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ORIGINAL ARTICLE

Prognostic Factors in the Evaluation of Patients with Abdominal Trauma: Abel Santamaría Cuadrado Teaching General Hospital

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ABSTRACT

Introduction: Trauma is associated with high morbidity and mortality, representing a major health problem in modern times. The abdomen is one of the most frequently affected regions in polytrauma patients; thus, identifying intra-abdominal injuries is essential to reduce morbidity and mortality.
Objective: To identify factors influencing the prognosis of patients with abdominal trauma treated at Abel Santamaría Cuadrado Teaching General Hospital between 2021 and 2024.
Methods: An observational, analytical, prospective longitudinal study was conducted with a sample of 274 patients. Statistical analysis was performed, adhering to ethical principles.
Results: Abdominal trauma predominated in young, male, and White patients. Closed abdominal trauma was the most common. Most patients received prehospital care. Injuries without organ involvement predominated, with the spleen being the most frequently affected organ. Only a small proportion required intensive care unit (ICU) admission, and most of these were reported as severe cases. Hemodynamic instability was observed in 4,74 % of patients.
Conclusions: The study identified the main factors associated with mortality in abdominal trauma, despite its low incidence during the study period.

Keywords: Focused Assessment With Sonography for Trauma; Hemodynamics; Damage Assessment.

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INTRODUCTION

Trauma is associated with high morbidity and mortality, representing a current global health problem due to the high consumption of medical resources and the loss of productive life resulting from potential sequelae. No organ system is entirely immune to injury; once a trauma occurs, it triggers increased metabolic demand.[1,2]

According to data from the World Health Organization, trauma accounts for 8 % of all global deaths. Up to 15 % of trauma cases in the United States involve the abdomen, rising to 24 % worldwide. Most injured patients are men over 50 years old, and for each death, there are two cases of total disability.[2] In Cuba, accidents represent the fifth leading cause of overall mortality; in 2022, the crude mortality rate due to accidents was 51,6 per 100,000 inhabitants.[3] In 31 % of polytraumatized patients, intra-abdominal injuries are identified—either open or closed depending on the mechanism of trauma—and account for 20–35 % of trauma-related deaths.[2,4]

The first laparotomy performed in a trauma context occurred in the 19th century in New York on a patient with an open firearm injury to the abdomen. From that moment, an aggressive surgical approach was adopted, resulting in a high rate of non-therapeutic laparotomies between 1880 and 1960, prior to the establishment of formal trauma centers.[4,5]

Following the development of protocols such as the *Advanced Trauma Life Support (ATLS)* program, which improved access to more sensitive and specific diagnostic and therapeutic methods, trauma mortality has significantly decreased.[1]

The Abel Santamaría Cuadrado Teaching General Hospital serves as the provincial reference center for polytraumatized patients in Pinar del Río, Cuba. Abdominal trauma remains a major diagnostic and therapeutic challenge because the physical examination is often nonspecific and requires high diagnostic suspicion, knowledge of trauma biomechanics, and the use of imaging modalities. Therefore, this study aimed to identify factors influencing the prognosis of patients with abdominal trauma at Abel Santamaría Cuadrado Teaching General Hospital between 2021 and 2024.

METHODS

An observational, analytical, prospective longitudinal study was conducted at the Abel Santamaría Cuadrado Teaching General Hospital in Pinar del Río Province between June 2021 and 2024. The study population consisted of all patients with abdominal trauma who required hospital care during the study period. A simple random sampling method was used to select 274 patients, who met inclusion criteria (patients aged ≥18 years diagnosed with abdominal trauma) and exclusion criteria (incomplete clinical records or those who arrived deceased).

Data were obtained through clinical record review, allowing collection of variables such as: sex, skin color, type of trauma, organ involvement, hemodynamic status, discharge condition, therapeutic management, age, total number of abdominal trauma cases per year, ICU admission, lethality, and hospital stay.

Descriptive and inferential statistics were applied for data analysis. The study was approved by the Ethics Committee of Abel Santamaría Cuadrado Hospital, adhering to the principles of the Declaration of Helsinki (2013) and Cuban ethical standards for human research.

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RESULTS

During the study period, 10 927 patients were treated in the hospital's emergency department; 274 (2,51 %) were admitted with abdominal trauma, and 54 (19,71 %) required ICU care (Table 1).

Table 1. Clinical-epidemiological characteristics of patients with abdominal trauma at Abel Santamaría Cuadrado Teaching General Hospital (2021–2024).

