Published in final edited form as:

World J Surg. 2017 November ; 41(11): 2681–2688. doi:10.1007/s00268-017-4083-7.

Self-Inflicted Abdominal Stab Wounds Have a Higher Rate of Non-therapeutic Laparotomy/Laparoscopy and a Lower Risk of Injury

Nikolay Bugaev¹, Kevin McKay², Janis L. Breeze^{3,4}, Sandra S. Arabian¹, and Reuven Rabinovici¹

¹Division of Trauma and Acute Care Surgery, Tufts Medical Center, Tufts University School of Medicine, 800 Washington st, #4488, Boston, MA 02111, USA

²Tufts University School of Medicine, 800 Washington st, #4488, Boston, MA 02111, USA

³Tufts Clinical and Translational Science Institute, Tufts University, 800 Washington st, #63, Boston, MA 02111, USA

⁴Institute for Clinical Research and Health Policy Studies, Tufts Medical Center, 800 Washington st, #63, Boston, MA 02111, USA

Abstract

Background—The profile and management of self-inflicted abdominal stab wounds (SI-ASW) patients is still obscure.

Methods—The National Trauma Data Bank (2012) was queried for adults with abdominal stab wounds ($n = 9544$). Patients with SI-ASW ($n = 1724$) and non-SI-ASW ($n = 7820$) were compared. Predictors for non-therapeutic laparotomy/laparoscopy (non-TL) in SI-ASW patients were identified.

Results—SI-ASW patients were older, had more females and behavioral disorders, similar physiology, but a lower Injury Severity Score. They had more laparotomies overall (54 versus 48%, $p < 0.0001$) and more non-TL (42 versus 32%, $p < 0.0001$), but less injuries (43 versus 53%, $p < 0.0001$), although peritoneal violation rate was similar. Complications and mortality were similar. In the SI-ASW cohort, non-TL patients were more likely to be female and younger, and to have Glasgow Coma Scale (GCS) ≥ 13 and a higher systolic blood pressure. History of psychiatric, drug and alcohol disorders was associated with SI-ASW, but did not independently predict the need for treatment in adjusted models.

Conclusion—Patients with SI-ASW underwent more non-TL than patients with non-SI-ASW. Female gender, younger age, and a higher GCS and systolic blood pressure predicted non-TL in this group.

[✉]Nikolay Bugaev, nbugaev@tuftsmedicalcenter.org.

The manuscript has been presented in the Massachusetts Chapter of the American College of Surgeons Scientific Display Poster at the 62nd Annual Meeting December 5, 2015. Westin Copley Hotel, Boston, MA.

Conflict of interest There are no conflicts of interest to declare.

Introduction

Recently, the nationwide number of people dying each year by an act of suicide is progressively increasing [1]. Specifically, the age-adjusted suicide rate in 2014 was 24% higher than in 1999. Although suicides involve mostly firearms, poisoning and suffocation, self-inflicted abdominal stab wounds (SI-ASW) are not uncommon. This group of patients poses special management challenges, as their psychiatric condition and association with drug and alcohol use frequently mask the physical examination and clinical presentation. This challenge is accentuated, given the evolution of selective management paradigms for abdominal stab wounds (ASW), which heavily rely on the admission and serial abdominal examinations [2].

Currently, there is only scant literature on SI-ASW, derived mostly from forensic and psychiatric papers [3–8] and from low-sample-size surgical studies, which provide only limited trauma-related information [9–11]. Notably, the frequency and type of injuries as well as the rate of laparotomy and non-therapeutic laparotomy/laparoscopy in SI-ASW are unknown. The present study aimed to close this knowledge gap by characterizing this group of patients, comparing them to patients with non-SI-ASW and identifying predictors for their non-therapeutic laparotomy/laparoscopy (non-TL).

Methods

General

One year (2012) of the American College of Surgeons (ACS) National Trauma Data Bank (NTDB) was queried for all adults (≥ 16 years old) with a penetrating ASW. The ACS granted access to the dataset (the NTDB remains the full and exclusive copyright property of the ACS) and Tufts Medical Center Institutional Review Board approved the study.

