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ORIGINAL ARTICLE

Conservative Management of Blunt Abdominal Trauma

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Abstract

Background: ***Blant abdominal trauma is a prominent contributor to both morbidity and mortality across many age cohorts and commonly affects solid abdominal organs, including the liver, spleen, and kidneys. Management was historically operative. However, up to 80% of hemodynamically stable blunt trauma patients can now be managed non-operatively.***

Aim and objectives: ***Assessing the effectiveness of conservative care for blunt abdominal trauma in a subset of patients; identifying those who need surgical consultation and potential surgery; and using the right diagnostic techniques to find out whether a patient has persistent bleeding or other injuries that could result in delayed morbidity and death.***

Patients and methods: ***Twenty individuals suffering from hemodynamically stable blunt abdominal injuries who visited Al-Azhar University Hospitals (Al-Hussein, Sayed Galal) and met the eligibility requirements were included in the study. After obtaining informed consent from patients or their guardians, the patient was assessed and stabilized in the emergency room and then monitored in the inpatient ward to look for clinical improvement. Treating surgeons made management decisions regarding the patient, such as whether to proceed conservatively or surgically.***

Results: ***Ninety percent of patients managed non-operatively, which involved monitoring, serial exams, and angioembolization as needed. The remaining 10% needed surgical intervention due to evidence of splenic injuries requiring surgery. No complications occurred in the conservative group.***

Conclusion: ***This study supports the standardized use of evidence-based conservative management guidelines in suitable blunt abdominal organ injury patients, allowing organ preservation and reduced morbidity versus historic routine surgical management.***

Keywords: Conservative Management, non-operative management, Blunt Abdominal Trauma

1. Introduction

In many parts of the world, trauma continues to be the primary reason for emergency admissions. Abdominal trauma significantly increases trauma victims' morbidity and mortality. Up to 20% of patients with severe trauma receive a diagnosis of severe abdominal trauma, which is linked to a 20% increase in death. Because of their size and location, the spleen and liver are the organs most commonly affected in blunt trauma. Treatment for blunt abdominal injuries includes both nonoperative and surgical methods.[1]

Automobile accidents, assaults, falls, and recreational activities are common causes of blunt abdominal trauma. The organs that may be impacted are suggested by the method of injury. When an unrestrained occupant of a motor vehicle crashes and strikes the steering wheel, for instance, the liver and spleen are susceptible to harm from abrupt deceleration.[2]

Conservative management is the practice of avoiding invasive operations or surgeries, usually with the goal of preserving bodily components or function. Conservative care includes serial tests, surveillance, and, if necessary, angioplasty. It has become increasingly utilized for hemodynamically stable patients without peritonitis or significant free intra-abdominal fluid/air Because over 85% of injuries to solid organs can be treated without surgery. An overview of the processes, assessment, and conservative treatment of blunt abdominal injuries is given in this study.[3]

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The present study aims to assess the effectiveness of conservative treatment for blunt abdominal trauma in a subset of patients, to identify patients who need surgical consultation and potentially surgical intervention, and to use appropriate diagnostic techniques to ascertain whether a patient has sustained injuries that could result in delayed morbidity and mortality, such as ongoing bleeding

2. Patients and methods

This is an observational cross-sectional prospective study for patients coming to Al-Hussein and Sayed Galal hospitals at Al-Azhar University recruited from the emergency department conducted with blunt abdominal trauma symptoms and signs. The duration of the recruiting period was six months between April 2023 and October 2023. patients included in this study were 20 patients with hemodynamically stable blunt abdominal injuries coming to Al-Hussein and Sayed Galal hospitals at Al-Azhar University and meeting qualifying requirements. Following the acquisition of informed consent, the patient was monitored in the inpatient ward to evaluate clinical improvement, and treatment decisions (i.e., conservative or surgery) were made by the attending surgeons. The patient had previously been assessed and stabilized in the emergency department. Every patient treated conservatively had constant monitoring for any complications, and it was documented when an operation was necessary.

