranging from 9 to 50 and the mean AIS of head was 4.28 including 26 with AIS 5, 8 with AIS 4 and 11 with AIS 3. Among these patients, 25 patients required immediately surgical treatment, and all of them were performed within 90 minutes after admission in our hospital except 2 patients. Overall mortality rate (GOS 1) was 24% (11 of 45) and severe disability rate (GOS 2, 3) was 33% (15 of 45) and moderate or mild disability rate (GOS 4, 5) was 43% (19 of 45).
**Conclusion:** We conclude that 29 patients showed the usefulness of the doctor helicopter transport system for TBI was 64% and all patients had good outcomes except patients with poor grade neurologic scale. However, 7 patients which needed improvement of transport and treatment had poor outcome mostly. There were appropriate treatments of mostly patients if trauma team was activated.
Radiologic Findings and Patient Factors Associated with 30-Day Mortality after Surgical Evacuation of Subdural Hematoma in Patients Less Than 65 Years Old

Je-II Ryu¹, Yu-Deok Won¹, Myung-Hoon Han¹, Jin-Hwan Cheong¹, Jong-Hoon Song², Ki-Chul Park², Hyun-II Kim³

Department of Neurosurgery, Hanyang University Guri Hospital¹, Department of Orthopedic surgery, Hanyang University Guri Hospital¹, Department of Surgery, Hanyang University Guri Hospital³

Objective: The purpose of this study is to evaluate the associations between 30-day mortality and various radiological and clinical factors in patients with traumatic acute subdural hematoma (SDH). During the 11-year study period, young patients who underwent surgery for SDH were followed for 30 days. Patients who died due to other medical comorbidities or other organ problems were not included in the study population.

Methods: From January 1, 2004 to December 31, 2014, 318 consecutive surgically-treated traumatic acute SDH patients were registered for the study. The Kaplan-Meier method was used to analyze 30-day survival rates. We also estimated the hazard ratios of various variables in order to identify the independent predictors of 30-day mortality.

Results: We observed a negative correlation between 30-day mortality and Glasgow coma scale score (per 1-point score increase) (hazard ratio [HR], 0.60; 95% confidence interval [CI], 0.52-0.70; p<0.001). In addition, use of antithrombotics (HR, 2.34; 95% CI, 1.27-4.33; p=0.008), history of diabetes mellitus (HR, 2.28; 95% CI, 1.20-4.32; p=0.015), and accompanying traumatic subarachnoid hemorrhage (hazard ratio, 2.13; 95% CI, 1.27-3.58; p=0.005) were positively associated with 30-day mortality.
**Conclusion:** We found significant associations between short-term mortality after surgery for traumatic acute SDH and lower Glasgow Coma Scale scores, use of antithrombotics, history of diabetes mellitus, and accompanying traumatic subarachnoid hemorrhage at admission. We expect these findings to be helpful for selecting patients for surgical treatment of traumatic acute SDH, and for making accurate prognoses.
Does Initial Activation of Neurosurgeon have an Effect on Severe Trauma Treatment? 
: For Traumatic Brain Injury (TBI) Patients

Taekyoo Lim, Wookyung Kim
Gachon University Gil Medical Center

Objective: Trauma centers are usually considered to improve prognosis. But the system is somewhat different by region. In Korea, organization recommends to including neurosurgeon in first trauma activation team. The aim of this study was to analyze the system to determine the effect of traumatic brain injury(TBI) on the outcome.

Methods: From 2015 March until 2017 February, 315 patients who had over 15 Injury Severity Score(ISS) diagnosed TBI in single trauma center. We retrospectively collected ISS, Revised Trauma Score (RTS), Trauma and Injury Severity Score (TRISS) and Glasgow Coma Scale (GCS) to assess Characterization of injury severity. For determining outcome, we collected Glasgow Outcome Scale (GOS) and estimated mortality. We divided the patients into two groups based on whether initial trauma team included neurosurgeon and compared the data according to the degree of TBI.

Results: Two hundred seventy patients enrolled the study. Mean age was 50.8±16.0 and most common cause of TBI was traffic accident (45.2%). 140 patients included Activated-neurosurgeon Group, 80 of 140 patients were classified moderate to severe TBI. 74 of 130 patients were moderate to severe TBI in the other group. There was no significant deference of ISS, RTS, TRISS, and GCS between two group, however, the mortality rate was slightly lower when neurosurgeons were included initial trauma team (20.0% vs 25.7%).

Conclusion: Initial activation of neurosurgeons in severe trauma patients may lower mortality in TBI patients. Further investigation will be needed.
Objective: To detect post-concussion syndrome (PCS) in Korean patients after minor head injury.

Methods: An observational cohort study of patients presenting to the emergency department of a major academic Korean hospital with mild head injury. Which means patient with any trauma related symptom was included. A researcher followed up the patient his or her symptoms by phone approximately 2 weeks after their visit.

Results: In total 234 patients, only 8% reported any post-concussion symptoms and 0.4% had three or more symptoms which might have met criteria for PCS. The median peak onset of symptoms was 3 days after injury. Comparing with the United states, 0.4% versus a lower range of 25%. Even if in minor head injury, one subject met criteria for the ICD 10 definition of post-concussion syndrome.

Conclusion: Despite the increasing interest, social concern for concussion and PCS is lacking. In minor head injury patients, whoever with any symptom related to the trauma was included. The incidence of PCS may be lower in Korea, due to cultural difference or mild injury compare to other studies. Also could give an idea that mild trauma could also cause the PCS.
Objective: It was a pilot study for developing an algorithm to determine the presence or absence of cervical spine injury by analyzing the severity factor of the patients in motor vehicle occupant accidents.

Methods: From August 2012 to October 2016, we used the KIDAS database, called as Korean In-Depth Accident Study database, collected from three regional emergency centers. We analyzed the general characteristics with several factors. Moreover, cervical spine injury patients were divided into two groups: Group 1 for from Quebec Task Force (hereinafter 'QTF') grade 0 to 1, and group 2 for from QTF grade 2 to 4. The score was assigned according to the distribution ratio of cervical spine injured patients compared to the total injured patients, and the cut-off value was derived from the total score by summation of the assigned score of each factors.

Results: 987 patients (53.0%) had no cervical spine injuries and 874 patients (47.0%) had cervical spine injuries. QTF grade 2 was found in 171 patients (9.2%) with musculoskeletal pain, QTF grade 3 was found in 38 patients (2.0%) with spinal cord injuries, and QTF grade 4 was found in 119 patients (6.4%) with dislocation or fracture, respectively. We selected the statistically significant factors, which could be affected the cervical spine injury, like the collision direction, the seating position, the deformation extent, the vehicle type and the frontal airbag deployment. Total score, summation of the assigned each factors, 10 was presented as a cut-off value to determine
the cervical spine injury.

**Conclusion:** In this study, it was meaningful as a pilot study to develop algorithms by selecting limited influence factors and proposing cut-off value to determine cervical spine injury. However, since the number of data samples was too small, additional data collection and influencing factor analysis should be performed to develop a more delicate algorithm.
Oral Presentation 5

June 24, 2017 (Sat.) 15:30-17:00 / 1F. Seminar 2

Moderators

Yong-Cheol Yoon (Gachon Univ. Gil Hospital)
Sung-Hyuck Choi (Korea Univ. Guro Hospital)
Relations between Fitting or Shell Type of Bicycle Helmet and Head Injury

Kun Hwang\textsuperscript{1,2}, Yeong Seung Ko\textsuperscript{1,2}, Yun Moon Jeon\textsuperscript{1,2}

\textit{Inha University School of Medicine}\textsuperscript{1}, \textit{Inha University Hospital}\textsuperscript{2}

**Objective**: It is well known that helmets reduce the risk of head and facial injury in cycling crashes. However, many cyclists do not wear their helmets correctly. The aim of this study was to review the relationship between fitting or shell type of bicycle helmets and head injury, systematically.

**Methods**: PubMed, Embase, and Cochrane library were searched for articles published before December 2014. Studies that did not allow evaluation of the relationship between fitting or shell type of bicycle helmets and head injury were excluded. The data were summarized and the odds ratio (OR) between the helmet fitting or helmet types and head injury were calculated. A statistical analysis was performed with Review Manager.

