ASSESSMENT OF PATTERN AND OUTCOME OF PATIENTS WITH PENETRATING ABDOMINAL INJURY IN JIMMA UNIVERSITY MEDICAL CENTER.

A RESEARCH THESIS TO BE SUBMITTED TO THE DEPARTMENT OF SURGERY, COLLEGE OF MEDICAL FACULTY, JIMMA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR SPECIALTY CERTIFICATE IN GENERAL SURGERY

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Jimma, Ethiopia

ASSESSMENT OF PATTERN AND OUTCOME OF PATIENTS WITH PENETRATING ABDOMINAL INJURY IN JIMMA UNIVERSITY MEDICAL CENTER, SOUTH WEST ETHIOPIA,A ONE YEAR CROSSECTIONAL STUDY FROM JANUARY1/2020-DECEMBER30/2021

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Abstract

Background: In both industrialized and developing countries, abdominal injuries are on the rise, and they continue to be a major cause of morbidity and mortality. As a result of violent crimes and war casualties, penetrating abdominal trauma (PAT) has been on the rise. The frequency of PAT varies around the world due to the industrialization of emerging countries, the weapons available, and, most importantly, the occurrence of armed confrontations. The mechanism underlying penetrating trauma, gunshot wounds (GSW), stab wounds, and impalement is dependent on the kind of injury (1).

Over the last century, the diagnosis and treatment of this prevalent issue has evolved from a conservative to an operative to a selective strategy. The use of suitable blood transfusions and antimicrobials, as well as technological breakthroughs in imaging, have aided in the selective treatment of severe injuries (2).

Objective: To assess the pattern and management outcome of patients with penetrating abdominal injury in JUMC, admitted and managed from January 1, 2020 – December 30, 2021

Methods: This study was carried out in JUMC, on penetrating abdominal injury patients managed from January 1, 2020 – December 30, 2021. Institution-based prospective cross-sectional study was conducted. The collected data was edited and fed into a computer and analyzed using SPSS version 26.

Result: A total of 43 penetrating abdominal injury patients (90.7% male) were analyzed. Abdominal stab wound injuries accounted for 23 (53%). All patients had an emergency laparotomy. The small bowel (30%), colon (25%) and diaphragm (20%) were the most commonly injured organs. In 8 patients (18%), no significant intraabdominal injury was detected at laparotomy. 33 discharged improved and 10 (23.6%) died from the injuries.

Conclusion: Penetrating abdominal trauma is a common type of surgical emergency affecting particularly young males. The commonest mode of injury is by stab wounds. Although the management of these patients should aim at minimizing the rate of negative laparotomies, this should not be done at the expense of delayed diagnosis and treatment.

Key words: penetrating abdominal injury, Stab and gunshot wounds, laparotomy

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Contents

ABREVIATIONS

PAT-penetrating abdominal trauma

PAI-penetrating abdominal injury

ICU- Intensive Care Unit

JUMC- Jimma University Medical Center

OR – Operation Room

MDCT-multi detector computed tomography

SNOM- Selective non-operative management

(SWs)- stab wounds

(GSWs)- Gunshot wounds

AGW-abdominal Gunshot wound

(RTAs)- Road traffic accidents

SSI-surgical site infection

FAST-focused ultrasonography for trauma

PI-principal investigator,

DC-data collector

HAI-hospital acquired infection

MOF-Multi-Organ Failure

SBP-systolic blood pressure

CHAPTER ONE

INTRODUCTION

Background

Trauma continues to be a major public health problem worldwide and it is associated with high morbidity and mortality in every country, regardless of the level of socioeconomic development. Trauma is reported to be the leading cause of death, hospitalization, and long-term disabilities in the first four decades of life. Globally, approximately one third of trauma patients have abdominal trauma and it accounts for a large fraction of loss of life and unrecognized abdominal injury remains a distressing frequent cause of preventable death. Abdominal trauma continues to be a major cause of trauma admissions all over the world and contributes significantly to high morbidity and mortality. The abdomen is vulnerable to injury since there is minimal bony protection for underlying organs. In developing countries including Tanzania, trauma in general and abdominal trauma in particular is increasing at a fast rate due to increase in urbanization, motorization, civil violence, wars and(1) criminal activities(2).

