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Different Patterns in Abdominal Stab Wound in the Self-Inflicted and Assaulted Patients: An Observational Analysis of Single Center Experience

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Patterns of penetrating abdominal stab wounds (ASW) may be different according to the mechanism of injury. The purpose of this study was to review and characterize penetrating abdominal stab wounds in self-inflicted wound patients and assaulted patients. We retrospectively analyzed patients with ASW who were admitted to our emergency department from 2007 to 2015. The patients were divided into two groups: self-inflicted wound group and assaulted group.

There were 46 stabbing cases in 45 different patients (25 males, 21 females; average age 47 y, range 21 to 85 y). Thirty-three patients were in the self-inflicted wound group and 13 patients were in the assaulted group. Although injury sites were concentrated around the periumbilical and epigastric regions in the self-inflicted wound group, the left lateral abdomen was a favorite site in the assaulted group. The peritoneum was violated in the 17 patients in the self-inflicted wound group and 11 patients in the assaulted group. Both the self-inflicted wound group and assaulted group included patients with previous psychological disorders (28 and 5 patients, respectively).

The mean Revised Trauma Score, Probability of Survival, Injury Severity Score and the Acute Physiology and Chronic Health Evaluation II scores were not significantly different between the groups although the Injury Severity Score tended to be higher in the assaulted group.

The rate of the peritoneal violation was significantly higher in the assaulted group than in the self-inflicted wound group. We also should be aware of more likelihood of patients with psychological disorders among those with assault wounds.

INTRODUCTION

Penetrating abdominal stab wounds are rare but have been increasing over the past decade. This type of trauma has the potential to induce a life-threatening condition whether it is self-inflicted or caused by an assault. Because clinical features, patterns and therapeutic strategies for stabbing trauma depend on the specificity of the region of the injury, it is critical to reveal the difference in patterns of penetrating abdominal stab wounds between mechanisms of injury.

The purpose of this study was to review and characterize penetrating abdominal stab wounds among self-inflicted wound patients and assaulted patients in an urban Japanese hospital. We believe that our study could help emergency physicians and trauma surgeons treat patients with abdominal stab wound.

MATERIALS AND METHOD

We retrospectively analyzed data on patients with abdominal stab wound admitted to our emergency department at an urban Japanese trauma center, Hyogo College of Medicine, from 2007 to 2015.

Demographic background, medical history especially of psychological disorders, site of injury, weapon causing the trauma, penetration of the peritoneum, Injury Severity Score (ISS), Revised Trauma Score (RTS), Probability of survival (Ps), and Acute Physiology and Chronic Health Evaluation (APACHE) II scores were noted in the medical record retrospectively.

We considered that a patient had a previous a psychiatric disorder if the patient had visited a psychiatric department.

Data were entered into a Microsoft Excel spreadsheet, and statistics were calculated with JMP Pro11. A value of probability of $p<0.05$ was considered to be significant.

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RESULTS

Table I shows the characteristics of the self-inflicted wound group and assaulted group. There was a total of 46 stabbing cases among 45 different patients (one patient had experienced a stab wound twice). Twenty-five patients (56%) were male and 21 were female (44%), with ages ranging from 21 to 85 y (mean 47.0 y old). Five patients were in cardiopulmonary arrest (CPA) on arrival, and three patients had only a superficial wound. The remaining patients were evaluated in our emergency department and subsequently hospitalized (Figure 1). All patients were treated by local wound exploration or laparotomy. One patient died soon after operation.

The patients with abdominal stab wounds were divided into two groups based on the mechanism of injury: self-inflicted injury group (33 patients,14 males, 46.6 (±14.6)) and assaulted group (13 patients, 11 males, 48.4 (±16.3)).

The wounds in almost all cases in each group were caused by kitchen knives (35 cases) and or other knives (7 cases). Other weapons were scissors, laundry hook, glass and iron pipe.

Table I. Characteristics of patients in the self-inflicted wound group and assaulted group.

	Self-inflicted group	Assaulted group	P-value
	33 Cases	13 Cases	
Gender			0.19
Male	14	11	
Female	19	2	
Mean age	46.6±14.6	48.4±16.3	0.72
Weapon			N/A
Kitchen knives	26	9	
Knives	4	3	
Scissors	1	0	
Iron pipe	0	1	
Glass	1	0	
Laundry hook	1	0	
Site of abdominal injury			
Epigastric region	14	2	N/A
Right lateral abdomen	5	3	
Periumbilical region	15	3	
Left lateral abdomen	9	5	
Lower abdomen	3	2	
Complication by other injury			P=0.97
Positive	17	7	
Negative	16	6	
Injury site of other injury			N/A
Extremity	9	4	
Chest	5	4	
Neck	5	1	
Face	2	1	
Genitals	1	0	
Psychological disorders	28	5	P<0.01
Peritoneal injury	17	11	P<0.05