**Results**: There was a significant increased risk of head injury in poor fitters over excellent fitters (OR, 2.62). There is no significant increased risk of head injury according to the helmet types (no shell helmet over hard shell helmet; OR, 1.53, $p=0.24$, thin shell helmet over hard shell helmet; OR, 1.60, $p=0.11$). However, ‘approved’ helmets could reduce head injury at greater rates than for non-approved helmets (OR 1.98). Approved qualifies as certified by a governmental body. An excellent helmet fit should include space in front or side of the helmet should be less than 2 fingers deep, strap tightened enough to pull down front over forehead when mouth opened, and side-to-side movement or front-to-front movement should be less than 2.54cm.
Conclusion: Education and continuous campaigning to choose suitable helmets and correct helmet usage should be required.

Figure 1. Helmet fitting and head injury. (A) – Good fit versus Excellent fit, (B) – Fair fit versus Excellent fit, (C) – Poor fit versus Excellent fit

Figure 2. Helmet types and head injury. (A) – No shell versus Hard shell, (B) – Thin shell versus Hard shell
Multimodal Treatment for the Severe Bleeding Pelvic Fracture

Kang Kook Choi, Byung Chul Yu, Gil Jae Lee, Min A Lee, Dae Sung Ma, Jung Nam Lee
Gachon University Gil Medical Center

Objective: Bleeding pelvic fracture is a challenge to the trauma surgeon. The hemorrhage from the fracture pelvis can be originated from three different sources, bone, artery, and vein. Therefore multimodal treatment strategy seems to be adequate.

Methods: Retrospective cohort study was performed. 154 pelvic fracture patients admitted to ICU were enrolled in this study from 2013,01,01-2017,05,30.

Results: Overall mortality was 10.8%. The mortality of the triple modality was 13.5%. TAE was performed for 40 patients. The preperitoneal pelvic packing was performed for 25 patients.

Conclusion: Multimodal treatment should be considered for the severe bleeding pelvic fracture.
Background: Pelvic fractures can lead to life-threatening hemorrhage, which are a common cause of morbidity and mortality in trauma. Thus, early identification of patients with pelvic fractures at risk severe bleeding requiring urgent hemorrhage control is crucial. This study aimed to investigate factors predicting the need for hemorrhage control in blunt pelvic trauma.

Methods: Medical records of 878 trauma patients were reviewed retrospectively between January 2015 and April 2017. We enrolled 91 patients with pelvic fracture due to blunt trauma and were more than 15 years old. Pelvic fracture pattern was classified according to Young-Burgess. A multivariate logistic regression model was used to determine independent predictors for the need pelvic hemorrhage control.

Results: The most common pelvic fracture pattern was Lateral Compression (LC) I (71.4%), followed by LC II (15.4%), and Vertical Shear (5.5%). Of 91 patients, 16 (17.6%) required a pelvic hemorrhage control intervention. Factors associated with the need for pelvic fracture hemorrhage control intervention on univariate analysis included pelvic fracture pattern, increasing age, and hypothermia. Vertical shear fracture patterns and hypothermia predicted the need for pelvic hemorrhage control on multivariate analysis.

Conclusion: Patients with vertical shear fracture patterns or hypothermia are at risk of bleeding requiring pelvic hemorrhage control.
The Results of Membrane–Induced Osteogenesis in Posttraumatic Bone Defects

Jin-Kak Kim, Jae-Woo Cho, Ki-Ho Moon, Beom-Su Kim, Do-Hyun Yeo, Jong-Keon Oh
Korea University Guro Hospital

Background: It is absolutely challenging to treat posttraumatic bone defects surgically. Masquelet has reported that membrane-induced 2-step operation can accelerate osteogenesis in the zone with bone defects. We, the authors, are performing membrane-induced osteogenesis for patients suffering from post-traumatic bone defects. Here, we are going to analyze the results of their treatment and also the effects of the operation.

Methods: We selected 54 subjects who had received treatment with membrane-induced osteogenesis and had been observed for over one year. Here, retrograde analysis was conducted. We evaluated the length of bone defects and the presence of union radiologically. Analyzing the results of the tissue culture, we evaluated the recurrence of infection or initial bacteria.

Results: The mean age of those 54 patients was 46. 47 were males, and 7 were females. The average length of their bone defects was 81.77mm. All patients, except for 8 cases in which infection recurred, got union. Infection recurred even though we operated the bone graft when the culture was found to be negative. In 1 case, the donor site for the bone graft showed infection. 5 out of the 8 recurrence cases have gained union, and 2 cases are waiting for union after the second operation, and only 1 case has received amputation.

Conclusion: In patients with severe bone defects, induced-membrane osteogenesis can be an excellent treatment. It is also useful for treating bone defects accompanied with infection.
The Incidence of and Factors Affecting Fixation Failure after Open Reduction of Symphyseal Diastasis

Joon-Woo Kim, Chang-Wug Oh, Kyeong-Hyeon Park, Jeong-Woo Kim, Jung-Won Han
Kyungpook National University Hospital

Objective: This study was undertaken to evaluate the incidence of symphyseal fixation failure and to identify its influencing factors.

Methods: A total of 31 symphyseal diastasis treated by anterior open reduction and plate fixation were reviewed. The minimum follow-up was 12 month. These included 24 cases of anteroposterior compression injury, 5 cases of lateral compression injury, and 2 cases of mixed vector injury, described by Young and Burgess. Of these, 24 cases had posterior ring injury, eight of which needed stabilization. The pubic symphysis was fixed with 1 plate in 13 cases and 2 plates in 18 cases. The quality of reduction was divided into excellent (10mm) according to the gap of pubic symphysis with postoperative radiograph. The relationship between fixation failure and the potential influencing factors were analyzed.

Results: The degrees of diastasis was improved from 26mm to 6.8mm on the average after surgery. Excellent reduction was achieved in 14 cases, fair in 11 cases and poor in 6 cases. Twelve patients were found to have loosening or breakage of screw and/or plate at a mean 73.2 days postoperatively. Nineteen patients showed healing of disrupted pubic symphysis without any problem of fixed implants, 8 patients healed without loss of reduction although loosening or breakage of implants were present, and 4 patients showed implant failure with significant loss of reduction of pubic symphysis that required revision surgery. The number of plate and screws, fracture classification, and the presence of posterior ring fixation did not influenced on
the outcomes. However, the poorer the quality of reduction after surgery, the more unsatisfactory results were obtained (p=0.02, Pearson’s chi-square test).

**Conclusion:** Our finding demonstrate that poor quality of reduction causes instability of pubic symphysis and resultant fixation failure in the treatment of symphyseal diastasis.
Oral Presentation 6

June 24, 2017 (Sat.) 15:30–17:00 / 4F. Seminar 4

Moderators

Namyeol Kim (Korea Univ. Guro Hospital)
Seon Hee Kim (Pusan National Univ. Hospital)
Experience of Emergency Department Thoracotomy in Single Institution

Dae Sung Ma, Seok Joo, Sung-Jin Kim, Kang Kook Choi, Jungnam Lee, Sung Youl Hyun, Yang Bin Jeon
Trauma Center, Gachon University Gil Medical Center

Objective: Emergency department thoracotomy (EDT) is often performed as a salvage maneuver in impeding cardiac arrest or cardiac arrest cause by trauma.

This study is to describe to our experiences for emergency department thoracotomy in extremis trauma.

Methods: This is a retrospective clinical analysis for patients were undergone emergency department thoracotomy in Trauma Center of Gachon University Gil Medical Center from January 2014 to December 2016.

Results: All of traumatized patients who were arrived at our hospital during study period were 9501. Among of them, emergency department thoracotomy was performed 13 cases. Male were 9 and female were 4. Mean age were 42. According to injury mechanism, stab injury were 6 and pedestrian TA were 5 and fall down 1. All patients were undergone CPR in TER. Among of them, After ROSC and transfer to OR were 8.

