ICU
MANAGEMENT & PRACTICE

## DDI in Trauma Patients

Management of critically injured patients is usually complicated and challenging. A structured team approach with comprehensive survey is warranted. However, delayed diagnosis of co-existing injuries that are less severe or occult might still occur, despite a standard thorough approach coupled with advances in image intervention. Clinicians are easily distracted or occupied by the more obvious or threatening conditions.

The delayed diagnosis of injury (DDI) in critical trauma patients brings further hazard to an already critical condition and may increase morbidity or even mortality in these patients. Protocols or guidelines developed by various societies including the Advanced Trauma Life Support (ATLS) course emphasise the importance of secondary or even tertiary surveys with thorough “head-to-toe” examination aimed at a structured approach to minimise the possibility of missed potential injuries.

This study focused on whether specific “major” body regions injured may contribute to increased possibility of DDI.

Methods

A retrospective study of trauma patients admitted to the surgical ICUs was conducted over a two-year period in southern Taiwan. The medical facility, located in a municipality with a population of 1.52 million people, provides medical-centre level health care and serves about 84,000 emergency patient (ED) patients per year. The ED is staffed by six trauma surgeons who are all qualified ATLS providers.

The hospital records of injured patients admitted to the surgical ICU were selected for detailed review and DDI analysis. Variables recorded included the following: demographic characteristics; times of injury, arrival and receiving care; Injury Severity Scores (ISSs); investigations and results; and morbidity and mortality. For the purpose of the study, DDI was defined as an injury that was not discovered nor suspected upon admission to the ICU following the initial resuscitation, diagnostic studies, or surgery, and not documented in either the trauma resuscitation notes or the admission notes.

Patients transferred directly to the surgical ICU and those patients in extremis, in whom the secondary survey had not been completed prior to their transfer to the operation room and subsequent arrival in the surgical ICU, were excluded from the study.

Study patients were divided into two groups: patients with DDI and patients without DDI. Demographic data and medical information were compared and statistically analysed in the two patient groups to identify factors associated with DDI. The chart for each patient was reviewed to determine when and how these DDI were eventually diagnosed.

Results

During the two-year study period, a total 976 trauma patients admitted to surgical ICUs were included in this study. The incidence of DDI was 12.1% (118/976). The DDI population was shown to have significantly higher mean ISSs (18.2, SD 8.4) than the non-DDI group (14.6, SD 8.1). However, 38.6% (331/858) of the non-DDI patients sustained two or more injuries, which was significantly lower than the corresponding figure of 54.2% (64/118) in the DDI group ($p = 0.002$). The average age of patients in the DDI group (38.6, SD 20.3 years) was significantly younger ($p = 0.004$) than the non-DDI group (44.6, SD 23.4 years). There was no significant difference between the two groups in gender, unfavourable outcome, or impaired consciousness.

Patients with DDI had higher percentages of thoracic, abdominal, and pelvic injuries (30.5%, 16.1%, and 7.6% respectively) than the non-DDI group (14.7%, 7.5%, and 3.0% respectively) ($p < 0.001$, 0.003, and 0.024 respectively). However, the incidence of soft tissue injuries was lower in the DDI group than in the non-DDI group (13.6% vs. 21.3%, $p = 0.065$). There were no significant differences between the two groups for injuries involving other body regions.

A logistic regression model demonstrated that head (odds ratio = 1.99; 95%CI = 1.20–3.31), thoracic (odds ratio = 2.44; 95%CI = 1.55–3.86), and abdominal injuries (odds ratio = 2.38; 95%CI = 1.28–4.42) were independently associated with increasing DDI in patients admitted to the surgical ICU.

Conclusion and Discussion

Although DDI are not completely preventable in critical trauma patients in a busy and overcrowded ED, patients sustaining thoracic, abdominal, and head injuries should be evaluated in more detailed and frequent re-evaluations for co-existing injuries in the same and other body regions to

identify possible DDI.

In previous studies, age was not found to be a significant risk factor for DDI, but the current study revealed that younger patients were more prone to have DDI. This might result from clinicians taking more caution with older patients because they are trained that these patients may have more complex conditions and co-morbidity with less tolerance to haemodynamic changes by trauma.

This study was limited to a single institution's experience and may reflect the characteristics only of local patients. Additionally, it is possible that the DDI in this study might be overestimated due to incomplete documentation; for example, if injuries were actually found and treated by ED clinicians but were not documented at the time, it might later be categorised as DDI. Finally, definition of DDI in the study was diagnoses which were not recorded in the admission chart compared to the final diagnosis before discharge; it is difficult to discern whether these DDI were clinically significant initially requiring surgery or other treatment that may change the mortality or morbidity situation, or whether they were just products of ultrasound or CT findings without any clinical bearing.

Reference:
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