For patients who have sustained a stab wound (SW), gunshot wound (GSW), or blunt multisystem injury, the abdomen remains a high-risk cavity with the potential to hide occult but life-threatening injuries. Unlike the extremity or neck for example, where bleeding occurs externally, for the abdomen, significant bleeding and enteric spillage can occur with minimal symptoms until late. In patients presenting after both blunt and penetrating traumas, injury to the abdominal contents is common.

Definitions: Penetrating abdominal injury: Any penetrating injury that could have entered the peritoneal cavity or retroperitoneum inflicting damage on the abdominal contents. In general, the entry wounds for an abdominal injury extend from the fifth intercostal space to the perineum. **Anterior penetrating abdominal injury**: An entry wound on the anterior abdomen or chest that could have penetrated into the peritoneal cavity. Usually these injuries occur anterior to the posterior axillary line.

Thoraco-abdominal penetrating abdominal injury: An entry wound below the fifth intercostal space and above the costal margin. These are wounds that could have initially entered the chest and then penetrated the diaphragm to enter the abdomen. These injuries are always associated with chest pathology (i.e., hemothorax, pneumothorax).

Posterior or flank penetrating abdominal injury: An entry wound posterior to the posterior axillary line. Wounds in this area are different in that the most likely organ to be injured will be in the retroperitoneal. Additionally, the large mass of flank and back muscle will make the diagnosis of organ injury more difficult and the possibility of organ injury less frequent.

The optimal management of patients with penetrating abdominal injuries has been debated for decades, since mandatory laparotomy gave way to the concept of 'selective conservatism.

The best way to treat patients with penetrating abdominal trauma has been a source of debate for decades. Abdominal SWs used to necessitate surgical treatment.

Selective non-operative care was published in 1960, implying that laparotomy may not be required in certain individuals and those problems and non-therapeutic laparotomies may be avoided. The discovery that only about half of all abdominal SWs penetrate the peritoneum, and that only 20–40% of those that do cause significant injury, led to the development of selective algorithms to effectively manage patients with abdominal-penetrating trauma who do not show signs of shock, peritonitis, or evisceration(3)

Following the experience of World Wars I and II, with the high rates of destructive injuries, penetrating abdominal trauma was historically treated with universal surgical exploration. Starting in the 1960s, with SWs, followed by GSWs, this paradigm began to shift. Patient selection for operative versus non-operative management based on the clinical picture and radiologic evidence began to evolve. With improved access, and quality of the images and the growing body of evidence regarding the potential morbidity of nontherapeutic operations, contemporary evidence now supports a non-operative approach to the management of penetrating abdominal trauma in select circumstances.

The balance between prompt surgical management of traumatic injury and avoiding unnecessary operation remains a central diagnostic and management challenge in penetrating abdominal

injury. Patients who present in extremis, with hemodynamic instability, peritonitis, or are unavailable mandate immediate operation. For the remaining patients, the practice of universal exploration would result in a high rate of nontherapeutic laparotomy. Although mortality after negative trauma laparotomy is low, morbidity attributed to negative laparotomy is as high as 20%. In addition, late complications including hernias and bowel obstructions are likely underreported given the challenges of long-term follow-up. Finally, not only is there a decrease in patient-centered outcomes, from a trauma resource utilization viewpoint, negative laparotomy is associated with an increase in unnecessary operative costs and hospital length of stay. The introduction of selective non operative management of penetrating abdominal trauma has been shown to result in a tangible cost savings.

Although a subset of patients with penetrating abdominal trauma will ultimately require exploration, a significant number can be managed without operative intervention and thus be spared the potential morbidity and mortality of a negative laparotomy. In a retrospective analysis of abdominal SWs, mandatory exploration was associated with a negative laparotomy rate of 37%.

In the modern era of selective non-operative management of abdominal trauma, several absolute indications for operative intervention remain. Hemodynamic instability in the setting of penetrating abdominal trauma requires laparotomy. In the hemodynamically stable patient, physical examination remains critical to patient triage, and peritonitis is an absolute indication for laparotomy. Although soft tissue injury can cause local tenderness, diffuse peritonitis after penetrating abdominal trauma is associated with a 97% chance of intra-abdominal injury at laparotomy. Given the central role of physical examination in patient triage, invaluable patients including those with concomitant head or spinal cord injury or those undergoing urgent non abdominal operations are not candidates for selective non-operative management. Although not an absolute contraindication to selective non-operative management, patients with omental or visceral evisceration after penetrating abdominal trauma should be strongly considered for operative intervention. Significant intraabdominal injury is present in 46% to 85% of patients with omental evisceration, and even higher rates with visceral evisceration. Peritoneal penetration alone after penetrating trauma is not an absolute indication for operative exploration.