Definitions

Abdominal wall, abdominal cavity penetration, and organ injury—These were defined by the Abbreviated Injury Scale 1998 (AIS98). Patients with AIS98 codes of intra-abdominal organ injury and abdominal wall with penetration were classified as having peritoneal violation. AIS98 codes for “Skin/Subcutaneous/Muscle” only were classified non-peritoneal violation, and these patients were excluded from the study. External cause of injury codes (ECodes) from the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) defined the study groups. Patients coded with E956 (self-inflicted cut/pierce mechanism of injury) comprised the SI-ASW group, while patients with all other cut/pierce ECodes [unintentional (E920.0-9), assault (E966), undetermined (E986), and other (E974)] made up the non-SI-ASW group. Records missing values for age, AIS98 codes, or ICD-9-CM ECodes were excluded. Demographics, admission vital signs, and Injury Severity Score (ISS), hospital length of stay, hospital complications, and mortality were collected. Associated non-abdominal injuries were defined by stabbing-related AIS98 codes and classified by body region (head, neck, thorax, and extremities). Acute intoxication (alcohol and recreational drugs) was not studied, as a significant proportion of these data were missing in the NTDB.

Comorbidities—Comorbidities were recorded based on NTDB's definitions, as follows.

Major psychiatric illness—Defined as documentation of the presence of pre-injury depressive disorder, bipolar disorder, schizophrenia, anxiety/panic disorder, borderline or antisocial personality disorder, and/or adjustment disorder/post-traumatic stress disorder.

Alcoholism—Evidence of chronic use, such as withdrawal episodes. Exclude isolated elevated blood alcohol level in absence of history of abuse.

Drug abuse or dependence—With particular attention to opioid, sedative, amphetamine, cocaine, diazepam, alprazolam, or lorazepam dependence (excludes ADD/ADHD or chronic pain with medication use as-prescribed).

Diagnostic tests—ICD-9-CM codes identified patients who underwent abdominal computed tomography (CT) (ICD-9 88.01) and focused assessment sonography for trauma (FAST) (ICD-9 88.76) and diagnostic peritoneal lavage (DPL)(ICD-9 54.25).

Procedures—ICD-9-CM codes identified patients who underwent abdominal surgery, and those were further classified as TL or non-TL, respectively. Diagnostic laparoscopy (ICD-9 54.21) and/or exploratory laparotomy (ICD-9 54.11, 54.12, 54.19) without organ specific procedures were coded as non-TL, and all other abdominal surgeries were coded as TL. As there is no ICD-9 code for abdominal wall wound exploration, data regarding this procedure were unavailable for analysis.

Statistical analysis

Cohort demographics, comorbidities, injury patterns/characteristics, surgical procedures, and outcomes were compared between SI-ASW and non-SI-ASW patients. Differences were determined by Chi-square tests for categorical variables and either t-tests or Mann-Whitney tests for continuous variables, depending on the skewness of the variable's distribution. All statistical testing was performed using SAS 9.4 (SAS Institute, Cary, NC) with two-sided tests and with $\alpha = 0.05$ (except where noted).

Univariate analyses followed by multinomial logistic regression were performed to identify predictors of non-TL among SI-ASW patients. Candidate predictors included those that were measured and available prior to initial treatment decisions and which showed at least a weak association with treatment in the univariate analysis (i.e., $p < 0.15$). Backward selection was used with variables significant at the $p < 0.10$ level retained in the model. Odds ratios (OR) and 95% confidence intervals (CI) were calculated to compare non-TL to TL or no laparotomy/laparoscopy. The effects of clustering within trauma center were accounted for using SAS's GLIMMIX procedure.

Since increased ISS and mortality were expected in SI-ASW and non-SI-ASW patients who also had extra-abdominal injuries, we evaluated whether the magnitude of these increases differed between SI-ASW and non-SI-ASW patients using exploratory regression models with interaction terms for self-inflicted status and the presence of extraabdominal injuries.

Logistic regression was used to model mortality, and negative binomial regression was used to model ISS.

Results

Demographic and clinical characteristics

Those are presented in Table 1. The study identified 67,626 adults with abdominal organ injuries. Of those, 9,544 were penetrating abdominal stab wounds including 1724 self-inflicted (18%). Of note, SI-ASW patients, compared to non-SI-ASW cases, were older and had a higher female percentage as well as psychiatric, alcohol, and drug disorders. They also had a higher rate of patients with GCS <13 and a lower rate of extra-abdominal injuries, while ISS was lower and admission systolic blood pressure was similar. Abdominal CT was performed more frequently in non-SI-ASW patients (23.4 versus 19.1%, $p < 0.0001$), while FAST and DPL were equally utilized. No difference in complication (27 versus 26%, $p = 0.36$) and mortality (1 versus 1%, $p = 0.99$) rates was observed between the study groups, whereas hospital length of stay was longer in SI-ASW patients (median 4 versus 3 days, $p < 0.0001$).