N/A: not available

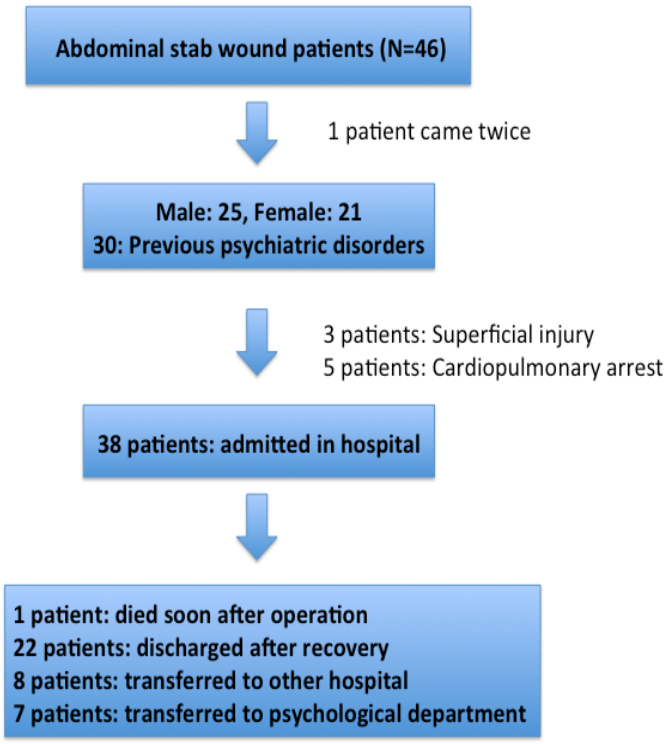

Figure 1.
Enrollment and outcome of study patients.
There were a total of 46 stabbing cases in 45 different patients. One patient had a stab wound twice. Five patients had cardiopulmonary arrest on arrival, and three patients had only a superficial wound. The remaining patients were admitted to our emergency department and hospitalized. One patient died soon after operation. Twenty-two patients were discharged from our hospital. Eight patients and seven patients were transferred to another hospital and the psychological department in our hospital, respectively.

We also analyzed the abdominal injury sites by dividing the abdomen into five parts: epigastric region, right lateral abdomen, periumbilical region, left lateral region, and lower abdomen. The most prevalent injury sites in the self-inflicted wound group were concentrated in the epigastric region and periumbilical region. However, in the assaulted group, the left lateral abdomen was the most prevalent site.

Multiple injuries other than in the abdomen were also reviewed. An abdominal stab wound occurred simultaneously with another injury or injuries in 24 cases. Based on the Abbreviated Injury Scale (AIS), extremity, chest, and neck injuries were frequent. A genital injury was found in one individual in the self-inflicted wound group.

Thirty-three patients had a previous diagnosis of a psychiatric disorder, and of those patients, 28 were in the self-inflicted wound group and 5 were in the assaulted group ($p<0.01$). Seventeen patients with self-inflicted abdominal stab wounds were found to have a violation of the peritoneum, while 11 of 13 patients who were assaulted had visceral organ damage ($p<0.05$).

Excluding three patients with superficial injuries and five with CPA, median ISS, RTS, Ps and APACHE II scores in the remaining cohort of hospitalized patients were calculated in each group (Table II).

Although ISS in the assaulted group tended to be higher than in the self-inflicted wound group (P=0.221) and this trend was more remarkable in the study that included CPA patients (P=0.053), there was no statistically significant difference in RTS, Ps, APACHE II score, and ISS score between the two groups.

Table II. Severity of injuries in the self-inflicted wound group and assaulted group.

Severity	Self-inflicted wound group	Assaulted group	P value
ISS*	Median 4 (IQR: 1-16)	Median 9.5 (IQR: 8-16)	P=0.22
ISS including CPA patients	Median 8 (IQR: 1-16)	Median 10 (IQR: 10-18.5)	P=0.053
Revised Trauma Score*	Median 7.841 (IQR: 6.817-7.841)	Median 7.841 (IQR: 7.006-7.841)	P=0.44
Probability of Survival*	Median 98.3 (IQR: 96.1-99.3)	Median 98.5 (IQR: 95.3-99.2)	P=0.86
APACHE Ⅱ score*	Median 11 (IQR: 7-16)	Mean 11 (IQR: 4-14)	P=0.68

*: Three patients with superficial injuries and five cardiopulmonary arrest patients were excluded. APACHE II: Acute Physiology and Chronic Health Evaluation II, IQR: Inter quartile range, ISS: Injury Severity score.

DISCUSSION

To the best of our knowledge, there have been no published reports about ISS, RTS, Ps, and APACHE scores in relation to abdominal stab wounds as a result of self-inflicted injury or assault. Except for five patients with CPA on arrival and three patients with superficial wounds, we analyzed the severity of the injuries of the other 38 patients. Although the ISS tended to be higher in the assaulted group than in the self-inflicted wound group, median RTS, Ps and APACHE II scores in the remaining cohort of hospitalized patients were not very different between groups. However, the trend of a higher ISS score in the assaulted group was more remarkable when including CPA patients. We hypothesize that patients in assaulted group were damaged by others repeatedly; therefore they were likely to present with multiple severe injuries. Banergee et al. was the first to compare the epidemiology and outcomes of a large series of patients with self-inflicted and non-self inflicted anterior abdominal stab wounds (6). They reported that self-inflicted wound patients had lower rates of hemodynamic instability, symptomatic abdominal wounds and direct disposition to the operating room from the emergency department. Mortality rates were very low in both groups, a result that was similar to the results of our study.