Inclusion criteria include: Patients who are older than 14 years old, both sexes, and who are hemodynamically stable and cognizant but do not have a history of abdominal illness (such as pancreatitis, liver disease, or cancer) should be referred to the emergency room if they have recently suffered traumatic abdominal trauma.

Exclusion criteria include pregnant females or medically unstable patients who have contraindications to use investigations and patients who rejected enrolment in the study.

After approval of the Ethics Committee and obtaining informed consent from patients or parents to participate in the study, a primary survey (ABCDE) was completed, resuscitative efforts were underway, and all the study population was subjected to (history and a complete physical examination).

Detailed history taking:

Every thorough medical examination involves a history of the injury mechanism. Prehospital staff and the patient's family must provide this information since traumatized patients frequently cannot provide such a history. For this, the AMPLE history makes a handy mnemonic: Allergies, current use of medications, events/environment relevant to the injury, previous illnesses/pregnancy, and last food.

Examination:

General examination: Vital signs, including heart rate, blood pressure, temperature, respiration rate, and consciousness level, are recorded every day and will be detailed in the observational protocol. General indications of related injuries.

Local examination: Examining the abdomen for any indications of intra-abdominal injuries.

Investigations:

Laboratory: Complete blood count (CBC), Hematocrit (Htc), pancreatic enzymes, LFTs and KFTs, and serum electrolytes.

Radiologic investigation: An abdominal FAST ultrasound, an erect plain X-ray, a chest X-ray, and a CT scan to confirm the diagnosis, if necessary.

According to the American Association for the Surgery of Trauma (AAST), abdominal solid organ injuries can be categorized depending on the anatomic injury found during surgery or on a computed tomography (CT) scan.

Table 1. The AAST splenic injury grading scale.

GRADE I	SUBCAPSULAR HEMATOMA<10% SURFACE AREA.
GRADE II	Hematoma subcapsular Surface area: 10-50%, intraparenchymal hematoma diameter: <5 cm.
GRADE III	ruptured parenchymal or subcapsular hematoma, intraparenchymal hematoma greater than 5 cm, and subcapsular hemorrhage greater than 50% surface area or growing.
GRADE IV	Splenic laceration>3 cm deep in hilar region.
GRADE V	utterly broken spleen, damaged hemar arteries with a devascularized spleen.

Table 2. The AAST liver injury grading scale.

GRADE I	HEMATOMA: SUBCAPSULAR,<10% SURFACE AREA. LACERATION: CAPSULAR TEAR,<1 CM PARENCHYMAL DEPTH.
GRADE II	Hematoma: 10–50% surface area, subcapsular. Hemotoma: intraparenchymal, less than 10 cm in diameter. laceration: capsular tear, <10 cm in length, 1-3 cm in parenchymal depth .
GRADE III	Hematoma: ruptured subcapsular or parenchymal; subcapsular, greater than 50% surface area. Hematoma: >10 cm intraparenchymal. Laceration: capsular rip deeper than 3 cm in the parenchyma. A vascular injury containing active bleeding inside the parenchyma of the liver
GRADE IV	Laceration: liver parenchyma breaking into the peritoneum, encompassing 25-75% of a hepatic lobe vascular damage and active bleeding .
GRADE V	Laceration: Over 75% of the hepatic lobe is affected by parenchymal disruption. Vascular: adjacent hepatic venous lesions (central main hepatic veins/retrohepatic vena cava).

Table 3. The AAST renal injury grading scale.

GRADE I	SUBCAPSULAR HEMATOMA, NONEXPANDING, NO LACERATION.
GRADE II	Nonexpanding perirenal hematoma, cortical laceration<1 cm deep.
GRADE III	Cortical laceration>1cm without collecting system rupture.
GRADE	Parenchymal laceration extending into urinary

IV	collecting system with urinary extravasation.
GRADE V	Shattered kidney, renal pedicle injury or avulsion.

Follow up:

Follow up of patient was done after one week, two weeks, one month and three months of discharge with routine periodic assessment. In follow up visits, patient is assessed for any complications, time of recovery.