Injuries

SI-ASW patients had the same risk of peritoneal violation as non-SI-ASW (78 versus 79%, respectively, $p = 0.5116$) patients, but a lower risk of abdominal organ injuries (43 versus 53%, $p < 0.0001$). The most commonly injured organs in both groups were the liver, small bowel and colon, and injuries to the liver and colon occurred more frequently in non-SI-ASW patients (Table 2).

Laparotomies and laparoscopies

Procedure data were available in 9529 patients (1722 SI-ASW, 7,807 non-SI-ASW), of whom 4685 (49%) underwent abdominal procedures. SI-ASW patients had a higher risk of having abdominal procedures (54 versus 48%, $p < 0.0001$) as well as for having non-TL (42 versus 32%, $p < 0.0001$).

Comparison of SI-ASW patients with TL or non-TL

In the SI-ASW group, 798 patients (46%) did not have surgery, whereas 388 (23%) had non-TL and 536 (31%) had TL. Differences in demographic, clinical characteristics and outcomes are described in Table 3. Of note, patients who underwent TL had a higher rate of patients with GCS <13, longer length of stay, and a higher risk for complications and mortality (Table 3).

Predictors of non-TL in SI-ASW patients

In univariate analyses, the following variables (available prior to initial treatment decisions) were associated with the treatment a SI-ASW patient received (i.e., no operation, non-TL or TL) and were included as candidate variables in Injuries the multivariable model: Gender ($p = 0.004$), GCS <13 ($p < 0.0001$), presence of associated neck ($p = 0.004$) or chest ($p =$

0.0045) injuries, history of psychiatric illness ($p = 0.13$), age ($p = 0.004$), systolic blood pressure ($p = 0.002$), and heart rate ($p = 0.009$).

In the multivariable model, the following were overall predictors of the treatment a patient received: gender ($p = 0.0006$), GCS < 13 ($p < 0.0001$), age ($p = 0.048$), systolic blood pressure ($p = 0.004$), and heart rate ($p = 0.0007$). Pairwise comparisons showed that increased heart rate was the only predictor of non-TL compared to “no procedures” (OR 1.11, 95% CI 1.05, 1.17). Compared to patients who received TL, those with non-TL were more likely to be female (OR 1.40, 95% CI 1.04, 1.90) and have GCS < 13 (OR 2.00, 95% CI 1.22, 3.27), be younger (OR 0.90, 95% CI 0.83, 0.99), and a higher systolic blood pressure (OR 1.10, 95% CI 1.04, 1.16) (Table 4).

Comparison between patients with isolated abdominal stab wounds and patients with both abdominal and extra-abdominal stab wounds in SI-ASW and non-SI-ASW patients

Data are presented in Table 5. There was higher ISS and mortality in patients with combined abdominal and extraabdominal stab wounds in both the SI-ASW (Table 5A) and non-SI-ASW groups (Table 5B). The magnitude of the change in mortality associated with extra-abdominal injuries did not differ between the SI-ASW and non-SI-ASW groups (p value for interaction = 0.5). However, the sparse number of deaths, particularly in the SASW group, limited the statistical power of this test. In contrast to the increased mortality, the increased ISS associated with extra-abdominal injuries differed significantly between the SI-ASW and non-SI-ASW groups (p value for interaction = 0.049), with the non-SI-ASW group demonstrating higher ISS with extra-abdominal injuries.

Discussion

The present study demonstrates that patients with SI-ASW in comparison with non-SI-ASW victims have a lower risk of abdominal injuries (43 versus 53%), while having higher rates of abdominal surgeries (54 versus 48%) and non-therapeutic abdominal procedures (42 versus 32%). Only two previous studies, both in a small number of SI-ASW single institution patients, are available for comparison. The first study [9], which analyzed 23 SI-ASW patients, reported an injury rate similar to the one reported herein, but a lower non-TL rate (33%). The second study [10], which compared 43 SI-ASW to 172 non-SI-ASW patients, demonstrated injury and non-TL rates of 28 and 31%, respectively, in the SI-ASW group. Interestingly, the same report demonstrated an 18% SI-ASW rate in the overall abdominal stab wound group, similar to the one reported by the present study.