For this reason, invasive evaluation including diagnostic laparoscopy for the sole purpose of determining peritoneal violation is not indicated.

Radiologic imaging is a key component of the diagnostic workup of patients who have sustained penetrating abdominal trauma, especially those undergoing a trial of non-operative management. In hemodynamically stable evaluable patients without peritonitis, a detailed evaluation of the external wounds and retained fragments using plain radiographs is imperative to plot missile trajectories. External wounds do not always correspond to internal injury and, especially in the setting of multiple missiles; trajectory may be misleading from external wounds alone. For example, an abdominal GSW may have a cranial trajectory resulting in a mediastinal injury. Alternatively, paired lateral abdominal wall bullet wounds may represent a superficial tangential trajectory or two separate trans-abdominal injuries with retained missiles. In both scenarios, management will change significantly based on the internal trajectory. FAST examination is a central component of the early assessment after blunt trauma. The utility of this imaging modality in penetrating trauma, however, is less uniformly accepted. The primary use of the FAST examination in penetrating abdominal trauma is to evaluate for pericardial fluid as a marker of cardiac injury. Especially in the setting of an unknown missile trajectory, the cardiac FAST is a critical component of the initial trauma evaluation. A positive cardiac FAST after penetrating trauma mandates immediate median sternotomy. For the intra-abdominal Fluid windows, while the FAST examination is highly specific for fluid, the sensitivity is poor ranging from 46% to 67%. In the hemodynamically unstable patient with multiple cavitary sources of hypotension, a positive FAST can still be helpful as a rapid tool for operative incision planning. For stable patients however, it rarely impacts clinical decision-making as the patient either meets criteria for selective non-operative management and will be undergoing CT, or will be going to the OR, irrespective of the FAST findings. CT has become universally accepted as an integral component in the evaluation of the penetrating trauma patient undergoing selective non1operative management. For patients undergoing exploration, CT is unnecessary and should not be routinely obtained. For patients with a GSW who are stable, evaluable, and without peritonitis and are undergoing a trial of non-operative management however, CT is a requisite next step.

Statement of problem

Penetrating abdominal trauma (PAT) has been on the increase as a result of violent crimes and war injuries .The frequency of PAT relates to the industrialization of developing nations.

Over the past century, diagnosis and management of this common problem has changed. Technical advances in imaging, blood transfusions and antimicrobials-helped in the selective approach (2).

Penetrating trauma more often affects lower socioeconomic groups. The socioeconomic role in violent death may be seen in Europe with the World Health Organization (WHO) reporting that interpersonal violence is 14 times more likely in low to middle income countries than in high income countries(8).

Penetrating abdominal trauma (PAT) in South Africa is amongst the most prevalent worldwide. In 2013, interpersonal violence was ranked 5th in all-cause mortality in Cape Town(4).

In Ghana and other countries of the West African sub region, the pressures of severe economic conditions and rapid social change have led to an increase in social conflict and violent crime especially in the rapidly expanding urban centers(5).

The proliferation of small arms - following civil wars and internal armed changes of the political process in many countries in the sub-region - has increased the crime rate and thus the incidence of penetrating abdominal injuries(6).

1.3 Significance of the study

Most of abdominal injuries are preventable. Establishment of preventive strategies as well as treatment guidelines requires a clearer understanding of the causes, injury characteristics and treatment outcome of these patients. However, such data are lacking in our environment as there is no local study which has been done on this subject despite increase in the number of penetrating abdominal trauma admission to our center. It is on this background that this study seeks to describe our own experience on the management of this condition outlining the causes, injury characteristics and treatment outcome as seen in our institution and to have a baseline data for future comparison(2).

Therefore, conducting such studies is important mainly because of that there are no studies conducted in the Ethiopian context despite the increasing number of cases with penetrating abdominal injury as there is increasing urbanization. So, this study will describe the characteristics of patients with penetrating abdominal injuries and review our current management and compare it to international standards.