Conclusion: Emergency department thoracotomy for extreme trauma patients may be an important procedure in providing the last survival opportunity.
Immediate Post–Laparotomy Hypotension in Severe Traumatic Hemoperitoneum

Kang Kook Choi, Byung Chul Yu, Gil Jae Lee, Min A Lee, Dae Sung Ma, Jung Nam Lee
Gachon University Gil Medical Center

Objective: Immediate post-laparotomy hypotension (PLH) is a precipitous drop in blood pressure, caused by the sudden release of abdominal tamponade after laparotomy in severe hemoperitoneum. Adequate preoperative preparation and resuscitation requires time and effort. The effect of laparotomy on blood pressure is undefined in patients with significant hemoperitoneum.

Methods: A total of 163 patients underwent laparotomy for trauma from January 1st 2013 to December 31st 2015. Exclusion criteria included: negative laparotomy, only a hollow viscous injury, and hemoperitoneum<1000 ml. Of these, 62 patients were enrolled in this retrospective review. PLH was defined as a decrease in mean arterial pressure (MAP) ≥10 mmHg after laparotomy within 10 minutes. The MAP at five minutes before laparotomy and 5/10 minutes after laparotomy were compared.

Results: The mean estimated hemoperitoneum is 3516 ml. Seventeen of 62 patients (27%) had PLH, MAP before laparotomy was not significantly different from MAP after laparotomy at the individual time points (five minutes after laparotomy: 74 vs 75 mmHg, p<0.001, 10 minutes after laparotomy: 74 vs 78 mmHg, p<0.001). Overall in-hospital mortality was 15/62 (24%). PLH did not increase mortality significantly (4/17 [23%] with PLH vs 11/45 [24%] without PLH, p=0.94).

Conclusion: PLH may be less frequent and less devastating than is often considered. Surgical hemostasis at laparotomy is important, as is preparation to manage PLH in patients with significant hemoperitoneum. The effect of the preparation on outcomes requires further study. Laparotomy with adequate resuscitation may explain the equal outcomes in the two groups.
Objective: Venovenous extracorporeal membrane oxygenation (v-v ECMO) can be a useful supportive treatment for trauma-induced adult respiratory distress syndrome (ARDS). However, there is a possibility of complications related to heparin circuit, such as bleeding and infection. Therefore the application of ECMO for trauma patients (especially traumatic brain injury) remains controversial. Recently heparin free ECMO has been introduced to patients with brain hemorrhage and hemorrhagic shock.

Methods: We describe eleven trauma patients with ARDS who were judged to be necessary by ECMO admitted to the Yonsei University Hospital, from March 2013 to March 2017. The following clinical data were collected and reviewed, patient demographics, Injury Severity Score, Injury mechanism, admission Glasgow Coma Scale(GCS) score, comorbidities, pre-ECMO clinical status, arterial blood gases, ventilator indicators, vv-ECMO details (cannulation sites, duration, heparin use), hospital outcomes and length of stay focusing on the efficacy of heparin free vv-ECMO on patients with bleeding risk especially traumatic brain injury.

Results: Eleven patients were included. Three patients were determined to need vv-ECMO, but died before application. One patient considered need to be adopted by ECMO because of trauma induced ARDS, but was recovered with the use of intravenous corticosteroids. Seven patients underwent v-v ECMO and four of them died. Six patients received heparin free vv-ECMO, one received vv-ECMO using heparin had an intraperitoneal bleeding due to heparin toxicity. Four of
eleven had traumatic brain injury. One patient had to replace the cannulation site with kinking of the catheter, but there were no complications or cause of death related to the ECMO. Mean ventilator use day was 17.9±13.4 days, Median LOS was 46.5(1-159) days. Mean ISS was 30.8±15.6 and mean age was 43.3±23.2. 8 of 11 were male.

**Conclusion:** Heparin free vv-ECMO in ARDS of trauma patients shows the possibility of being salvageable therapy for patient with high bleeding risk or traumatic brain injury.
Oral Presentation 6 / OP 6-(4)

Rib Fixation for a Patient with Severely Displaced and Overlapped Costal Cartilage Fractures: A Case Report

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Objective: Rib fixations for flail chest or displaced rib fractures are not a new technique. However, reports on rib fixations involving costal cartilage fractures are very few and surprisingly there are no reports of internal fixations involving only the costal cartilage in the English literature. The diagnosis is difficult and the necessity of the procedure may be quite controversial. Placing plates in screws into the costal cartilage alone may seem unstable and easily dislodged or stripped through the cartilage.

Methods: We report a 31-yr-old male scuba diver instructor who underwent rib fixations over his 7th and 8th costal cartilage ribs for severe pain. The procedure was done with conventional plates and screws.

Results: He had the plates and screws removed 2 months later due to lingering pain, but with them removed he is now quite happy with the results without pain.

Conclusion: The procedure for fixation of painful overlapped costal cartilage is quite simple and can be done with the usual conventional methods, fixating plate and screws directly over the cartilage alone without fixation over the bony rib,
Epidemiology of Burn Patients in Military

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Objective: We investigated the burn epidemiology, clinical differences and degree of tissue injury to burn types. Such data can propose proper educational program designs to suit the community.

Methods: We had a retrospective clinical analysis of 908 acute burns for 7 year period (2010~2016). These included patient demographics, causes, tools of injuries and result of treatment.

Results: The male was predominant(905; 89.7%). The non-officer soldiers(752; 82.8%) were the common victims. The flame burns(FB: 325; 35.8%) was the most common and followed scald burns (SB: 305; 34.6%), contact burns(CB: 219; 24.1%), electric burns(EB: 45; 4.9%) and chemical burns(ChB): 14; 1.5%.

SB had average 3.9% TBSA. Most of them were superficial(251; 82.3%) by spillage of hot water/liquid food on lower leg(139; 45.6%) or foot,(122; 40.0%). Most were treat by simple dressing(283; 92.8%).

FB had relatively large wound of 9.4%. The 209(64.3%) had superficial wound by catching fire to flammable oils(105; 32.3%) or to bomb powders(95; 29.2%) on head and neck(194; 59.7%) or hands(188; 57.8%). They underwent simple dressing(271; 83.4%) and allografts or flap surgery(54; 16.6%). The 38(11.7%) showed wound hypertrophy. There were 13(4.0%) corneal erosion or burns. The mortality rate was 1.2%(4 patient).
CB had small (1.1% TBSA), deep wound (171; 78.1%) by application of hotpacks (175; 79.9%) to nude skin of lower leg. The more (133; 60.7%) were treated by allograft or flap surgery.

ChB had 3.8% TBSA. The most of wounds were superficial (13; 92.9%) and treated well.

EB had 7.0% TBSA. They had serious wound by touch to high tension live line (31; 70.5%). They had lots of complications; LOC (6; 13.6%), nerve injuries (5; 11.1%), major amputations.

Conclusion: The cook should put on a protector over the boots during work. The lighter or smoking should be prohibited during work by flammable liquids or bomb powders. Teaching of not to apply the hotpack on nude skin is very important. The high tension live line is always very dangerous.
Objective: The occurrence of delirium is well known risk factors associated with poor prognosis. The purpose of this study is to identified risk factors for delirium after trauma and to predict the development of delirium.

Methods: Data was collected retrospectively from August 2015 to December 2016 at a regional trauma center on consecutive trauma patients. Head trauma patients and patients under 18 years were excluded. A multivariate logistic regression was performed to identify risk factors for delirium.

Results: Of the 264 patients who met criteria, 32 (12.1%) were diagnosed with delirium. The mean age of the patients was $52\pm 19$ years, 15.7 for Injury Severity Score (ISS), 14.4 for Glasgow Coma Scale (GCS) 14.4 and 3.6 days for Intensive Care Unite (ICU) stay. In addition, chest Abbreviated Injury Score (AIS) was 1.2±0.9, abdomen AIS was 2.9±0.1 and extremity AIS was 1.0±0.9.