Seventeen of our 33 study patients with self-inflicted abdominal stab wounds had peritoneal injury judging from computed tomography, local wound exploration, and laparotomy, while 11 of 13 patients assaulted by others had peritoneal injury, indicating that assaulted patients are more likely to have intra-abdominal organ damage than self-inflicted wound patients. Hopson et al. reported a 40% incidence of non-injurious penetrating stab wounds in an assault group in the United States (5). Our result was not in agreement with Hopson's report. We do not know why Japanese people in the assault group had high rate of peritoneal violation. However, it may depend on regional differences such as poverty or security or differences in physique because Japanese people tend to be thinner than American and European people.

All cases of abdominal stab wounds underwent local exploration or laparotomy. In most cases with a hemodynamic stable condition abdominal computed tomography before local exploration or laparotomy was performed. In cases with hemodynamic instability or CPA who were admitted to our emergency department, we performed emergency laparotomy to detect the bleeding point or performed emergency room thoracotomy to clamp the aorta, and then moved the patient to the operation theater without scanning the abdominal wounds. Depending on the degree of visceral injury, trauma surgeons decided on the surgical strategy.

Abdullah et al. found that most self-inflicted abdominal wounds occurred on the right side of the abdomen, with 40% in the upper part and 23% in the lower part (1). That the wounds were located on the right side is assumed to be because most people are right-handed so it is easy to stab the right part of abdomen. In our study, the most prevalent regions of the abdominal wound in the self-inflicted wound group were the periumbilical region and epigastric region. This phenomenon is associated with the unique Japanese idea of "Hara-kiri" performance, which involves transversely cutting the abdomen (7). Morita et al. demonstrated that mortality was higher in their "Hara-kiri" wound group than in their stab wound group.

Our study showed that based on the Abbreviated Injury Scale there were multiple injuries other than to the abdomen, in 24 cases. The most favorite site in both groups was an extremity, which involved hesitation wounds and defensive wounds following chest injury. One unique case had a genital injury, which was caused by a patient with schizophrenia in the self-inflicted wound group. Racette et al. reported hesitation wounds depending on the wound context in 74% of suicides and defensive wounds depending on the wound context in 61% of assaults (8).

Our study showed that some patients not only in the self-inflicted wound group but also in the assaulted group had psychological disorders. Therefore, we must be aware of the existence of patients with psychological disorders irrespective of the mechanism of injury. Our statistical analysis, confirmed a relationship between self-inflicted abdominal stab wounds and psychiatric disorders, which is compatible to a previous study. Venara et al. also demonstrated that a psychiatric history was less prevalent in an assault group compared to a suicide attempt group (4).

Venara et al. also discussed weapons (4). Most preferred weapon was a knife because it is easily obtainable. Our study revealed that the most favored weapon was a kitchen knife whether abdominal stab wound was self-inflicted or resulted from an assault, probably because of its extreme availability.

Almost all patients attempting suicide by stabbing is male ranging in age from 35 to 70 years. The previous two studies revealed that 12.3% and 41% of patients attempting suicide had previously attempted suicide (1) (2). Normally, more than 80% of stab wound patients were male (3). The most frequently injured body regions in patients with stab wounds were the upper extremities followed by the abdomen. Our study revealed results similar to previous reports regarding the mean age of patients, which was 47.0 y. However, males accounted for only 54% of abdominal stab patients, which is not typical compared with previous studies.

Venara et al. also indicated the association with suicide of acute alcoholic intoxication and prior psychiatric history (4). It was reported that almost all suicide attempts took place at the patient's home between 8 a.m. and 9 p.m., while assaults occurred more often at night in a public setting. Assaults usually occur at night when the

street is less crowded and people become more intoxicated by drugs and alcohol as the night goes on. On the other hand, alcohol and drugs were detected less frequently in our abdominal stab wound group compared to other reports. Although patients with previous psychological disorders usually already have been prescribed drugs such as a minor or major tranquilizer, amphetamine was detected in only one patient in our study. Thus, we must be aware that the backgrounds of the patients such as weapons used, alcoholic intoxication and prior psychiatric history are discrepant between Asian countries and European countries.

We evaluated patients with abdominal stab wounds from several perspectives. The mechanism of injury tended to be associated with the injury site in the abdomen, complications by other injuries, psychological disorders, and peritoneal injury. Although severity at the emergency room was not different between the self-inflicted wound group and assaulted group, the rate of a violation of the peritoneum was significantly higher in the assaulted group than the self-inflicted wound group, suggesting that assaulted patients are more likely to have organ damage. We also need to be aware of the existence of patients with psychological disorders even in an assaulted group. This study reviewed data from a single emergency department. However, we believe our observations will encourage emergency trauma surgeons to promptly recognize these characteristics when treating abdominal stab wound patients.

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