The study will also benefit future researchers as an input for their subsequent reference.

CHAPTER TWO

LITERATURE REVIEW

Trauma is a very well-known factor in premature death among young healthy individuals, and is the first cause of death in people below the age of 44 years. It also carries a heavy burden in terms of the economy of any country(2).

Because there is no bone protection for the underlying organs, the abdomen is prone to harm. Trauma in general and abdominal trauma in particular, is on the rise in developing nations like Tanzania, owing to increased urbanization, motorization, civil wars, and criminal activity (2).

It is the second leading cause of sickness, accounting for 16% of worldwide disease burden and it is most prevalent among people aged 15 to 45.

According to the World Health Organization, poor and middle-income nations account for more than 90% of all injuries. Africa, namely the Sub-Saharan region, accounts for 21% of these.

The fast proliferation of motorized transportation and industrial output without proper safety precautions puts people in danger.

The abdomen is the third most commonly wounded organ, and exsanguination induced by injuries to the abdominal organs accounts for 40 to 80 percent of post-traumatic mortality.

There are several patterns in terms of origin and type of abdominal injury; nevertheless, most literatures indicate that blunt is the most common mechanism (85%).

The most common causes of blunt and penetrating injuries were road traffic accidents (RTAs) and stab injuries respectively. In rural locations, blunt abdominal trauma is more common, but penetrating abdominal trauma is more common in metropolitan areas. In civilian practice, the most common cause of blunt abdominal injuries is automobile accidents. Penetrating abdominal trauma has become more common in civil society as a result of increased criminal activity, civil violence, and the usage of firearms, arrows, and spears (2). In Germany and Central Europe, abdominal-penetrating injuries caused by stabbing or weapons are uncommon. Penetrating injuries account for 5% of all injuries in Germany, with stabbing accounting for 36% and firearms accounting for 12%. In roughly 30% of these injuries, the abdomen is involved(4).

Stabbing wounds (SWs) and gunshot wounds have a low occurrence rate in other European countries, according to studies (GSWs). Penetrating trauma is reported at higher rates in research from the United States and South Africa, for example, 38 percent in the United States.

South Africa has one of the highest rates of penetrating abdominal trauma (PAT) in the world.

Interpersonal violence was the fifth leading cause of death in Cape Town in 2013.(7) . Even more astonishing, stabbing or gunshot injuries account for up to 80% of all emergency visits at South African district hospitals due to trauma (4)

Penetrating rather than blunt abdominal injuries were shown to be more common in a research conducted in Kenya, with a ratio of nearly 2:1. Stabbing wounds (42.5%), gunshot wounds (21.3%), and road traffic accidents (RTAs) (15%) were the primary causes of abdominal injuries overall (6). In Ghana's university hospital, there were more PAI owing to road traffic accidents (RTA), accounting for 11.7 percent of all PAI seen. Impalement injuries, flying objects, and falls from heights were other less common causes of PAI, accounting for fewer than 10% of PAI cases(8) .

In a research conducted in Germany, gunshot (GSW) and stab wounds accounted for 62.4 percent and 37.6 percent, respectively (SW). The majority were young men (94.7%), with an average age of 2 years.

Penetrating trauma is more common in lower socioeconomic groups and affects several body locations, with the torso accounting for more than half of all cases (chest and abdomen o pelvic).

Interpersonal violence is 14 times more prevalent in low to middle income nations than in high income countries, according to the World Health Organization (WHO) (9).

The demands of poor economic conditions and rapid social change have contributed to an upsurge in social conflict and violent crime in Ghana and other West African countries, particularly in rapidly expanding metropolitan areas.

Following civil wars and internal armed political process changes in many nations in the sub-region, the proliferation of small guns has increased criminality and hence the incidence of penetrating abdominal injuries (8).

The majority of the participants were men, ranging in age from 8 to 79 years (1). There were 74 males and six females among the 80 patients, resulting in a male to female ratio of 12.3:1.The participants ranged in age from 15 to 56 years old, with the majority in their third decade and a mean age of 28.2 years (1).

The time before being admitted to the hospital was determined by the severity of the injuries.

The earlier the presentation, the more severe the harm; it ranged from one hour to one week.