Among the factors, Age (odds ratio [OR], 1.034; 95% confidence interval [CI], 1.005-1.064; $p = 0.022$), Sex (odds ratio [OR], 0.125; 95% confidence interval [CI], 0.028-0.553; $p = 0.006$), Hemoglobin level (odds ratio [OR], 0.817; 95% confidence interval [CI], 0.681-0.980; $p = 0.03$), ICU day (odds ratio [OR], 1.121; 95% confidence interval [CI], 1.027-1.224; $p = 0.018$), abdominal operation (odds ratio [OR], 2.924; 95% confidence interval [CI], 1.199-7.133; $p = 0.018$) were correlated with delirium.
Conclusion: Abdominal operation is strongly associated with delirium in patients with abdominal injury. Careful observation of changes in consciousness after surgery is necessary.
A Case Report of Iatrogenic Lung Injury by Feeding Tube with Guide Wire Insertion in Traumatic Brain & C-Spine Injury Patient

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Objective: we report a case of iatrogenic lung injury in traumatic brain & C-spine injury patient,

Methods: This patient is 68 year old male with multiple traumatic injury, mainly traumatic brain hemorrhage & C-spine fx c spinal shock, due to motocycle acidents,
so our trauma team managed ventilator care with tracheostomy in intensive care unit, because of spinal cord injury at the C-4 level with diaphragm paralysis and drowsy mentality.

Results: This paient had a 16fr. levin nasogastric tube for feeding but somtimes NG tube is clogged so we decided to change 12fr. Kangaroo™ Feeding Tube with guide wire at 22 hospital days by NS resident.
A postinsertion chest X-ray revealed the tube to be in Rt. pleural space with pneumothorax. Immediately after chest CT scan, 24fr.chest tube was inserted and the enteral feeding tube was removed, To the next emergency bronchosopy was performed to determine whether surgery was performed. Bronchoscopic finding was no endobronchial lesion within visible range.
After 10days conservative manage and removed chest tube, the patient recovered without any sequelae.

Conclusion: Inadvertent perforation of the tracheopulmonary tree during enteral feeding tube insertion is not uncommon in the neurologically impaired, and the seriously ill patient,
Especially we have to be more carefully insertion of these narrow bore enteral feeding tubes with inner guide wire in traumatic brain & C-spine injury patient.
After blunt liver injury, there are many complications which are delayed rupture, hemobilia, AV fistula, pseudo-aneurysm, biloma and abscess formation. We experienced two complication cases that occurred after massive blunt liver injury and report it.

1. 42 years old male patient, he visited ER due to abd pain and Rt. chest wall pain. While he was working on a fishing boat, he got stuck in the ropes. He had difficulty in breathing and had direct tenderness on the Rt. abdomen, Vital was stable so, we decided to do conservative Tx. But after 5 days, BP and hemoglobin decreased, So we did exploratory laparotomy and found deep laceration at Rt. hepatic lobe. We did pad packing and removed the pads after 2 days.

F/U abdominal CT revealed large hematoma at Rt. hepatic lobe so inserted percutaneous catheter. But, in the F/U CT took several days later, there are no significant change compared to previous CT. So did fistulogram and found fistula between hematoma and Rt. IHBD, it means that was a biloma. He was treated conservatively by using antibiotics and PCD, he discharged POD#99 without any complication.

2. 44 years old male patient, he visited ER due to abd pain, chest wall pain and Rt. shoulder pain. On a CT image, there was active bleeding at liver, we did exploratory laparotomy and found bleeding focus at seg 5 and 8. So did pad packing and removed the pad after 2 days, POD #20, the F/U CT revealed two pseudo-aneurysms at seg 5 and 8, so did coil embolization without any complication.
complication after blunt liver injury doesn't happen frequently but it may be fatal if it occurs. So early detection is very important.

Therefore, the above complication should always be kept in mind when there is a symptom,
Clinical Role of Emergent Interventional Procedures for Traumatic Injuries in a Regional Trauma Care Center

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Objective: Hemodynamically unstable traumatic patients represent therapeutic challenges for the traumatologist and interventional management is now regarded as essential. We conducted this retrospective study to figure out the role of interventional procedure in trauma care.

Methods: We performed a retrospective review of 514 patients who had undergone emergent interventional procedures at an angiographic suite of the Korean largest regional trauma center between January 2013 and March 2017. Annual number of patients, time interval from door to angiography, classification of interventional procedure, clinical profiles of patients, angiographic and clinical success rate, and recurrent bleeding rate were evaluated.

Results: A total of 2308 patients with an injury severity score of more than 15 were transferred to the trauma center and 514 (22.3%) patients were referred to angiographic suite. Transcatheter arterial embolization (TAE) was performed in 428 patients who all underwent CT angiography for the evaluation of arterial hemorrhage. TAE was performed for hemorrhage associated with pelvic fractures (n=185), splenic lacerations (n=100), liver lacerations (n=76), musculoskeletal injuries (n=55), renal lacerations (n=47), hemothorax (n=44), adrenal bleeding (n=13), mesenteric bleeding (n=5), and other injuries (n=12). Stent-graft deployment including thoracic endovascular repair was performed in 15 patients. Initial hemostasis was achieved in 394 (91.4%) patients. Rebleeding occurred in 34 patients and hemostasis was achieved with the second embolization or operation.
Conclusion: Emergent interventional procedure is a safe and effective method for hemostasis after traumatic vascular injuries. The full-time availability of an angiographic suite in trauma center has served as a front-line therapeutic intervention that prevents delays in definitive bleeding control, and this improvement was enough to result in better clinical outcomes in trauma care.
Objective: Orbital trapdoor fractures are pure orbital floor fractures with herniation and entrapment of the orbital contents, leading to restricted eye movement and diplopia. Trapdoor fractures in children have been discussed widely in published reports; however, the treatment policy and outcome remain controversial, although early treatment has been advocated. Our retrospective study analyzed the long-term results of pediatric patients undergoing surgery for trapdoor fractures to determine the outcome in relation to the type of fracture and the timing and technique of intervention.

Methods: The present study included 28 patients (age range 6 to 16 years) who underwent surgery for trapdoor fractures from 2008 to 2015. The demographic, etiologic, radiologic, and surgical findings, interval between trauma and surgery, surgical techniques, and complications were recorded. Diplopia, ocular motility, dysesthesia, and scar quality were recorded at follow-up.

Results: The follow-up duration averaged 12 months. At follow-up, 16 patients underwent emergency surgery and 12 patients had diplopia and EOM limitation restored within 3 months. In addition, all 16 patients were found to have relieved their symptoms within 6 months. On the other hand, 12 patients underwent delayed op, 3 of whom had not fully recovered after 6 months. No sensory deficit of the skin or unesthetic eyelid scar was noted.
Conclusions: We found a correlation between the outcome and the timing of surgery for trapdoor fractures in the pediatric population. The success rate was significantly better when the fractures were treated within 24 hours of the injury. The results of the present study have strengthened the assertion that trapdoor orbital fractures pose a true surgical emergency.
Analysis of Korean Trauma Data Bank for 2 Years of a Single Trauma Center in Rural Area

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Andong Hospital

Objective: The aim of this report is to be a basic source for development of trauma system

Methods: 6884 people for KTDB From Jan, 1st in 2014 to Dec, 31th in 2015 were engaged in this analysis,

Methods: 6884 people for KTDB From Jan, 1st in 2014 to Dec, 31th in 2015 were engaged in this analysis,

Results: 6884 trauma patients were registered in KTDB for 2 years who were admitted to ward or died in emergency room (ER). Male were 4222 (61.3%), Blunt injuries were 6550 (95.1%) and penetrating injuries were 248 (3.6%). Mean age was 54.31 ± 19.96. Median time from the injury to the ER was 61 minutes, median time in ER was 91 minutes. Mean Injury Severity Score (ISS) was 6.43 ± 7.09 and mean ISS of intensive care unit patients was 17.69 ± 10.34. There were Trauma Related Injury Severity Score in 6539 patients, mean Probability of survival (Ps) of them was 0.967 ± 0.089, 175 patients were died and 105 of them were died after admission. Mean Ps of those 175 patients was 0.594 ± 0.324.

Conclusion: This study is thought to be the feasible data as a rural trauma center through comparative study with other trauma centers which are in urban area. Further studies about KTDB are thought to be needed for future development of trauma system.
Introduction: Retropharyngeal hematoma is rare but can make life-threatening airway obstruction. Prompt airway secure and surgical evacuation of hematoma are mainstay of treatment. But, due to insufficient experiences, we mistreated a patient with large retropharyngeal hematoma and we want to share this case.