Year	Patients in Emergency	Abdominal Trauma		ICU Admissions	
		No.	%	No.	%
2021	3471	23	8,39	7	12,96
2022	3316	67	24,45	9	16,67
2023	3154	146	53,28	23	42,59
2024 (Jan–Apr)	986	38	13,87	15	27,78
Total	10,927	274	100	54	100

The mean age of patients with abdominal trauma was 45 years (SD = 14,5). The 30–44-year age group accounted for 38,32 % of cases, with a 2,55 % lethality rate. White males had the highest mortality (5,11 % and 4,74 %, respectively). Closed trauma predominated (72,26 %), though open trauma showed higher lethality (5,11 %). The mean hospital stay was 9,2 days (Table 2).

Table 2. General characteristics of patients with abdominal trauma.

Variable		Patients (n=274)		Deaths	
		No.	%	No.	%
Age (years)	< 30	49	17,88	2	0,73
	30-44	105	38,32	7	2,55
	45-59	78	28,47	5	1,82
	≥ 60	42	15,33	4	1,46
	< 30	49	17,88	2	0,73
Sex	Male	229	83,58	13	4,74
	Female	45	16,42	5	1,82
Skin color	White	141	51,46	14	5,11
	Black	117	42,70	3	1,09
	Mestizo	16	5,84	1	0,36
Type of trauma	Open	76	27,74	14	5,11
	Closed	198	72,26	4	1,46

More than half of patients (57,30 %) had no organ involvement. Among those with organ damage, closed trauma predominated (28,10 %).

As shown in Table 3, hemodynamically stable patients represented 93,43 %, whereas instability was strongly associated with mortality.

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Table 3. Relationship between hemodynamic status and patient outcome.

Hemodynamic status	Alive	%	Deceased	%	Total	%
Stable	251	98,05	5	1,95	256	93,43
Unstable	0	0	18	100	18	6,57
Total	251	91,61	23	8,39	274	100

Patients who received prehospital care had better outcomes, with 98,43 % survival and only 1,57 % mortality, compared to 18,07 % mortality among those without early intervention (Table 4).

Table 4. Relationship between prehospital care and discharge outcome.

Prehospital care	Alive	%	Deceased	%	Total	%
Yes	188	98,43	3	1,57	191	69,71
No	68	81,93	15	18,07	83	30,29
Total	256	93,43	18	6,57	274	100

When assessing therapeutic conduct (Table 5), timely surgical treatment and blood transfusion were associated with better prognosis (84,62 % and 82,89 % survival, respectively).

Table 5. Relationship between discharge outcome and therapeutic management.

Therapeutic conduct	Alive	%	Deceased	%	Total	%
Surgical treatment	99	84,62	18	15,38	117	42,70
Blood transfusion	63	82,89	13	17,11	76	27,74
Vasopressor support	0	0	13	100	13	4,74
Ventilatory support	16	55,17	13	44,83	29	10,58

DISCUSSION

Abdominal trauma is one of the main diagnostic challenges in emergency centers, as the physical examination provides little information regarding the true extent of the trauma and sometimes does not correlate with the patient's severity. This research highlights that abdominal trauma has a relatively low incidence compared to the total number of patients attending the emergency room at this institution, and it also shows a trend of increase in recent years, which is related to the concomitance of the COVID-19 pandemic during the first two years of the study, a period characterized by movement restrictions and confinement. Considering that most abdominal traumas occur secondary to traffic accidents, this explains the low incidence between 2021 and 2022.

Comparatively with other regions of Latin America, similarities are observed regarding the fact that abdominal trauma represents a relatively small part of the total number of trauma patients treated, being surpassed by cranioencephalic injuries and thoracic trauma. For example, Treviño Noah,[6] in a study conducted in Peru between 2020-2022, reported an incidence of 1.08 % for abdominal trauma with a total of 6268 patients treated, representing a small portion of the total.

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Several national and international studies [7,8,9] show a predominance of the male sex in the studied sample, identifying various factors that may influence this fact, such as social norms where men tend to take on high-risk professions like drivers, construction workers, dockers, among others that make them more susceptible to traffic and/or occupational accidents, as well as limited knowledge about protective measures and safety protocols, driving under the influence of alcohol, among others.

Parra-Romero et al.[2] conducted a study on the management of abdominal trauma in a Mexican hospital, noting that the average hospital stay was 6,95 days, in line with the current study; this will depend on factors inherent to the trauma, such as the extent of the injuries, type of trauma, prehospital care provided, as well as timely surgical intervention and early diagnosis of injuries, all of which significantly reduce the incidence of complications and improve the prognosis of these patients.