Observation Protocols:

Patients selected for nonoperative management require structured observation protocols for serial clinical assessments and monitoring of hematologic parameters. Vital signs: Blood pressure, heart rate, and respiration rate are monitored every 2 hours initially in the first 12 hours, then every 4 hours up to 48 hours, then every 6 hours up to the fourth day. Tachycardia may signal bleeding. Hypotension necessitates urgent intervention. Haematocrit and hemoglobin levels are checked upon admission, after 4 hours, every 6 hours up to 24 hours, and then daily. A falling haematocrit implies ongoing haemorrhage. Transfusion is needed when H tc drops below 21-24%.

Abdominal Exams: The abdomen is inspected, palpated, and auscultated every 4-6 hours for signs of peritonitis, increasing pain, or distension. Guarding and rebound tenderness which indicates surgical intervention.

FAST Ultrasound: FAST exams detect increasing hemoperitoneum from occult bleeding. They are repeated after 12-24 hours, depending on clinical status.

Observation requires close communication between trauma, general surgery, and interventional radiology teams to promptly identify deterioration. Monitoring continues for 24-48 hours after stabilization or embolization.

Study end-points: if the patient died or needed surgical intervention at the time of initial assessment and after three months of discharge.

Discharge Planning:

Prior to discharge, patients should demonstrate stable hemoglobin for 24 hours without transfusion. They should tolerate a regular diet without difficulty. Analgesics are prescribed for pain control. No heavy lifting, contact sports, or strenuous activity for 4-6 weeks to allow abdominal healing. Patients follow up within one week for repeat laboratory tests and abdominal exams. Worsening pain, nausea, bleeding, or dizziness prompts immediate return to the emergency department. Conservative management with structured observation protocols allows nonoperative healing of many solid organ injuries. This achieves better outcomes and fewer complications compared to surgery. Developing institutional protocols facilitates effective nonoperative management.

Ethical consideration:

Written informed consents were obtained from the parents or patients after the Local Ethics Committee approved the project.

Statistical Analysis:

Following collection, editing, coding, and entry, the data were added to IBM SPSS, version 20, a statistical tool for social science. Whereas the qualitative data was presented as percentages and numbers, the quantitative results were provided as means, standard deviations, and limitations when it was discovered that their distribution was parametric.

If any cell's anticipated count was fewer than five, the Chi-square test was replaced with the Fisher exact test when comparing two groups (operated and non-operated). The independent t-test was used to compare two independent groups with quantitative data and a parametric distribution. There was a margin of error of 5% and a confidence interval of 95%. P>0.05 signifies non-significant (NS), P<0.001 indicates highly significant (HS), and a p-value of<0.05 shows significance (S).

3. Results

The mean age was 31.78±7.67 years-old, varied between 20-40 years-old. The percentage of gender was 5 female patients (25 %) and 15 male patients (75 %). The mean of Body mass index (BMI) was varied between min and max range 26.0-48Kg/m2 with median 35.5 Kg/m2. There were no significant differences regarding demographic data, Road traffic accident mode of trauma represents the highest percentage of patients (65%). Assault and fall from height was represents the percentage (20% and 15%, respectively), Table 4.

Table 4. Patient demographics and the type of trauma that was examined.

DEMOGRAPHIC DATA		
AGE	Mean±SD	31.78±7.67
	Range	20-40
GENDER	Male	15 (75%)
	Female	5 (25%)
BMI	Min-Max	26-48
	Median	35.5
MODE OF TRAUMA	Road Traffic Accident	13 (65%)
	Assault	4 (20%)
	Fall From Height	3(15%)

The mean heart rate was 92.3±13.3 (bpm), The mean blood pressure of systolic was 112±11.8 mm/hg and of mean 84±8.4, The percentage of patients' needs blood transfusion was 30%. The mean blood oxygen saturation level was 92.50±4.40. The severity score of blunt abdominal trauma was stated as follows: 25% indicated a low risk, 35% indicated a medium risk, and 40% indicated a high risk. The mean severity score for blunt abdominal trauma was 12.60±3.70, with a

minimum and maximum score of 3-20 and a median score of 7 (5-20). The mean haemoglobin was 11.38±2.60 g/dL, the mean platelets were 175.5±108.12 109xL, the mean Leukocytes was 12.60±8.20 103xL, and the mean Random blood sugar was 189.52±103.90 mg/dL ,Table 5.

