Selective Management of Multiple Anterior Abdominal Stab Wounds: Is it Safe?

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ABSTRACT: Background: Selective management of stable patients with anterior abdomen stab wounds (AASWs) has become a gold standard management approach throughout the world. Evidenced-based options for supporting selective management include clinical follow-up, local wound exploration with or without diagnostic peritoneal lavage, diagnostic laparoscopy, and abdominal computerized tomography. The presence of multiple AASWs might signify a more aggressive attack and limit the safety of a selective management approach.

Objectives: To evaluate whether multiple AASWs are associated with an increased risk of intra-abdominal injury requiring emergency surgery.

Methods: We retrospectively reviewed all AASW patients admitted to Assaf Harofeh Medical Center, Zerifin, Israel, and Hillel Yaffe Medical Center in Hadera, Israel, from 2007 to 2015. Patients were divided into two groups based on the number of stab wounds: single or multiple. Data were coded for demographics, severity of injury, presence of intra-abdominal injury, laparotomy rate, length of hospital stay (LOS), length of stay in the intensive care unit (ICU), and survival.

Results: The study included 189 patients. Of these, 143 patients had a single AASW and 26 had multiple AASWs. There were no differences between the groups regarding demographics, severity of injury, intra-abdominal penetration, specific organ injury, LOS, or ICU. There was no difference in the percentage of patients requiring laparotomy. The overall mortality was 2.66% (4/189). There was no significant difference in the mortality rate between the groups (P = 0.11).

Conclusions: The presence of multiple AASWs is not a risk factor for increased frequency and severity of intra-abdominal injury.

KEY WORDS: anterior abdomen stab wounds (AASWs), penetrating injury, trauma management

Selective management of stable patients with anterior abdomen stab wounds (AASWs) is a widely accepted approach throughout the world. However, there is still no single standard of care. Evidence-based options for selective management include observation [1-3], local wound exploration with or without diagnostic peritoneal lavage [3,4], and abdominal computerized tomography (CT) [1-6].

The presence of multiple AASWs might signify a more aggressive treatment plan and limit the safety of a selective management approach. We were unable to find any findings in the literature addressing this question. We hypothesized that multiple AASWs are associated with an increased risk of intra-abdominal injury; therefore, standard approaches of clinical observation only may not be appropriate.

PATIENTS AND METHODS

We retrospectively reviewed all AASW patients admitted to Assaf Harofeh Medical Center, Zerifin, Israel, and Hillel Yaffe Medical Centers in Hadera, Israel, from 2007 to 2015. Patients were divided into two groups based on the number of stab wounds: single or multiple. Data were coded for demographics, severity of injury, presence of intra-abdominal injury, laparotomy rate, length of hospital stay (LOS), length of stay in the intensive care unit (ICU), and survival. AASWs were defined as stab wounds of the anterior abdominal wall bordered by the costal margins superiorly, the pubis and inguinal ligaments inferiorly, and the anterior axillary lines laterally. Patients with flank, back, and thoracoabdominal stab wounds were excluded from the study.

Both hospitals had the same approach to management of AASW patients during the period of the study. All patients were initially managed according to the Advanced Trauma Life Support protocol of the American College of Surgeons [7]. Urgent explorative laparotomy was performed on patients with signs of hemodynamic instability, peritoneal irritation, or evisceration. Patients with no indications for immediate lapa-
rotomy underwent local wound exploration (LWE). Patients with proven violation of the anterior fascia underwent an abdominal CT scan.

In the case of an abnormal CT finding, such as free air, free fluids, or organ injury, management decisions were made by the attending trauma surgeon based on clinical judgment. The Injury Severity Score (ISS) of the patients was divided into four groups (1–8, 9–14, 15–24, > 25).

The study was approved by the institutional review boards of both hospitals.

**Statistical Analysis**

To compare the quantitative (continuous) variables between the two independent groups, a sample t-test was applied. The association between the two categorical variables was assessed using either chi-square test or Fisher’s exact test. All statistical tests were two-tailed. A P value < 0.05 was considered statistically significant. Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 20 (SPSS, IBM Corp, Armonk, NY, USA).

**Results**

During the study period, 265 patients with abdominal stab wounds were admitted to the medical centers. Ninety-six patients with stab wounds to the back and flank were excluded. The 169 patients with AASWs were divided into two groups. Group I included 143 patients with a single stab wound and Group II included 26 patients with multiple abdominal stab wounds. The vast majority (95%) in both groups was male. The mean age was 27.5 years (range 12–86 years). There was no statistically significant difference in the mean age of the groups.