Patients exhibited normal vital signs in 80% of cases, whereas 20% had disordered vital signs such as hypotension, tachycardia, tachypnea, and hypothermia at the time of presentation.

The relationship between vital indicators and management outcome is explained.

Patients who had abnormal vital signs at the time of admission had a 50% risk of dying.

Eighty percent of patients with blunt abdominal injuries who had abnormal vital signs died, compared to less than 40 percent (36.4 percent) of those with penetrating abdominal injuries who had similar findings, indicating that blunt abdominal injuries have a better prognosis than penetrating abdominal injuries(6).

The best way to treat patients with penetrating abdominal trauma has been a source of debate for decades.

Abdominal SWs used to necessitate operational exploration. Selective non-operative management (SNOM) was first published in 1960, implying that laparotomy may not be necessary in certain patients, resulting in fewer problems and nontherapeutic laparotomies. The discovery that only about half of all abdominal SWs penetrate the peritoneum, and that only 20–40% of those that do cause serious harm, led to the creation of selected algorithms for managing patients with abdominal-penetrating SWs without signs for shock, peritonitis or evisceration(4).

General surgeons in the United Kingdom and Ireland are typically in favor of non-operative management of abdominal stab wounds. Few British and Irish surgeons, on the other hand, are comfortable managing patients with abdominal gunshot wounds non-operatively, owing to the

rarity of this sort of injury as well as surgeons' training and experience(3) .In order to discover major injuries before operational exploration or clinical manifestation, various diagnostic methods have been applied. To see if the peritoneum had been breached or if there was a substantial intra-abdominal injury, local wound exploration and diagnostic peritoneal lavage were utilized. Furthermore, imaging studies such as ultrasonography, computerized tomography (CT), and diagnostic laparoscopy have aided in the development of new penetrating abdominal trauma. Further, the introduction of imaging studies, such as ultrasound, computerized tomography (CT) and diagnostic laparoscopy , has contributed in the new trends of penetrating trauma management(4).

A laparotomy was performed on 90% of the patients who had gunshot wounds to the abdomen (AGW) in this study. Almost a fifth of these laparotomies revealed no organ damage that needed to be repaired. The total survival rate of 85.9% is comparable to that of other centers where a selective conservative approach to AGW management was used. Without the use of a mandatory laparotomy for AGW, an acceptable survival rate is possible.

Laparotomy has been reported to be nontherapeutic in up to 70% of hemodynamically stable, asymptomatic patients, resulting in clinically significant complication rates. Trauma surgeons are increasingly using conservative management of select patients with penetrating abdominal trauma. Conservative management has recently been accepted for select patients with gunshot wounds to the abdomen, and it is a very routine modern procedure for stab wounds. A thorough trauma assessment to rule out contraindications, computed tomography (CT) to assess intra-abdominal pathology, close hemodynamic monitoring, serial physical examinations, and serial laboratory work are all part of conservative therapy Hemodynamic instability, peritonitis on clinical examination, and a concurrent head injury or other condition that prevents reliable serial exams are all contraindications to conservative management. Evisceration is generally thought to be a contraindication to conservative management (12).