Case: a 82 year old female patient was transferred due to neck swelling with difficulty of respiration after fall-down from a bed during sleep. Already, she was got cricothyroidotomy from previous hospital after identification of large retropharyngeal hematoma by CT. In the emergent department of our hospital, she got worse to resipirate. So, we underwent tracheostomy in the operating room. 6hrs later after first surgery, the neck swelling was getting worse and we did angioembolization to occuld bleeder successfully. Still, the ventilation difficulty was getting worse. Again 6 hrs later after angioembolization, she got reoperation to evacuate retropharyngeal hematoma, then she got better and she was discharged 14 days later after second operation.

Results: If, the retropharyngeal hematoma make airway difficulty, prompt airway secure and surgical evacuation of hematoma is the straightforward way to stabilize the patient, we did unneccessory procedures making just a trachoestomy and angioembolization while falling the patient into danger.
Heterotopic Ossification at Abdominal Incision Site

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Introduction: Heterotopic ossification is the process by which bone tissue develops outside of the skeleton.

Presentation of Case: A 50-year-old man underwent an emergent laparotomy for traumatic hemoperitoneum by traffic accident. After 50 days from a laparotomy, he was referred for hard structure at abdominal incision site. We noticed it was bone tissue that do not normally ossify through computed tomography. Then, a segment of abnormal bone tissue was excised and radiation therapy was done for preventing recurrence.

Conclusion: Heterotopic ossification at abdominal incision site is an extremely rare. It is benign condition but if any symptoms occur, excision is recommended.
Clinical Significance of Malnutrition Risk in Severe Trauma Patients: A Single Center Study

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**Objective:** Suboptimal nutritional status is often observed among hospitalized patients across all medical/surgical specialties. The objective of the present study was to (1) analyze the prevalence of malnutrition in hospitalized trauma patients and (2) to evaluate the relationship between malnutrition and selected clinical outcomes.

**Methods:** The retrospective field study was conducted between January 2016 and March 2017 in Pusan National University Hospital Trauma Center with a total number of 847 patients. Patients were checked for malnutrition using Pusan National University Malnutrition Screening, which include serum albumin, ratio of actual body weight to ideal body weight (%), total lymphocyte count, appetite, and dysphagia, within 24 hours and after 7 days of hospitalization, respectively. Clinical outcomes under consideration included 1) mortality, 2) length of hospitalization, and 3) length of stay in intensive care unit.

**Results:** The prevalence of malnutrition in hospitalized trauma patients was 54.7%. Patients at risk for malnutrition demonstrated older age (47.4 ± 18.9 vs. 54.9 ± 17.4 years, p<0.001) and higher injury severity score (23.6 ± 6.3 vs. 26.4 ± 8.8, p<0.001. Furthermore, patients at risk for malnutrition showed prolonged hospitalization (22 (15-32) vs. 35 (20-59), p<0.001) and prolonged length of stay in intensive care unit (3 (2-8) vs. 10 (4-18), p<0.001). Furthermore, the incidence of mortality in patients at risk for malnutrition was higher in the patients group with malnutrition risk (1.6% vs. 6.3%, p=0.001).
**Conclusion:** Malnutrition is widespread regarding hospitalized patients with severe trauma and results in suboptimal clinical outcome. Especially elderly trauma patients and patients with higher injury severity score and longer length of stay and/or intensive care unit stay should be monitored carefully during hospitalization.
Objective: Chronic subdural hematoma (C-SDH) is a common disease in the elderly, and the recurrence rate of C-SDH is reported to range from 2.3 to 33%. There are several controversial aspects of surgical management of recurrent C-SDH. Here, the authors present their experience treating patients with recurrent C-SDH conservatively who were initially managed with burr-hole craniostomy (BHC) with closed-drainage system (CDS).

Methods: We prospectively examined the pre- and postoperative CT scans of 41 consecutive patients who underwent BHC with CDS from January 2014 to June 2015. There were 28 men and 13 women and the mean patient age was 69 years. Three patients underwent bilateral BHC with CDH. Thirty four patients (82.9%) had a history of head trauma.

Results: Markwalder’s grade was grade 0 in 3 patients, grade 1 in 22 patients, grade 2 in 13 patients, and grade 3 in 3 patients. Recurrent C-SDH was developed in 4 patients (9.8%). Although there was recurrent hematoma with mass effect on CT, the patients were treated with conservative management because their neurological symptoms were not severe. Follow-up CT showed decreased amounts and densities of recurrent hematomas continuously. All patients were treated successfully without complications.

Conclusion: Although a patient presenting with neurologic symptoms and a radiologically
proven C-SDH, should undergo immediate surgical evacuation, a patient with mild symptoms with recurrent C-SDH and/or brain compression on CT can be managed conservatively under a carefully monitored follow up.
Objective: The aims of the Korean Neuro-Trauma Data Bank System (KNTDBS) are to evaluate and improve treatment outcomes for brain trauma, prevent trauma, and provide data for research. Epidemiological studies of traumatic brain injury (TBI) are essential to the targeted prevention and effective treatment of brain-injured patients. Our purpose was to examine epidemiology and outcomes of older patients following TBI in a retrospective study based on data from the KNTDBS.

Methods: The Korean Society of Neurotraumatology collected data from 20 institutions from September 2010 to March 2014. We analyzed the data of 904 patients aged ≥65 years among total of 2617 patients registered in the KNTDBS and retrospectively reviewed the medical records of patients admitted for TBI. The demographic characteristics of older patients with TBI were investigated.

Results: There were 540 men (59.7%) and 364 women (40.3%). With increasing age of the older patients, the incidence of TBI decreased and the mean age was 74 years. The most common cause of injury fall and negligent accident (44.0%; n=398), followed by traffic accident (27.5%; n=249). Mean initial Glasgow Coma Scale score 13. The most common diagnosis was acute subdural hematoma (50%; n=452), followed by others and traumatic subarachnoid hemorrhage. A total of 244 patients underwent surgical treatment, and 660 patients (73.0%) underwent conservative treatment, 58 patients died and mortality rate was 6.4%. Among non-survivors, 32
patients died within 7 days and direct brain damage was the most common cause of death.

**Conclusion:** Using the KNTDBS, we identified epidemiology, outcomes, and various factors related to mortality in older patients with TBI. Data extracted from the TDBS can be used in research and can contribute to new treatment guideline and attempts. We hope our study may play a role in improving and compensating for the defect of the KNTDBS in the future.
Successful Repair of an Iatrogenic Central Vein Lesion with a Stent Assisted Coil Embolization after Blunt Thoracic

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We present a case of the successful repair of an iatrogenic central vein lesion with a stent assisted coil embolization in 77-year-old women after blunt thoracic trauma. The patient was admitted to a local hospital after falling from a three-meter-high front door. A chest computed tomographic scan performed after central line catheter insertion revealed a right brachiocephalic vein pseudoaneurysm and multiple rib fractures. The patient was transferred to our institution for further management. Right brachiocephalic vein was perforated during the placement of a right subclavian vein central line catheter. Right brachiocephalic vein pseudoaneurysm was promptly observed by chest computer tomographic scan. Stent assisted coil embolization of right brachiocephalic vein pseudoaneurysm was performed in angiography room. Massive bleeding was prevented and the central vein perforation was treated successfully using a minimally invasive technique.
Clinical and Radiological Outcomes of Posterior–Anterior Fusion for Lumbar Burst Fractures

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Objective: To identify the better option of treatment, we introduced the surgical results and efficacy of spondylectomy and posterior-anterior fusion for lumbar burst fractures.

Methods: During 4 years, from 2011 to 2014, 22 patients with lumbar burst fracture were treated by spondylectomy and posterior-anterior fusion at our institute. Radiological outcome was evaluated by measuring kyphotic angulation, interbody height and lordotic curve. Clinical outcome was evaluated by visual analogue scale.

Results: Kyphotic angulation difference between preoperative and immediate post operative was 13.9°, preoperative and last follow up was 10.2°, immediate post operative and last follow up was 4.9°. A corrections of vertebral body height between preoperative and immediate post operative was 20.9 mm, preoperative and last follow up was 15.4 mm, immediate post operative and last follow up was 5.5 mm. Lordotic curve between preoperative and immediate post operative was 6.5°, preoperative and last follow up was 5.8°, immediate post operative and last follow up was 5.0°. The VAS score decreased from 8 to 2.