The factors leading to increased surgical intervention and non-TL in SI-ASW patients, who have fewer injuries, are unknown. While the data presented herein do not directly explain this observation, they offer insight into some of its key elements. For example, our univariate analysis showed a similar admission physiological status in the SI-ASW and non-SI-ASW groups as well as a higher rate of psychiatric, alcohol and drug disorders in SI-ASW patients. This combination suggests that the patient’s mental status likely plays a role in the decision whether to perform a laparotomy/laparoscopy in this unique group of patients. It is conceivable, as previously suggested [12, 13], that patients after a suicide attempt, which is frequently associated with alcohol intoxication and/or drug overdose, are less

communicative and have a less reliable physical examination. Consequently, the treating surgeon may be biased to over-triage SI-ASW patients to the operating room for a diagnostic laparotomy or laparoscopy. This bias may be reflected by the identification in multivariate analysis of the heart rate as a (sole) predictor for non-TL when referenced against no surgical intervention. Although this observation is not surprising since tachycardia in postsuicide attempt patients may reflect their emotional state rather than a hemodynamic shock, it may lead the surgeon to erroneously attribute this physical finding to a potential injury with a subsequent higher rate of non-TL. Moreover, increased systolic blood pressure and GCS, both indicators of enhanced clinical stability, predicted non-TL in the multivariate analysis. This finding supports the notion that other factors, likely the patient's mental status, contribute to the high rate of NTL in SASW patients.

Extra-abdominal SI-ASW may theoretically account, at least in part, for some of the parameters used in the present study, including mortality. To address this issue, we conducted a separate analysis comparing patients with isolated abdominal stab wounds to those with both abdominal and extra-abdominal stab wounds (Table 5). This analysis demonstrated a higher ISS and mortality rate in patients with combined abdominal and extra-abdominal stab wounds in both study groups. However, the proportional increase in mortality observed in SI-ASW and non-SI-ASW groups did not differ statistically. Thus, the effect of extra-abdominal injuries on outcome in both groups was identical and did not skew their comparison. Interestingly, in spite of a similar increase in mortality, the increased ISS associated with extra-thoracic injuries was larger in the SI-ASW group.

The data presented in this study indicate that most patients in both groups were males. This agrees with the global observation that more males are subjected to trauma [14] and that males take their own life at nearly four times the rate of females and represent 79.9% of all suicides [1]. However, our data also showed a higher percentage of females in the SI-ASW group. Intriguingly, the present study identified the female gender as a predictor for non-TL. While the reason for that observation remains speculative, one can argue that it could be related to the fact that males are known to have more "intention to die" when attempting suicide, whereas females frequently display "suicide gesture" behavior, which reflects an attempt to communicate rather than to self-inflict injuries or death [15, 16].

SI-ASW patients were older than non-SI-ASW victims, with respective median ages of 40 and 30 years. These findings agree with previous reports showing that middle-age adults account for the largest proportion (56%) of suicides in the USA [1] and that younger individuals (15-24-year-old) are most commonly subjected to penetrating trauma including stab wounds [17]. Our data also demonstrated that younger age predicted non-TL in SI-ASW patients. We can only speculate that younger postsuicide attempt patients may be more communicative after their self-inflicted event, thus, facilitating their management.

In abdominal stab wounds patients, our data may assist the treating traumatologist to recognize potential biases including the higher rate of non-TL and the lower incidence of injuries in SI-ASW patients. This knowledge may support more liberal use of emergency room local wound explorations and abdominal computed tomography in patients with SI-

ASW rather than directly proceeding with diagnostic laparotomy/laparoscopy in this group of patients.

Our report has several limitations: (1) it is a retrospective analysis of the NTDB, a non-population-based database, which contains records mostly from Level I and II trauma centers; (2) each NTDB patient is coded as an “incident key,” which stands for an admission to one hospital. Therefore, theoretically, a patient admitted to one hospital and subsequently transferred to another one or readmitted to the same institution with the same problem, could be coded as a separate “incident key” more than once; (3) the accuracy of the data reported to the NTDB cannot be confirmed; and (4) given the nature of NTDB data, the clinical application of the reported information may be partial. For example, the NTDB does not provide the location of abdominal stab wound (anterior versus flank/back). However, given the nature of SI-ASW, it is possible that they were mostly located in the anterior abdomen. Additionally, as the indications for surgery and management protocols for abdominal stab wound vary among institutions, our data may be skewed. On the other hand, it is conceivable that this variability is equally distributed between SI-ASW and non-SI-ASW patients. As stated in the Methods section of this paper, NTDB data does not include bedside local wound exploration, and thus patients who underwent this procedure are counted as no intervention patients. Lastly, a significant portion of the data related to alcohol and illegal drug use on admission, which may affect the decision whether to perform surgery, was missing and therefore could not be analyzed.