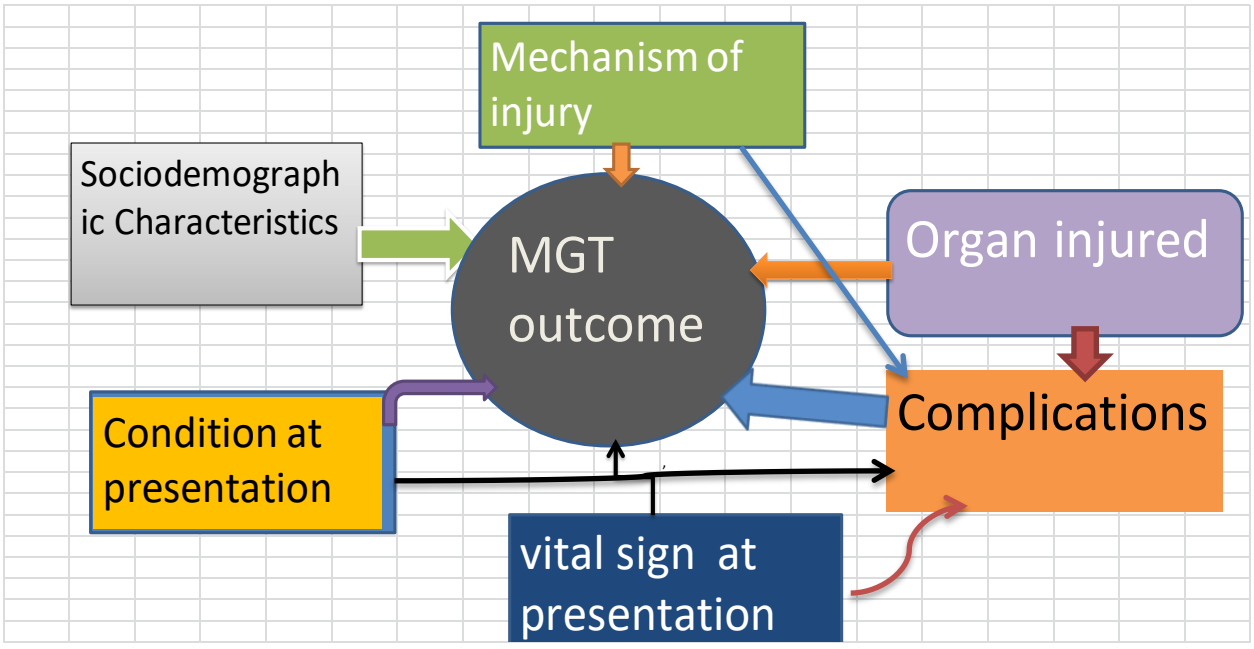
In this series, the negative laparotomy rate for AGW was 18.2 percent. This figure is consistent with previous studies of required AGW exploration rates ranging from 15 to 27 percent in all cases where peritoneal penetration was suspected. According to some sources, the complication rate for unneeded laparotomies is as high as 41%(7).

Patients' stays in the hospital were extended by nearly 8 days due to these unnecessary laparotomies. In low-income nations with limited health-care resources, such as Ghana, avoiding unneeded laparotomies can result in significant hospital savings, as other hospitals have

The contents of the abdomen are most likely to be injured depending on the type of injury, although this is not a hard and fast rule. Patients with no obvious physical findings can have serious intra-abdominal injury, whereas those with penetrating injuries can have a negative laparotomy. While early active intervention is preferred, negative laparotomy is associated with an increase in morbidity and death. On the other side, a delay in proper management will have similar consequences.

Abdominal injury management would necessitate a regimen that took into account a number of factors. In order to reduce negative laparotomies and avoid needless morbidity and mortality in abdominal injuries, the study recommends proper resuscitation before to surgery as well as careful observation of patients with mild injuries(6) .

Figure 1Conceptual framework of pattern and outcome patients with penetrating abdominal injury, JUMC, 2022



CHAPTER THREE

Objectives

3.1 General Objective

To assess the pattern and management outcome of patients with penetrating abdominal injury in JUMC from January 1, 2020 – December 30, 2021.

3.2 Specific Objective

To assess the pattern of patients with penetrating abdominal injury in JUMC from January 1, 2020 – December 30, 2021.January 1, 2020 – December 30, 2021.

To assess management outcome of patients with penetrating abdominal injury in JUMC from January 1, 2020 – December 30, 2021.

To identify predictors of management outcomes from January 1, 2020 – December 30, 2021.

CHAPTER FOUR

METHODS AND MATERIAL

4.1 Study area

This study was carried out in JUMC which is found in the city of Jimma, one of the largest cities in southwestern Ethiopia. Jimma University is one of the largest and comprehensive public research universities in Africa.

Jimma medical center provides services to more than 15 million people with around 1600 staff members and 800 beds. Department of surgery is one of the main departments in JUMC, which gives full-fledged clinical service and offers specialty training.

4.12 Limitations of the study:

There were no local studies on PAT to compare our findings.

Sample size was small and conclusions made may not be representative.

4.2 Study period

Cross-sectional prospective study was conducted in JUMC from January on penetrating abdominal injury patients managed from January1/2020 – December 30/ 2021.

4.3 Study design

Hospital-based cross sectional study involving observation of patients from admission to final outcome of management as either discharged or deceased.

4.4 Source population

All abdominal injury patients who were admitted and managed in JUMC from January1/2020 – December 30/ 202.