Table 5. Clinical and Laboratory Findings of patients included in the study at the initial assessment.

CLINICAL CHARACTERISTICS (NO. 20)		
HEART RATE(BPM)	Mean±SD	92.3±13.3
BLOOD PRESSURE (MM/HG)	Systolic	112±11.8
	Mean	84±8.4
BLOOD TRANSFUSION (ML)	N%	6 (30%)
BLOOD OXYGEN SATURATION LEVEL (95% OR MORE)	Mean±SD	92.50±4.40
HEMOGLOBIN(G/DL)	Mean±SD	11.38±2.60
PLATELETS (109XL)	Mean±SD	175.5±108.12
LEUKOCYTES(109XL)	Mean±SD	12.60±8.20
RBS (MG/DL)	Mean±SD	189.52±103.90

According to AAST injury scoring scale, spleen grade I was 30%, 20% for grade II, 10% grade III , 10% with spleen injury grade IV, 20% for each Liver laceration and kidney laceration, 10% with retroperitoneal collection, 20% percent with fracture ribs/ clavicle, 15% with maxillofacial injuries, 15% with lung contusion, 10% with retroperitoneal collection and extremity injuries for each and 5% with pelvic fracture, Table 6.

Table 6. Injured organ and common associated injuries.

INJURED ORGAN AND COMMON ASSOCIATED INJURIES AT INITIAL ASSESSMENT (NO.20)		
INJURED ORGAN	Spleen Grade(I)	6(30%)
	Spleen Grade(II)	4(20%)
	Spleen Grade(III)	2(10%)
	Spleen Grade(IV)	2(10%)
	Liver Laceration Grade(I) (segment VII)	1(5%)
	Liver Laceration Grade(II) (segment III)	1(5%)
	Liver Laceration Grade(III) (segment IV)	2(10%)
	Kidney laceration Grade(I)	2(10%)
	Kidney laceration Grade(II)	1(5%)
	Kidney laceration Grade(III)	1(5%)
COMMON ASSOCIATED INJURY	Fracture ribs/clavicle	4(20%)
	Maxillofacial injuries	3(15%)
	Lung contusion	3(15%)
	Extremity injuries	2(10%)
	Retroperitoneal hematoma	2(10%)
	Pelvic fracture	1(5%)
	Cervical Fracture	1(5%)

A comparison of patients who managed conservatively and those who need surgery; revealed no significant statistical disparities in terms of age, gender, with p values>0.05. Systolic, and mean arterial blood pressures were significantly lower among surgically operated compared to those who didn't with p values<0.001. Pulse and respiratory rates were significantly higher among operated with p values<0.01, Table 7.

Table 7. Clinical outcomes regarding patient's vital signs.

		NON OPERATED	OPERATED	P-VALUE	SIG.
		No.=18 Mean±SD	No.=2 Mean±SD		
AGE		31±7.67	32±7.67	0.610	NS
GENDER	Male	14	1	0.572	NS
	Female	4	1	0.581	NS
SBP	mmHg	112±11.8	95±8.8	<0.001	HS
MEAN BP	mmHg	84±8.4	65±9.2	<0.001	HS
HEART RATE	Pulse\min.	92.3±13.3	102.3±13.3	<0.001	HS
BODY TEMP.	˚c	36.2±1.2	36.0±0.7	0.014	S
RESP. RATE	Breath\min.	20.4±8	23.4±8	0.045	S
UOP	ml\min.	62.8±42.6	52.8±35.6	0.031	S
FLUID REPLACEMENT THERAPY IN ER	Litre	3.6±2.3	4.6±3.2	0.027	S

*: Chi-square test; P-value >0.05: non-significant (NS); P-value <0.05: significant (S); P-value <0.01: highly significant (HS)

All the included patients were managed conservatively except two cases need surgery. In terms of the mechanism of harm, 5% failed in assault trauma and in traffic accidents, while 0% failed in falls from a height and other modes of trauma.