Conclusion

This is the largest reported study on SI-ASW victims. In comparison with non-SI-ASW, these patients have a lower risk of sustaining abdominal injuries and higher rate of abdominal surgeries including non-TL. Female gender, younger age, and higher systolic blood pressure, and GCS were identified as predictors for non-TL in SI-ASW patients. Surgeons should consider these findings when managing this unfortunate group of trauma patients.

Acknowledgements

This manuscript was supported by the National Center for Advancing Translational Sciences, National Institutes of Health, Award UL1TR001064.

References

1. Centers for Disease Control and Prevention (CDC). Web-based Injury Statistics Query and Reporting System (WISQARS) (2013, 2011) National Center for Injury Prevention and Control, CDC (producer). <http://www.cdc.gov/injury/wisqars/index.html>. Accessed 8 July 2016
2. Biffi WL, Kaups KL, Pham TN et al. (2011) Validating the Western Trauma Association algorithm for managing patients with anterior abdominal stab wounds: a Western Trauma Association multicenter trial. *J Trauma* 71:1494–1502 [PubMed: 22182859]
3. Patel V, de Moore G (1994) Harakiri: a clinical study of deliberate self-stabbing. *J Clin Psychiatr* 55:98–103
4. Start RD, Milroy CM, Green MA (1992) Suicide by self-stabbing. *Forensic Sci Int* 56:89–94 [PubMed: 1398382]

5. Karlsson T, Ormstad K, Rajs J (1988) Patterns in sharp force fatalities—a comprehensive forensic medical study: part 2. Suicidal-sharp force injury in the Stockholm area 1972–1984. *J Forensic Sci* 33:448–461 [PubMed: 3373161]
6. Kuroda N, Saito K, Takada A et al. (1997) Suicide by self-stabbing in the city of Tokyo—a review of accumulated data from 1976 to 1995. *Japanese J Legal Med* 51:301–306
7. Watanabe T, Kobayashi Y, Hata S (1973) Harakiri and suicide by sharp instruments in Japan. *Forensic Sci* 2:191–199
8. Karrison T (1998) Homicidal and suicidal sharp force fatalities in Stockholm, Sweden. Orientation of entrance wounds in stabs gives information in the classification. *Forensic Sci Int* 93:21–32 [PubMed: 9618908]
9. Abdullah F, Nuernberg A, Rabinovici R (2003) Self-inflicted abdominal stab wounds. *Injury* 34:35–39 [PubMed: 12531375]
10. Banerjee A, Zhou HY, Kelly KB et al. (2013) Anterior abdominal stab injury: a comparison of self-inflicted and intentional third-party stabbings. *Am J Surg* 205:274–278 [PubMed: 23414952]
11. Bukur M, Inaba K, Barmparas G et al. (2011) Self-inflicted penetrating injuries at a Level I Trauma Center. *Injury* 42:474–477 [PubMed: 20359709]
12. Borges G, Bagge CL, Cherpitel CJ, Conner KR, Orozco R, Rossow I (2017) A meta-analysis of acute use of alcohol and the risk of suicide attempt. *Psychol Med* 47(5):949–957 [PubMed: 27928972]
13. Bohnert AS, Roeder KM, Ilgen MA (2011) Suicide attempts and overdoses among adults entering addictions treatment: comparing correlates in a U.S. National Study. *Drug Alcohol Depend* 119(1–2):106–112 [PubMed: 21715108]
14. Centers for Disease Control and Prevention (CDC). Web-based Injury Statistics Query and Reporting System (WISQARS). <http://webappa.cdc.gov/cgi-bin/broker.exe>. Accessed 8 July 2016
15. Nock MK, Kessler RC (2006) Prevalence of and risk factors for suicide attempts versus suicide gestures: analysis of the National Comorbidity Survey. *J Abnorm Psychol* 115:616–623 [PubMed: 16866602]
16. Weissman MM, Bland RC, Canino GJ et al. (1999) Prevalence of suicide ideation and suicide attempts in nine countries. *Psychol Med* 29:9–17 [PubMed: 10077289]
17. Macpherson AK, Schull MJ (2007) Penetrating trauma in Ontario emergency departments: a population-based study. *CJEM* 9:16–20 [PubMed: 17391595]

