

## Time to Surgery and Injury Severity Score

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**Purpose:** To evaluate the association between time to surgery and injury severity score (ISS).

**Methods:** Medical charts and records were reviewed for polytrauma patients who underwent trauma surgery from November 2014 to March 2016. The patients were divided into two groups based on the ISS.

**Results:** Among the 217 operated patients, 22 patients underwent first and second surgery. The patients with an ISS over 17 (mean 13.0 days) had a longer interval between surgeries than patients with an ISS of 17 or less (mean 7.5 days) ( $p=0.031$ ). One hundred and twenty-one patients only underwent elective surgery and there is a positive correlation between ISS and time to elective surgery ( $p<0.028$ , Pearson's correlation coefficient=0.224). Seventy-four patients underwent emergent surgery only. Among these, the patients with an ISS of 17 or less underwent general surgery (86%) but the patients with an ISS more than 17 underwent neurological surgery (47%).

**Conclusion:** Patients with high ISS need critical care during the preoperative and postoperative period. [ J Trauma Inj 2016; 29: 151-154 ]

**Key Words:** Polytrauma, Injury severity score (ISS), Surgery

### I. Introduction

Blunt trauma generally describes patients whose injuries involve multiple body regions or cavities, compromise the patient's physiology and potentially cause dysfunction of uninjured organs. These patients are at risk of higher morbidity and mortality than expected from simply the summation of their individual injuries.<sup>(1)</sup>

Numerous scoring systems have been developed to define the severity of trauma in polytrauma patients and determine patient outcome. Injury severity scores (ISS) are widely used for estimating mortality and morbidity of patients with multiple trauma.<sup>(2,3)</sup>

This study evaluates the association between time to surgery and injury severity score.

### II. Materials and Methods

The medical records of polytrauma patients who underwent trauma surgery from November 2014 to March 2016 were reviewed. All of the patients were treated as trauma clinical pathway by the trauma team.

The general characteristics, injury severity score, time to emergent operation, time between emergent and elective operation, admission date to intensive care, and surgical department were collected for analysis. Emergent operation was defined as an operation that is life-threatening or treats a major problem (e.g. brain hemorrhage, spinal cord or nerve injury, major vessel injury, abdominal injury) and is performed within 24 hours. Elective operation was defined as a defini-

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Submitted : November 16, 2016 Revised : December 1, 2016 Accepted : January 20, 2017

tive operation performed to the traumatic diagnosis when a patient is recovered. Operation interval was defined as time from emergent operation to elective operation.

Patients who had major underlying disease, those who died before arrival or those who were transferred to another medical center during the course of hospitalization were excluded.

Statistical analyses were carried out with IBM SPSS Statistics ver. 20.0 (IBM Co. Armonk, NY). Student's t-test was used to evaluate between emergent operation and elective operation. To measure the association between ISS and operation interval, Pearson's correlation coefficient was calculated. Statistical significance was accepted for  $p$  value  $< 0.05$ .

### III. Results

Two hundred seventeen patients were enrolled and divided into two groups based on the ISS.(4) In terms of injury mechanisms, traffic accidents were the most common, with 68%, followed by falls (20%) (Table 1).

Seventy-four patients underwent only the emergent operation, 121 patients underwent elective operation, and 22 patients underwent the emergent and elective surgery.

The patients with an ISS more than 17 (mean 13.0 days) had longer operation interval than the patients with an ISS of 17 or less (mean 7.5 days) ( $p<0.031$ ). The mean ICU stay was 8.3 days and the two groups differed by 16.9 days, not a statistically significant difference ( $p=0.109$ ) (Table 2).

One hundred and twenty-one patients underwent elective surgery only, and there is a positive correlation between ISS and time to elective surgery ( $p=0.007$ , Pearson correlation coefficient=0.225) (Fig. 1). Orthopedic surgery is the most common (74%). Seventy-four patients underwent emergent surgery only. Of these patients, those with an ISS of 17 or less underwent general surgery (86%), those with an ISS more than 17 underwent neurological surgery (47%).