The rate of abdominal cavity penetration and the incidence of intra-abdominal injury are shown in Table 1. Both groups had similar rates of hypotension and tachycardia on arrival (P = 0.8). No difference was observed in injury severity, LOS, and need for ICU admission [Table 2]. There was no statistically significant difference in laparotomy rate between the groups. The non-therapeutic laparotomy rate was 23% in Group I (19/81) compared to 14% in Group II (2/14) (P = 0.78).

Four of the 169 patients died, for an overall mortality rate of 2.36%. Two of the patients who died had single stab wounds and two others presented with multiple abdominal stab wounds (P = 0.11).

The most frequently injured organs were small bowel (17.2%) and liver (14.2%) followed by injuries to the vascular system (11.2%), large bowel and stomach (8.3% each), kidney (4.1%), and spleen (3.6%). No statistically significant differences were found in the specific organ injury rates [Table 3].

**Discussion**

Penetration of the abdominal cavity was previously considered an absolute indication for surgery. This approach has been replaced by selective management of patients with penetrating abdominal stab wounds in the last two decades [8]. Several large studies clearly demonstrated that the rate of non-therapeutic laparotomy in stable patients without peritonitis or evisceration approaches 53% [1,3]. Moreover, non-therapeutic laparotomies are associated with significant morbidity [1,2]. The development of selective abdominal stab wound management protocols, including the liberal use of abdominal CT, has decreased the number of non-therapeutic operations [1,2].

Abdominal CT plays an important diagnostic role in the management of flank and back stab wounds in stable trauma patients [9] because of the limited value of LWE and diagnostic laparoscopy in the evaluation of retroperitoneal injury. The management of AASWs is much more diverse. LWE, abdomin-

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<th>Table 2. Comparison of injury parameters between the groups</th>
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<th>Table 3. Incidence of specific organ injury*</th>
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*Some patients with single or multiple abdominal stab wounds had more than one intra-abdominal injury.

331
nal ultrasonography, CT, diagnostic peritoneal lavage, and diagnostic laparoscopy have been reported as parts of protocols for management of AASWs. However, the use of both abdominal ultrasonography and CT has been questioned. Abdominal ultrasonography is associated with a low sensitivity for fascial penetration and is strongly operator dependent [10]. Inaba and colleagues [6], in a study of 249 AASW patients, found no advantage of CT compared with serial physical examination in stable victims without evidence of peritonitis or evisceration. In their study, all patients underwent surgery based on physical examination alone. Some experienced trauma centers still observe stable AASW patients without peritoneal findings [2,4]. Navsaria and co-authors [11] provided additional support for serial abdominal examination. That team reported 87.3% sensitivity and a 93.5% specificity rate for serial abdominal examinations in the management of 186 patients with AASWs. In that study, 53.8% of the group was managed successfully without surgery.

However, to the best of our knowledge, there are no reports in the literature comparing the safety of selective management of single versus multiple AASWs. The presence of multiple wounds is more challenging. If the management protocol includes LWE, should all wounds be explored? Is CT evaluation of the wound tract affected by multiple wounds?

Several studies evaluating the patterns of AASW showed that more than one-third of all wounds do not penetrate the abdominal cavity [2,12]. Of those penetrating the abdominal cavity, 50–75% do not cause injuries that require surgical repair [1]. Surprisingly, we found no significant difference in the rate of intra-abdominal injury between the single and multiple AAWS patients in our study. We speculate that the victims may begin to protect themselves after the first wound, which decreases the likelihood of subsequent abdominal cavity penetration. The ISS was similar in both groups. We found no significant differences in the length of ICU and hospital stay. Approximately 50% of our patients in either group required laparotomy, which is comparable to the rate reported by others [2,8]. The most commonly reported intra-abdominal injuries in patients with AASW are hollow viscous injuries, followed by solid organ damage [12]. In our study, the intestine was injured in 33.5% of patients and solid organs were injured in 34.6%.

LIMITATIONS

This study has several limitations. It is a retrospective study with a relatively small sample size conducted at two separate institutions. Important variables in the management decisions were governed by the clinical judgment of the various surgeons responsible for the patients. There was also no information concerning either the time interval between admission and operation or the complication rates.

Despite the limitations of the study, our provocative findings should stimulate a large prospective study to confirm the safety of selective management of multiple AASW patients.

CONCLUSIONS

The presence of multiple AASWs is not a marker for increased risk of intra-abdominal injury, which suggests that a selective management approach is appropriate for this group of patients.

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References


“Time is the coin of your life. It is the only coin you have, and only you can determine how it will be spent. Be careful lest you let other people spend it for you”

Carl Sandburg (1878–1967), American poet, biographer, writer, and editor; winner of three Pulitzer Prizes: two for his poetry and one for his biography of Abraham Lincoln.