Conclusion: The spondylectomy and posterior-anterior fusion improved kyphotic angle, lordotic curve and interbody height. Clinical outcome was also good,
Single Port Laparoscopic Repair of Small Bowel Perforation: A Case Report

YoungRo Yang
The Korean Society of Traumatology

Traumatic small bowel injuries have been relatively neglected by existing literature compared to other traumatic abdominal injuries, which hinders physical examination and subsequently, early diagnosis and treatment. Traumatic abdominal injuries require continuous surgical observation, as the patient is susceptible to delayed disruption while radiologic diagnosis is being delayed. Laparoscopic exploratory laparotomy could be performed to diagnose small bowel injury in patients who have sustained blunt abdominal trauma and treatment could be simultaneously performed, preventing unnecessary open surgeries. We reported two cases of single port laparoscopic repair of blunt abdominal trauma-induced small bowel injury.
Objective: The Preventable Trauma Death Rate (PTDR) using Trauma and Injury Severity Score (TRISS) has been most widely used as a quality indicator in South Korea. However, this method has a small number of deaths corresponding to the denominator. Therefore, it is difficult to check the change of quality improvement for annual mortality, and there is a disadvantage that variation is severe. Therefore, the author attempted to improve the quality of the mortality evaluation by reducing the variation by applying the PARK Index which can increase the number of denominator significantly. And the S-score (Save score) was also examined as another quality indicator.

Methods: In the PARK Index (Preventable Major Trauma Death Rate, PMTDR), the denominator is number of all patients who have survival probability (Ps) larger than 0.25, Numerator is the number of deaths among these. The PARK Index includes only patients with ISS > 15, and the formula is as follows,

\[
PARK \text{ Index} = \frac{\text{No. of deaths from DP+PP}}{\text{No. of all DP+PP}} = \frac{\text{No. of deaths from Ps>0.25}}{\text{No. of all DP+PP}}
\]

The S-score is calculated in the same way as the W-score, but the S-score only includes patients with ISS > 15, which is a difference from the W-score.
**Results:** The PARK Index was 12.9 (37/287) in 2014, 9.6 (33/343) in 2015, and 7.39 (52/709) in 2016. In the PARK Index, the size of denominator was significantly increased compared to PTDR, and 287 vs 40 (7.2-fold) in 2014, 353 vs 34 (10.4-fold) in 2015, 709 vs 65 (10.9-fold) in 2016. The S-score was -0.29 in 2014, 4.21 in 2015, and 8.75 in 2016.

**Conclusion:** The PARK Index gradually decreased and the S-score gradually increased year by year. This means that both are improving quality for mortality and can be good quality indicators for mortality in trauma center.
Objective: A previously healthy 64-year-old male had an accident on a cultivator handle and visit local medical center (LMC). CT (Computer Tomography) scan revealed traumatic hemopericardium and multiple rib fractures, and sternum fracture. Since the patient had hemopericardium, they planned emergency exploration. There was ascending aorta dissection with intimal tearing on proximal ascending aorta and primary closure was done.

Methods: Post operative follow up CT scan was done in LMC and the initial ascending aorta dissection still remained. The patient transferred to our hospital for further evaluation. On the follow up CT scan in our hospital, the ascending aorta dissection was progressed and underwent ascending aorta replacement on cardiopulmonary bypass.

Results: The patient discharged on postoperative day 11 without complications.

Conclusion: For many years, traumatic aortic injury has been considered a high lethal lesion and potential cause of death in blunt chest trauma. Especially, ascending aorta injury after blunt trauma is an emergency condition needing urgent diagnosis and treatment which could not be solved by medical treatment or endovascular surgery. Ascending aorta is a heavy burden organ due to high pressure. So, in ascending aortic injury, ascending aorta replacement should be done without hesitation.
Factors Affecting Peri-Implant Fracture Following Locking Plate for Osteoporotic Distal Femur Fractures

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**Objective:** The purpose of this study is to evaluate the outcomes and to analyze the risk factors for the occurrence of peri-implant fracture after treatment of osteoporotic distal femoral fractures using locking plate.

**Methods:** Eighty nine osteoporotic distal femoral fractures were treated between January 2006 and January 2014. The cohort comprised 13 men and 76 women with a mean age of 70.4 (50-91). All patients with distal femoral fracture were treated with locking compression plate. Bone mineralized densitometry measurement was obtained from all patients.

**Results:** All patients had osteoporosis with the mean BMD of -3.16 (-2.5--5.4). The mean range of motion of knee was 126 degrees (90-145). 84 cases (94.4%) showed union, the mean time to union was 14 weeks (10-42), Peri-implant fractures occurred in four patients (4.5%) after bone union at mean 37.5 months (14-62) postoperatively. Eight patients had angular deformities of over 5 degrees. Nonunion was shown in 5 cases and superficial wound infection in 2 cases. There were eight patients with rheumatoid arthritis. Among these RA patients, two patients had suffered the peri-implant fracture. In statistical analysis, rheumatoid arthritis or periprosthetic fracture in TKR patient is a risk factor for peri-implant fracture (p=0.039, 0.019, respectively), and other factors have no statistical differences.
**Conclusion:** The treatment using locking plate showed favorable outcomes in osteoporotic distal femoral fracture. However, peri-implant fracture could occur in patients with rheumatoid arthritis or periprosthetic fracture after TKR. Therefore, cautious consideration is necessary for management of osteoporotic distal femur fracture in patients with RA or periprosthetic fracture after TKR.
The Interposition Vein Graft in the Replantation for the Very Distal Fingertip Injury

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Objective: The fingertip is a common site of hand trauma. The microsurgical replantation is used limited in the very distal injury such a degloving injury. Main obstacle of the replantation is the very small calibered vessels which is located deep in the pulp. It is critical to expose and prepare the artery in the avulsed distal segment. The small vein graft harvested from the wrist has been used for the elongation of the artery in the distal part which makes the anastomosis be easier. In this study, we analyzed the outcomes of very distal fingertip replantation using a small vein interposition graft.

Methods: Between 2012 and 2014, we performed very distal fingertip replants for 8 patients. All patients had the small interposition vein graft from the ipsilateral wrist used in the replantation surgery and received intravenous dextran-40 to promote anticoagulation and medicinal leeches for acute decongestion. By postoperative day 6, bleeding was no longer promoted.

Results: The average surgery times was 1.5 hours (range= 1 ~ 3 hours). The all 8 replants survived. The partial necrosis occurred in two patient but they were healed by secondary intention without any other complications. The average length of hospital stay was 8 days (range,7-14 d). No patients received blood transfusions.

Conclusion: This interposition vein graft technique may ease very distal fingertip replantation and increase the success rate. It can help the physician and patient decide whether to proceed with replantation.
Objective: Despite the numerous protocols and evidence-based guidelines have been published, application of these therapeutics to the patients who are eligible is limited in the real clinical setting. Therefore, rounding checklist was developed to improve the clinical application rate and the implementation results were evaluated.

Methods: Checklist consisting 12 components (feeding, analgesia, sedation, thromboembolic prophylaxis, head elevation, stress ulcer prevention, glucose control, pressure sore prevention, removal of catheter, e-tube & respiration, delirium, and infection control) were recorded by assigned nurses and then scored by the staff in the critically ill patients who were admitted in the trauma intensive care unit (ICU) in the Dankook University Hospital for more than 2 days. Total 170 patients (950 sheets) between April and October 2016 were divided into 3 periods: April to June, July to August, and September to October for the analysis. Questionnaire regarding the satisfaction of the nurses and interventions according to the interim analysis were performed two times during this implementation period.