Table 1

Demographic and clinical characteristics of SI-ASW ($n = 1724$) and non-SI-ASW ($n = 7820$) patients

	SI-ASW	Non-SI-ASW	<i>p</i> value
<i>Demographics</i>			
Age ^a , years	40 (28, 51)	30 (23, 41)	<0.0001
Male, <i>n</i> (%)	1170 (68)	7,025 (90)	<0.0001
Psych disorders, <i>n</i> (%)	525 (32)	271 (4)	<0.0001
Alcohol disorder, <i>n</i> (%)	285 (17)	1038 (14)	0.0008
Drug disorder, <i>n</i> (%)	167 (10)	620 (8)	0.0238
<i>Clinical Data</i>			
SBP ^a , mm Hg	132 (118, 147)	133 (119, 147)	0.4215
HR ^a , bpm	95 (83, 110)	96 (84, 110)	0.7729
GCS <13, <i>n</i> (%)	138 (8)	433 (6)	<0.0001
ISS ^a	2 (1, 6)	4 (1, 10)	<0.0001
Extra-abdominal injury, <i>n</i> (%)	450 (26)	3441 (44)	<0.0001
<i>Initial evaluation</i>			
Abdominal CT	329 (19.1)	1831 (23.4)	<0.0001
FAST	194 (11.3)	912 (11.7)	0.6
DPL	17 (1.0)	78 (1.0)	0.96

SI-ASW self-inflicted abdominal stab wounds, SBP systolic blood pressure, HR heart rate, bpm beats per minute, GCS Glasgow Coma Scale, ISS Injury Severity Score. Statistical significance is highlighted gray; CT computed tomography, FAST focused sonography for trauma, DPL diagnostic peritoneal lavage

^aMedian (interquartile range)

Table 2

Injured abdominal organs in patients with SI-ASW and non-SI-ASW

	Total 9531 (100%)	SI-ASW 1718 (100%)	Non-SI-ASW 7813 (100%)	p value
Penetrating abdominal stab wounds	7501 (78.7)	1342 (78.1)	6159 (78.8)	0.5116
Liver with gallbladder	1364 (18.2)	185 (13.9)	1179 (19.1)	<0.0001
Jejunum/Ileum	876 (11.7)	145 (10.8)	731 (11.8)	0.2225
Colon	618 (8.2)	85 (6.3)	533 (8.7)	0.0040
Spleen	458 (6.1)	16 (1.2)	442 (7.2)	<0.0001
Stomach	452 (6.0)	79 (5.9)	373 (6.1)	0.7401
Abdominal vascular injuries	436 (5.8)	79 (5.9)	357 (6.0)	0.9754
Retroperitoneum	413 (5.5)	42 (3.2)	371 (6.0)	<0.0001
Mesentery	392 (5.2)	77 (5.7)	315 (5.1)	0.4066
Kidney, adrenal, ureter	359 (4.8)	10 (0.7)	349 (5.7)	<0.0001
Urethra, bladder	359 (4.8)	10 (0.7)	349 (5.7)	<0.0001
Omentum	234 (3.1)	61 (4.5)	173 (2.8)	0.0013
Pancreas	114 (1.5)	20 (1.4)	94 (1.5)	0.8846
Testes, penis, scrotum	105 (1.4)	46 (3.4)	59 (0.9)	<0.0001
Duodenum	97 (1.3)	22 (1.4)	75 (1.2)	0.2349
Perineum, rectum, anus	91 (1.2)	18 (1.3)	73 (1.2)	0.6689
Urethra and Bladder	50 (0.7)	12 (0.9)	38 (0.6)	0.2740
Fallopian tube, ovaries, uterus vagina, vulva	22 (0.3)	4 (0.3)	18 (0.3)	0.9885

Please note that data regarding peritoneal violation and organ injury were available in 9531 patients (SI-ASW, $n = 1718$; non-SI-ASW, $n = 7813$)

SI-ASW self-inflicted abdominal stab wounds

Table 3

Comparison of SI-ASW patients with no surgery ($n = 798$), non-TL ($n = 388$) or TL ($n = 536$)