### IV. Discussion

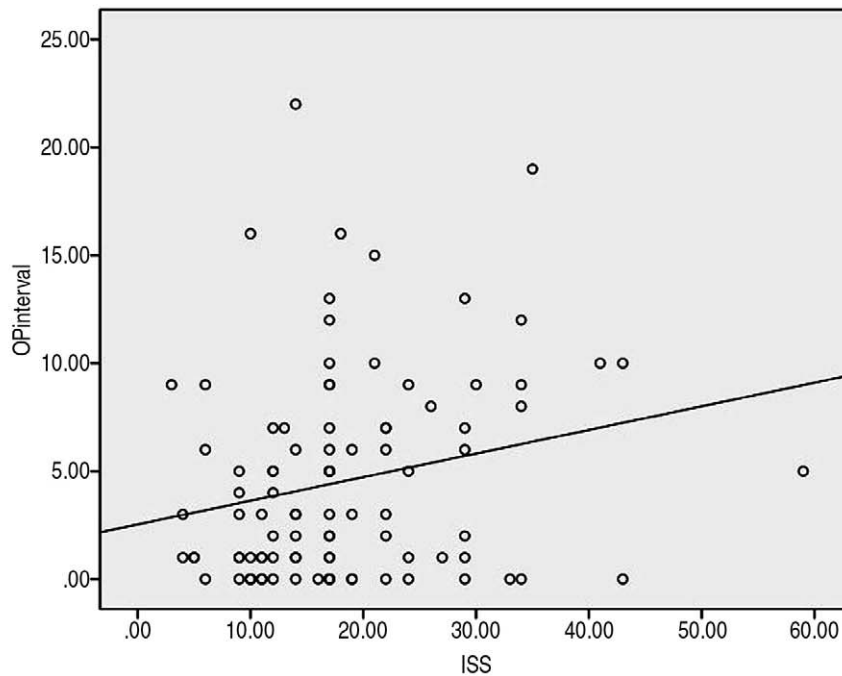
Traffic crashes are a serious public health problem and a major cause of disability worldwide. According to the World Health Organization, road traffic crashes claim 1.2 million deaths annually and cause up to 50 million non-fatal injuries.(5) In 2004, RTA ranked as the ninth leading cause of death worldwide and is expected to be the seventh by 2030.(6) Moreover, the economic burden on society is increasing due to dis-

**Table 1.** General characteristics of patients

	ISS $\leq$ 17 (N=119)	ISS $>$ 17 (N=98)	$p$ value
Age	45.3	50.6	0.301
Gender			
Male	80	71	0.105
Female	39	27	0.204
Mechanisms of injury			
Traffic crashes	75	72	
Pedestrian	(22, 30)	(33, 46)	
Motorcycle	(28, 37)	(12, 17)	
In car	(25, 33)	(27, 37)	
Fall	24	20	
Etc.	20	6	

**Table 2.** Differences in clinical course from emergent to elective operation

	ISS $\leq$ 17	ISS $>$ 17	$p$ value
OP interval	7.5	13.0	0.031
Mean ICU stay	8.3	16.9	0.109



**Fig. 1.** Correlation between ISS and time to elective surgery (OP interval).

abilities and deaths accompanying traffic accident. So treatment of trauma patient is important for the patient and society.

In this study, most of the patients with multiple trauma were male. This result is consistent with the studies conducted by Richard et al.(7) The reason is unclear; it may be associated with social activity but further study is needed.

Trauma is considered a surgical disease, and historically trauma care has been led by general surgeons.(8) This premise is based on the urgent need for hemostasis, and definitive trauma care often requires general surgical skills. The optimal time from injury to the operation room in trauma is unknown, but Remick et al.(9) reported that early trauma deaths have the potential for salvage with immediate surgery.

Elective operations are important for recovering function. In this study, elective surgery is almost all orthopedic surgery (74%). Cantu et al.(10) reported that patients with multiple injuries will likely benefit from resuscitation before definitive stabilization of femur fractures, but early fixation after resuscitation is important. Thus early elective surgery may have to be considered after the emergent operation when the patient is recovered. But severe trauma patient have higher possibility to have a multiple injury including

lung and so on. So patient who have high ISS score maybe take a longer recovery time in general condition. And that is same result in our study.

This study was performed to assess the association between the ISS and OP interval in trauma patients, and the result showed that high ISS is associated with a longer OP interval. A long OP interval means that the patients have a higher risk of complications, so the trauma team have to reduce complications during the admission.

The current practice of trauma care is multidisciplinary, involving critical care-based specialties, interventional radiology and surgical subspecialties in general, thoracic, and cardiovascular. Neurosurgery and orthopedic surgery is also needed for trauma patients. A higher quality of treatment is achievable through internal medical therapy in addition to surgical treatment. Additionally, cooperation with all departments for trauma patient is essential for trauma patient treatment.(11)

## V. Conclusion

Patients with high ISS had significantly longer operation interval or took more time to elective surgery. Thus, patients with high ISS need critical care dur-

ing the preoperative and postoperative period.

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