Results: Record omission rate were decreased as per period (19.9%, 12.7%, and 4.2%, respectively). The rate of scored sheet to total sheet which indicates clinical application rate increased from 68.7% to 93.8%. Among 776 (81.7%) scored sheet, score more than 11 consisted 70.4%, 85.4%, and 85.6% in each period. The satisfaction from the questionnaire also increased
from 61.7 to 67.6 points out of 80 points,

**Conclusion:** ICU rounding checklist is effective tool for the improvement of clinical application rate of the protocols for the traumatized critically ill patients without overburdening of the nursing. The clinical outcomes of the ICU checklist will be evaluated and reported at an early date.
A Rare Case of Lumbar Disc Herniation with Concomitant Intradiscal Hematoma: Followed by Repeatative Occupation Related Minor Trauma; Case Report

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A case of surgically treated lumbar intervertebral disc extrusion at L4/5 level with intraoperatively confirmed intradiscal hematoma in a 30-year-old physical trainer is presented. Preoperative magnetic resonance (MR) imaging revealed downward migrating disc herniation, however the intradiscal hematoma was mimicked on initial study. Intervertebral disc herniation with concomitant intradiscal hematoma is extremely rare, but could occur in patients who have excessive axial stress to the spine occupationally. In our case, the patient was an occupational physical trainer who had repeatative minor trauma to the lumbar spine. Although the patient did not have any clear history of major trauma to the spine, the intraoperative findings revealed intradiscal hematoma, which is very rare. Therefore, in certain patients, the possibility of rare intradiscal hematoma should also be considered, even when they do not present definitely on preoperative MR images due to various signal intensities of hematoma by time.
Augmentative Interlocking Screws with Exchange Nailing Improves the Healing in the Infra–Isthmic Nonunion of Femoral Shaft

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Objective: Exchange nailing after reaming has been a procedure of choice for the treatment of aseptic nonunion of femoral diaphysis. However, several factors are known to exert adverse effect to the outcome with this technique. The purpose of this study was to evaluate the potential risk factors of failure after exchange nailing for femoral diaphyseal nonunion.

Methods: Thirty consecutive, aseptic nonunions of femoral diaphysis presented with a nail in situ (isthmic: n=15, infra-isthmic: n=15) with an average of 67 weeks, were retrospectively reviewed. A nail at least 2 mm larger in diameter than the previous nail was used, without any additional procedures such as bone grafting, dynamization, or augmentative plating. Interlocking was done in static mode, while fixing three or more interlocking screws, at the distal segment in infra-isthmic nonunion. In primary outcome, the radiographic and clinical evidence of healing of nonunion and time to union were measured. Possible adverse factors were analyzed as a secondary outcome.

Results: Twenty-eight of 30 femoral nonunions (93.9%) healed after exchange nailing. The average time to achieve union was 23.1 weeks (range, 13.7-36.7). There were two failures in isthmic nonunions, while all infra-isthmic nonunions were united. These were two out of ten nonunions with 2 distal interlocking screws, while all with 3 or more distal interlocking screws were healed successfully.
**Conclusion:** Exchange nailing for the treatment of aseptic nonunions of femoral diaphysis can achieve a very high healing rate. Three or more interlocking screws may be helpful to gain the further stable construct in infra-isthmic nonunions, resulting in a satisfactory union.
Geriatric Patients after Trauma Associated Admission are Easy to have Hypercholesterolemia

Maru Kim, Tae Hwa Hong, Hang Joo Cho
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Objective: There are many geriatric patients after trauma, however, analysis about their long-term prognosis is lacking. This study was planned to analyze nutritional state in geriatric patients after trauma associated admission. (GPT)

Methods: Data was collected from Korean national health and nutrition examination survey conducted from 2013 to 2015. The elderly older than 60 years old were gathered and divided according to trauma associated admission within a year. Their nutritional parameters were analyzed. We performed Chi square for qualitative comparison and independent t-test for quantitative comparison. Also logistic regression was performed and odds ratio was calculated.

Results: Total 3731 people older than 60 years old were analyzed and there were 94 GPT. There were no general difference between two groups (Table 1). Table 2 showed that GPT were statistically associated with more hypercholesterolemia (27.37% vs. 39.36%, p = 0.0372). Also GPT showed tendency to gain weight for a year, less underweight, more obesity and higher HbA1c. However theyt could not show statistical difference.

Conclusion: GPT showed more incidence of hypercholesterolemia. More attention might be required to GPT and further evaluation to GPT is needed.
**Successful Inferior Vena Cava Repair Under Femoro-Femoral Extracorporeal Circulation Support in Two Cases of Inferior Vena Cava Rupture**

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*Uijeongbu St. Mary’s Hospital, The Catholic University of Korea, College of Medicine*

**Objective:** We report two rare cases of blunt trauma to the intrapericardial inferior vena cava (IVC), which were successfully managed by surgical treatment under femoro-femoral extracorporeal bypass support.

**Methods:** Case one; 46-year-old male was transferred to our hospital for treatment of trauma by a traffic accident. Computed tomography (CT) demonstrated hemopericardium, bilateral multiple rib fractures, and liver laceration combining hemoperitoneum. Case two; 49-year old male was transferred to our hospital for treatment of blunt trauma by tiller. The patient presented cardiac arrest. Hemopericardium was revealed by sonography. A traumatic surgeon performed cardiopulmonary resuscitation and pericardiocentesis with Arrow® catheter under sonography guidance. After 50ml of pericardial drainage, sinus rhythm was recovered. Chest CT demonstrated large amount of hemopericardium. For these two cases we performed emergency operation, while assuming that cardiac injuries were the source of the bleeding. To prevent unstable hypotension during cardiac approach, we performed femoro-femoral extracorporeal circulation before sternotomy. Large amount of hematoma and ruptured IVC were revealed after sternotomy. All the blood from IVC was drained by extracorporeal suction and re-infused via arterial cannula. Primary closure by interrupted suture was done.

**Results:** These two patients were discharged without problem.
Conclusion: Before cardiovascular approach, femoro-femoral extracorporeal circulation might be a safe and stable procedure in case that massive bleeding is expected.

Intrapericardial drainage should be considered when a cardiac arrest occurs in trauma patients with hemopericardium.
Successful Endovascular Management of Posttraumatic Phlegmasia Cerulean Dolens by External Iliac Vein

Chan kyu Lee, Chan Yong Park, Hyun Min Cho, June Pil Seok
Pusan National University Hospital

We report a rare case of a 47-year-old male with posttraumatic phlegmasia cerulea dolens caused by ruptured right common iliac vein, treated with endovascular venous stent graft. The patient was a victim of motor vehicle accident, and had suffered direct injuries to the head and abdomen. The patient also had cyanotic and swollen right lower leg. Abdominal and lower extremities CT angiography revealed large retroperitoneal hematoma caused by ruptured right external iliac vein and grade I liver injury. Rupture of the right external iliac vein was successfully treated with venous stent graft followed by the inferior vena cava filtering because venous thrombus was identified below the stent graft. He initially was hemodynamically unstable but gained recovery after the intervention. The patient was initially comatose at the emergency department, however, was discharged on hospital day 18 with fully recovered.
Fat Embolism Rapidly Developed with Hypoxia in a Patient from Auto–Versus Pedestrian Accident

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Ajou University School of Medicine

Background: Fat embolism refers to the presence of fat droplets within the peripheral and lung microcirculation with or without clinical sequelae. Fat embolism syndrome (FES) is a syndrome that is most commonly associated with long bone (especially femur) and pelvic fractures.

Case Presentation: The patient is 48-year-old male with pedestrian traffic accident transferred from a local hospital by helicopter with our medical staff including two flight surgeons on board. At the rendezvous point, the patient was intubated by one of our medical staff because of his medical condition presented with 90% of oxygen saturation on pulse oximetry with deterred mental status. This patient arrived our trauma center 114 minutes after the estimated time of the injury.

Results: Fat embolism was identified in right common iliac vein from abdominal CT scan with contrast enhancement. Fat embolism is often challenging to make diagnosis within 24 hours of injury because it manifests key symptoms after 24 hours of injury. However, this rare case that the patient was diagnosed with fat embolism by less than 4 hours after the injury.

Conclusion: Rapid development of fat embolism is challenging to trauma surgeons for early diagnosis. However, it is proven that the fat embolism may be developed within 3 hours after the injury from this rare case. Even though most orthopedic surgeries are not treated as much urgent
as torso and brain surgery, if the patient's condition is stable enough for the orthopedic surgery, then it is highly recommended that reduction of femur fracture should be done as soon as possible to prevent or at least to minimize development of the fat embolism syndrome.
Objective: The aim of this study is to understand the pattern of trauma epidemiology in our institution, identify the weakness in our registry and develop a customized data bank to serve this purpose.