Engbang,[10] in his research "Epidemiology, diagnostic and management of abdominal trauma in two hospitals in the city of Douala, Cameroon," with a total population of 43 patients, found that the average age of patients was 31,7 years, with again, the male sex being the most affected (70,7 %). This relates to individuals in this age group being of working age, having greater financial means to acquire motor vehicles, and better access to alcoholic beverages, all significantly increasing risk. Similarly, Agrawal,[9] mentioned a study where the highest incidence of abdominal trauma occurred in patients between 20 to 30 years (34 %), considering that the study focused on a university city with significant tourism development and several recreational centers justifies this difference, as noted in studies by Mejia,[11] and Ramírez.[12]

The organic compromise in patients with abdominal trauma varies significantly depending on the type of trauma (open or closed), as well as its extent and severity, which will depend on the intensity of the trauma and its kinematics. In Cantú's thesis,[13] conducted in Mexico, 28 patients were identified without organic compromise, while other consulted literatura,[14,15] indicated that the main affected organs were the spleen, followed by the liver, especially in closed traumas. Conversely, open traumas, which occur more frequently in our area due to stab wounds, primarily affect the small intestine and colon in their entirety, followed by the liver and abdominal vasculature. The severity varies from localized injuries to profuse hemorrhages leading to hypovolemic shock, superinfection, among others, which can be potentially fatal.[16]

The first step in the protocol proposed by the ATLS is to identify the hemodynamic status of the patients. An unstable patient is considered to have altered consciousness, systolic blood pressure less than 90 mmHg, heart rate greater than 100 beats per minute, respiratory rate less than 10 or greater than 24 breaths per minute, and signs of hypoperfusion; the rest of the patients are considered hemodynamically stable.[3,4]

In the study published by Ramírez,[12] of the patients diagnosed with abdominal trauma, hemodynamic stability reached the highest percentage at 85,5 %, while only 14,5 % presented instability, similar to the studies proposed by Ledrick,[17] where a minority of patients (9 %) presented hemodynamic instability. This significantly influences the long-term prognosis of trauma patients in general and particularly in abdominal trauma, where early intervention that ensures the hemodynamic stability of the patient helps maintain the homeostatic balance of all organic systems, reducing complications that may arise as a consequence.

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Related to the above, and in order to ensure that the patient receives comprehensive care, maintains hemodynamic stability, and arrives in the best possible condition for surgery if necessary, there are well-established prehospital care protocols by the WHO and medical organizations worldwide, clearly defined in the advanced trauma life support guidelines (ATLS) and modified to the reality of each Cuban medical institution, based on the trauma care experience at the Abel Santamaría Hospital. Several studies analyze the relationship between early prehospital attention and the survival of patients with abdominal trauma, demonstrating a directly proportional relationship between both.[12,16,18]

For comprehensive management, it is essential to quickly classify individuals with abdominal trauma to ensure the stability of vital parameters and identify injuries and their extent. The ABCDE sequence (airway, breathing, circulation, neurological deficit, exposure) is followed as part of the primary assessment of every patient arriving at the emergency room, with initial measures including rewarming, fluid resuscitation or blood products as needed, and the use of permissive hypotension. The ultimate goal of this first stage is to correct temperature, acidosis, and coagulopathy (the lethal triad in trauma). Diagnostic means such as ultrasonography (FAST or extended FAST), in addition to abdominal puncture and more sophisticated studies like multi-slice or contrast-enhanced computed tomography, are used.[16,17,18]

Trauma injury scales facilitate triage and guide treatment towards either surgical intervention or conservative treatment, considering that any surgical procedure can itself carry various short, medium, and long-term complications, thus this intervention should not be taken lightly.[19,20] Several authors reflect that in advanced trauma care centers in recent years, the majority of patients with abdominal trauma were managed conservatively.[4,10] Other studies show that in cases where surgical intervention for abdominal trauma was necessary, the presence of open trauma, evisceration, and hemodynamic compromise has been the situations determining the decision for surgical action, requiring management with blood products in a high percentage of cases.[6,7,13,18]

CONCLUSIONS

This study at Abel Santamaría Cuadrado Teaching General Hospital found a low incidence of abdominal trauma, with few ICU admissions. Several prognostic factors significantly influenced patient outcomes—some modifiable and others not. The mean age was 45 years, with a predominance of males and closed trauma without organ involvement.Hemodynamic instability was a major risk factor for mortality. Most patients received prehospital care, which was associated with lower mortality. Multivariate analysis revealed that surgical treatment, blood transfusion, vasopressor use, and ventilatory support were significantly related to mortality; blood transfusion emerged as a protective prognostic factor.

Conflict of Interest
The author declares no conflict of interest.

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