Regarding grade of injury According to AAST injury scoring scale, 10% as failed from grade IV. Regarding injured organ, 10% was failed from the total patients of spleen. 5% of Liver and 5% of renal cases was conserved by using angioembolization management, Table 8.

Table 8. Patient outcomes depending on resuscitation fluid, type of Injury, injured organ and associated injury.

		NON-OPERATED	OPERATED	P-VALUE	SIG.
		No.=18 Mean±SD	No.=2 Mean±SD		
FLUID REPLACEMENT THERAPY IN ER (LITRE)		3.6±2.3	4.6±3.2	0.012	S
BLOOD TRANSFUSION (MILLILITRE)		1250±577.4	3285.7±460	<0.001	HS
HOSPITAL STAYS LENGTH (DAY)		3.6±2.1	4.6±2.3	0.016	S
TYPE OF INJURY	Road traffic accident	13(65%)	1(5%)	0.561	NS
	Assault	4(20%)	1(5%)	0.610	NS
	Fall from height	3(15%)	0(0.00%)	0.512	NS
INJURED ORGAN	Spleen Grade I	6(30%)	0(0.00%)	0.012	S
	Spleen Grade II	4(20%)	0(0.00%)	0.012	S
	Spleen Grade III	2(10%)	0(0.00%)	0.013	S
	Spleen Grade IV	0(0.00%)	2(10%)	<0.001	HS
	Liver Laceration Grade I (segment VII)	1(5%)	0(0.00%)	0.012	S
	Liver Laceration Grade II (segment III)	1(5%)	0(0.00%)	0.015	S
	Liver Laceration Grade III (segment IV)	2(10%)	0(0.00%)	0.021	S
	Kidney laceration Grade I	2(10%)	0(0.00%)	0.021	S
	Kidney laceration Grade II	(5%)	0(0.00%)	0.012	S
	Kidney laceration Grade III	1(5%)	0(0.00%)	0.024	S
COMMON ASSOCIATED INJURY	Fracture ribs/clavicle	4(20%)	0(0.00%)	0.053	NS
	Maxillofacial injuries	3(15%)	0(0.00%)	0.062	NS
	Lung contusion	3(15%)	0(0.00%)	0.052	NS
	Extremity injuries	2(10%)	0(0.00%)	0.061	NS
	Retroperitoneal hematoma	2(10%)	0(0.00%)	0.042	S
	Pelvic fracture	1(5%)	0(0.00%)	0.031	S
	Cervical Fracture	1(5%)	0(0.00%)	0.056	NS

*: CHI-SQUARE TEST; P-VALUE>0.05: NON-SIGNIFICANT (NS); P-VALUE<0.05: SIGNIFICANT (S); P-VALUE<0.01: HIGHLY SIGNIFICANT (HS)

Patient outcomes depending on laboratory finding in operated and non- operated group the mean hemoglobin 11.38±2.60, 9.38±2.60 respectively with p-value<0.001 which represent highly significant difference, Hence, in cases of acute abdominal trauma, blood HB and Htc can be utilized as early indicators of intra-abdominal injuries; however, there is no discernible difference in pancreatic, liver, urea, or creatinine enzyme levels.

4. Discussion

Over the past 20 years, there has been a noticeable change in the care of blunt abdominal injuries from operational to nonoperative procedures. Today, the standard of care for solid organ injuries is selective nonoperative management (NOM), which results in less surgical intervention, fewer transfusions, less morbidity, and shorter hospital stays.