Methods: The data was extracted from 2011-2013 in Pusat Perubatan Universiti Kebangsaan Malaysia. Parameters include the demographics (gender, age, ethnic, trauma type), time and day of injury and hospital presentation, Injury Severity Score (ISS), management provided, the length of stay, the survival and difference in weekdays and weekends admissions and outcome. Other injury scoring such as TRISS, RTS were unable to compute due to missing and incomplete data.

Results: There were 142 patients with predominantly male, 86.7% were between the age of 15 to 59-year-old. Traffic accidents remains the major cause with 87.3% followed by fall and penetrating injury. Trauma occurs more during weekdays with 63.4% but no difference in the time of presentation. There were total of 238 injuries for 142 patients with more than 90% have at least 2 different regions of injuries. There were significant numbers of AIS score of more than 5 which mostly involving the head and neck region. The mean ISS score was 18. Most the patients fall under ISS 9-15 (38.7%) followed by ISS 16 with 22.5%, Our mortality rates were 7%. The length of stay was shorter in conservative management group (4.5 days versus 19.3%).
Conclusion: Our University hospital shares a reasonable burden of trauma cases within the city center. Majority of our cases falls under moderate to severe ISS involving at least two organs with 7% mortality. Evidently, this data support the need of a dedicated trauma services in our institution which will ultimately improves the final outcomes. However, a better data management is needed to prevent missing and incomplete figures ensuring a good quality data.
Objective: Nowadays, Video-Assisted Thoracic Surgery (VATS) is widely used for its benefits, low post-operative pain, excellent anesthetic result and complete visualization of intrathoracic organs. Despite of these advantages, VATS has not yet been widely used in trauma patients. In this study, we aimed to investigate the usefulness of VATS in the chest trauma area.

Methods: From January 2016 to December 2016, 203 patients underwent surgical treatment for chest trauma. Their medical records were analyzed retrospectively.

Results: Eleven patients underwent thoracic surgery by VATS. Six patients were unstable vital sign in the emergency room. Two patients underwent emergency surgery and the rest patients underwent planned surgery. The common surgeries were VATS hematoma evacuation and wedge resection. There was no conversion to thoracotomy. The surgery proceeded without any problems for all patients.

Conclusion: VATS would be an effective diagnostic and therapeutic modality in chest trauma patients. It can be applied to retained hemothorax, persistent pneumothorax, suspicious diaphragm injury and even coagulation of bleeder.
The Effect of Pentoxyfilline in Inflammatory Cell Reaction

Objective: Immunity is the state of having sufficient biological defences to avoid infection, trauma, or other unwanted biological invasion. T-cells, macrophage play important role in cell mediated immunity. Pentoxyfilline (PTX) is known that decrease proinflammatory cytokine and TNF-a. However, the effect on immune system was not known well. Aim of this study is to investigate the effect of PTX in inflammation.

Methods: THP-1 derived macrophage were incubated with LPS and/or indicated concentration of PTX for 6hr and wash with PBS to eliminate effect of LPS. In this media, T cells were plated into at trans well plate and co-culture was done at 12hr. The T cell viability was measured by MTT and expression of IL-2 was analyzed by RT-PCR.

Results: PTX inhibit concentration of MIF, TLR4 protein level and mRNA expression of TLR4 in macrophage. However, PTX did not restore in the T cell proliferation with PGE2. In the co-culture study, The T cells viability decreased in the macrophage cells stimulated with LPS. The additional PTX restored the T cells viability. In the same manner, IL-2 expression in the macrophage stimulated with LPS restored in the macrophage cells stimulated with LPS and PTX.

Conclusion: LPS stimulated macrophage cells inhibit the T cell viability in hyperinflammation condition. In this state PTX restore the T cells viability to increase IL-2. PTX influence the cell-cell interaction, therefore, have its immunomodulatory effects.
The Impact of Oxygen and Pentoxifylline in Hypoxic Condition

Juug-Youn Kim, Sung-Hyuk Choi, Young-Duck Cho, Dae-Hyun Baek, Ziang Qiuyu, Dong-Seok Moon, Gwang-Yeol Huh, Hyun-Jin Kim
Korea University Guro Hospital

Objective: Many patients admit the emergency department due to massive hemorrhage, respiratory failure, and further that the experience can fall into shock. In the treatment of shock patients, airway maintenance and oxygen supply are known to be of paramount importance. Therefore, this aim of study was to investigated to effects of oxygen supply and variable medication in hypoxic condition. We conducted an experiment to determine effect of oxygen and variable medication in iNOs, macrophage migration inhibitory factor (MIF) as an inflammatory cytokine of macrophage, in MTT, IL-2, IL-8 as an immune marker of T cells proliferation and T cells in hyperinflammatory condition by the using coculture.

Methods: The experiments were performed with THP-1 devired macrophage and Jurkat cells. First, macrophage cells put through normoxic state, hypoxic state, oxygen supply and variable medication, and measured the iNOs, MIF by western blots. Second, Jurkat cells were incubated through hypoxic state, oxygen supply and variable medication, and measured MTT, IL-2 and IL-8. Third, in co-culture, after Jurkat cells under hyperinflammatory macrophage cells were incubated through hypoxic state, oxygen supply and variable medication, and measured MTT, IL-2.

Results: 1. In hypoxic state in macrophage cells, iNOs expression and MIF increased when cells were exposed to hypoxia. Pentoxifylline under oxygen supply condition restored iNOs in stimulated macrophage.

2. T cell viability decreased in hypoxic condition, however pentoxifylline restored T cell viability,
regardless of oxygen supply. IL-8, MIF increased in hypoxic condition, however pentoxifylline and steroid restored IL-8, MIF, IL-2 decreased in hypoxic condition.

3. In coculture condition, oxygen supply and pentoxifylline more increased T cell viability, IL-2 than pentoxifylline in hypoxic state.

**Conclusion:** Hypoxia decreased T cell viability, iNOS, MIF and IL-8 increased in hypoxic state rather than normoxic state. However, PTX restored T cell viability, IL-2 in oxygen supply condition than the hypoxic state,
Objective: The purpose of this study was to identify the risk and prognostic factors correlated with mild to severe symptoms in patients with chronic subdural hematoma (CSDH) who underwent burr hole drainage.

Methods: A total of 256 patients who had undergone burr hole drainage for CSDH were enrolled in this study. According to their Glasgow coma scale (GCS) score at admission, patients were divided into a “severe” (GCS < 13) and a “mild” (13 ≤ GCS) group. Patient outcome was assessed at discharge and at a three-month follow-up using the Glasgow outcome scale (GOS).

Results: Of the 256 patients, 36 (14.1%) were included in the “severe” group, and 220 (85.9%) in the “mild” group. In patients with severe symptoms, old age (p = 0.040), end-stage renal disease (ESRD) (p = 0.038), alcoholism (p = 0.032), a low initial GCS score (p < 0.001), and low and mixed hematoma density (p = 0.033) were more frequently observed. According to the GOS scores at discharge, more patients in the “severe” group also had ESRD (p = 0.018). For the “mild” group, GOS scores indicated significant correlations with GCS score at admission (p < 0.001), irrigation (p = 0.037), and age (p = 0.004). The GOS score at the three-month follow-up was correlated with only GCS at admission (p = 0.002) in patients with mild symptoms.

Conclusion: The outcome of patients with mild CSDH who underwent burr hole drainage was correlated with age, initial GCS score, and irrigation. The outcome of patients with severe CSDH was correlated only with ESRD.
Objective: We introduce a patient who was suffered from isolated traumatic bilateral oculomotor nerve palsy after head trauma.

Methods: The patient presented with bilateral ptosis and abnormal pupillary responses with slightly drowsy mentality at first. Performed images demonstrated some hematomas along subarachnoid, intraventricular, subdural spaces and multiple small supratentorial contusions.

Results: There was no bony abnormality or ligament injury. We assumed that small amount of interpeduncular hematoma might be the proper lesion associated with oculomotor nerve palsies, since the clinical symptom and signs presented bilaterally and the oculomotor neural fascicles run through the interpeduncular fossa.

Conclusion: We assumed that the nuclear palsy caused by midbrain injury is most probable and peripheral lesion near the petroclinoided ligament should be ruled out.
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