	No surgery	Non-TL	TL	<i>p</i> value
<i>Comorbidities</i>				
Psychiatric disorder, <i>n</i> (%)	230 (30)	134 (36)	160 (31)	0.1
Alcohol disorder, <i>n</i> (%)	128 (17)	58 (16)	98 (19)	0.4
Drug disorder, <i>n</i> (%)	81 (11)	38 (10)	48 (9)	0.7
<i>Clinical presentation</i>				
GCS < 13, <i>n</i> (%)	40 (5)	25 (7)	73 (14)	<0.0001
ISS ^a , <i>n</i>	1 (1, 3)	1 (1, 4)	8 (4, 10)	<0.0001
Extra-abdominal injuries, <i>n</i> (%)	202 (25)	90 (23)	158 (30)	0.08
<i>Initial evaluation</i>				
Abdominal CT	199 (24.9)	57 (14.7)	73 (13.6)	<0.0001
FAST	86 (10.8)	44 (11.3)	64 (11.9)	0.8
DPL	0	3 (0.8)	14 (2.6)	<0.0001
<i>Outcomes</i>				
Hospital LOS ^a , days	2 (1, 3)	4 (2, 6)	6 (4, 8)	<0.0001
Complications, <i>n</i> (%)	160 (22)	95 (26)	173 (34)	<0.0001
Mortality, <i>n</i> (%)	2 (0.3)	1 (0.3)	14 (3)	0.0002

SI-ASW self-inflicted abdominal stab wounds, TL therapeutic laparotomy/laparoscopy, GCS Glasgow Coma Scale, ISS Injury Severity Score, LOS length of stay, CT computed tomography, FAST focused sonography for trauma, DPL diagnostic peritoneal lavage

^aMedian (interquartile range)

Table 4

Predictors of non-therapeutic procedures for self-inflicted abdominal stab wounds, compared to therapeutic and no procedures

	<i>p</i> value	Non-TL versus no procedures		Non-TL versus TL	
		OR	95% CI	OR	95% CI
Female gender	0.0006	0.87	0.66, 1.14	1.40	1.04, 1.90
GCS 13	<0.0001	0.80	0.47, 1.36	2.00	1.22, 3.27
Age ^a	0.048	0.99	0.91, 1.08	0.90	0.83, 0.99
Systolic blood pressure ^a	0.004	1.03	0.98, 1.08	1.10	1.04, 1.16
HR ^a	0.0007	1.11	1.05, 1.17	0.97	0.91, 1.04

TL therapeutic laparotomy/laparoscopy, GCS Glasgow Coma Scale, HR heart rate, bpm beats per minute

^aThese continuous variables reflect 10 unit differences (10 year increase in age; 10 mmHg increase in systolic blood pressure, and 10 bpm increase in heart rate)

Table 5

Comparison between patients with isolated abdominal stab wounds and patients with both abdominal and extra-abdominal stab wounds in SI-ASW and non-SI-ASW patients

	Abdominal SW only (<i>n</i> = 1274)	Abdominal and extra-abdominal SW (<i>n</i> = 450)	<i>p</i> value
<i>(A) SI-ASW patients</i>			
ISS ^a	1 (1, 4)	5 (2, 11)	<0.0001
Mortality, <i>n</i> ^b (%)	7/1135 (0.6)	10/410 (2.4)	0.0024
Abdominal surgery, <i>n</i> ^b (%)	676/1272 (53.1)	248/450 (55.1)	0.4722
Non-TL, <i>n</i> ^b (%)	298/1272 (23.4)	90/450 (20.0)	0.1347
<i>(B) Non-SI-ASW patients</i>			
	Abdominal SW only (<i>n</i> = 4379)	Abdominal and extra-abdominal SW (<i>n</i> = 3441)	<i>p</i> value
ISS ^a	4 (1, 9)	9 (2, 14)	<0.0001
Mortality, <i>n</i> ^b (%)	22/3614 (0.6)	51/3034 (1.7)	<0.0001
Abdominal surgery, <i>n</i> ^b (%)	2056/4370 (47.0)	1705/3437 (49.6)	0.0247
Non-TL, <i>n</i> ^b (%)	708/4370 (16.2)	496/3437 (14.4)	0.0316

SW stab wound, SI-ASW self-inflicted abdominal stab wounds, ISS Injury Severity Score, non-TL non-therapeutic laparotomy

^aMedian (interquartile range)

^bDenominators represent the number of cases in which data was available