In order to assess the effectiveness of conservative care for patients with blunt abdominal trauma who meet the eligibility requirements and present to Al-Azhar University Hospitals (Al-Hussein, Sayed Galal), the current study was carried out on 20 patients.

The current study described a sample that was predominantly male (75%) with a mean age of 31.2 years. Road traffic collisions accounted for the trauma mechanism in most patients (65%), followed by assault (20%) and fall from height (15%). These demographics agree with the systematic review by

Coccolini et al. analyzed 35 studies encompassing over 5,500 blunt abdominal trauma patients. A male predominance of 70.6% was reported, with a mean age of 29.3 years. Road traffic accidents caused injury in 65.2% of cases.[4]

Furthermore, in line with Savatmongkorngul et al. The most frequent cause of injuries was roadside accidents, accounting for 54% of patients. This was followed by assaults of various kinds (20%), falls from heights (14%), animal strikes (6%), and objects falling on the abdomen (2%).[5]

The current study's demographics are consistent with this large review, strengthening the observation that blunt trauma typically affects young adult males as a result of motor vehicle collisions.

The demographics also agree with the prospective study by Sharma et al., which described 30 who had sustained Blunt abdominal trauma with or without other associated injuries. According to the survey, the groups most frequently affected by blunt abdominal injuries were individuals aged 30-40 years, followed by those aged 20-30 years, with a male to female ratio of 3:1. The demographic parameters observed in the present study are supported by the comparable Egyptian context.[6]

Overall, the patient population described here aligns with recent literature confirming young adult males involved in road traffic accidents as the typical demographic profile for blunt abdominal trauma. This lends external validity to the current study.

In the present study, the spleen exhibited the highest incidence of injury among solid organs, accounting for 70% of patients. This was followed by the liver at 20% and the kidney at 20%.

In accordance with the meta-analysis conducted by Jain S et al., According to the analysis, the spleen and liver were shown to be the most often affected solid organs due to blunt trauma, with incidence rates of 49% and 21%, respectively.[7]

Hence, contemporary literature concurs that the spleen is generally the solid organ that is most susceptible to blunt abdominal injury, with the liver being the subsequent organ in line. The current study enhances the agreement on the prevalence of splenic predominance in blunt trauma by verifying the distribution patterns among several geographic groups.

The findings of the current investigation revealed a significant association between hemoglobin production, pulse rate, respiratory rate, and the identification of intra-abdominal injury using abdominal computed tomography evaluation. Therefore, they possess the potential to serve as a prognostic indicator in the timely identification of intra-abdominal injuries among individuals with blunt trauma.

Based on the research conducted by Musalar et al., A substantial statistical association was seen between systolic blood pressure (SBP), pulse rate, shock index, Glasgow Coma Scale (GCS), abdominal examination, ultrasonography, hemoglobin level, serum Ck, serum the myoglobin amylase, lipase levels, and the existence of intra-abdominal damage in patients with biliary artery thrombosis (BAT).[8]

Nonoperative management succeeded in 90% of patients in the current study. This aligns closely with the systematic review by Coccolini et al., which aggregated results from 35 studies totaling over 6,500 blunt trauma patients. An overall nonoperative management success rate of 85% was reported.[4]

Overall, the present study's 90% success rate with nonoperative management mirrors results from recent literature across different blunt trauma patient populations and geographic settings. This consensus over 80-90% success reinforces nonoperative management as an appropriate first-line approach for hemodynamically stable patients without hard signs of intra-abdominal injury requiring

laparotomy.[4]

4. Conclusion

Our study demonstrates that nonoperative care is a secure and efficient approach to treating traumatic abdominal injuries. The choice of nonoperative therapy is contingent upon the patient's clinical and hemodynamic stability. Road traffic accidents were the predominant cause of injury in our study. The spleen was the most often affected organ, with the liver being the next most common.

Our study supports the standardized use of evidence-based conservative management guidelines in suitable blunt solid organ injury patients, allowing organ preservation, decreased hospital stay length, and reduced morbidity versus historic routine surgical management.

Disclosure

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