4.5 study population and unit

All penetrating abdominal injury patients who were admitted and managed in JUMC from January1/2020 – December 30/ 2021.

4.6 Sampling

4.61 Sample size

Sample size was all penetrating abdominal injury patients who were admitted and managed in JUMC from January1/2020 – December 30/ 2021.

4.6.2 Sampling method

Patient who met the inclusion criteria were recruited to the sample. This was intended to attain a sample size large enough for validity of the study.

4.7 Description of a surgical patient admitted to the surgical ward.

4.7.1 Inclusion criteria

All penetrating abdominal injury patients who were admitted and managed in JUMC January1/2020 – December 30/ 2021were included.

4.7.2 Exclusion criteria

Those patients who were not admitted to the ward and dead on arrival.

4.8 Study Variables

4.8.1 Dependent variable

Management outcome

4.8.2 Independent variables

Age of patient

Sex

Residency/place

Cause of injuries

Wound location

Condition at presentation

Vital sign

Organs injured, intraoperative findings

Complications

4.9 Data collection tools and procedures

By using patient document charts, resident's notes, hospital records, OR documentation logbooks, and morbidity and mortality report.

4.10 Operational definitions

Management Outcome- condition of the patient on discharge -improvement or death.

Complication- is unfavorable evolution or consequence of a disease or a therapy.

Hemorrhagic Shock- Acute circulatory failure leading to inadequate tissue perfusion as a result blood loss.

Penetrating abdominal trauma-abdominal injury involves the violation of the abdominal cavity by an object.

Signs of Peritonitis –patient having guarding and/tenderness all over the abdomen.

Evisceration-any abdominal organ/bowel or omentum visible out of the abdominal wall.

4.11 Data processing and analysis

The collected data was first checked for its completeness and the data was coded, entered and analyzed using SPSS (version26). Finally, data was presented in tables and graphs and cross tabulation with the statistical test for association

4.12 Ethical Considerations

Ethical approval was obtained from the Research and Ethics Committee of JU .The purpose and objectives of the study was explained to every study participant and consent was taken before data collection. The information collected was not exposed to third person and the information was only be used for the current study, and patients name was not mentioned to protect confidentiality.

4.13 Dissemination and Utilization of the result

The result of this study will be compiled with three copies and would be given to the department of surgery, School of medicine, and college of medicine and health science.

CHAPTER FIVE

Result and Discussion

5.1 Result

5.1.1 Sociodemographic characteristics

A total of 95 abdominal injury patients were admitted and managed in one year period from January 1/2020 to December 30/2021 of whom 52 patients were blunt abdominal injuries and 43 were penetrating abdominal injury . More than half of the patients were in the range of 16-30yrs (23 patients).When we see the gender distribution, only 4(9.3%) were females. The male to female ratio was M: F 9:1(table 1) and sex was significantly associated with death (p.value.033)

Among the study participants sixteen patients were farmers (37.6%) and (25%) students (Table2)

Most of the patients came from rural areas 36(83.7%) and are married 24 (55.8%) (Table2).

Table 1. 1. Sociodemographic characteristics of patients with penetrating abdominal injury, JUMC.2022

Table 1. sociodemographic characteristics		**Frequency**	**percent**
Age	0-15	8	18.6
	16-30	23	53.5
	31-45	8	18.6
	46-60	4	9.3
Sex	Male	39	90.7
	Female	4	9.3
Marital status	Married	24	55.8
	Single	19	44.2
Residence	Urban	7	16.3
	Rural	36	83.7

Table 1. 2. Socio-demographic characteristics of patients with penetrating abdominal injury, JUMC, 2022

Sociodemographic characteristics		Frequency	Percent
Occupation	Unemployed	6	14.0
	Student	11	25.6
	Farmer	16	37.2
	Merchant	3	7.0
	Office worker/employee	3	7.0
	House wife	1	2.3
	Daily laborer	1	2.3
	Other	2	4.7
Educational status	No formal education	13	30.2
	Primary school	18	41.9
	High school and above	12	27.9
Ethnicity	Oromo	27	62.8
	kaffa	7	16.3
	amhara	3	7.0
	others	6	14.0
Religion	Muslim	24	55.8
	Orthodox	12	27.9
	protestant	7	16.3

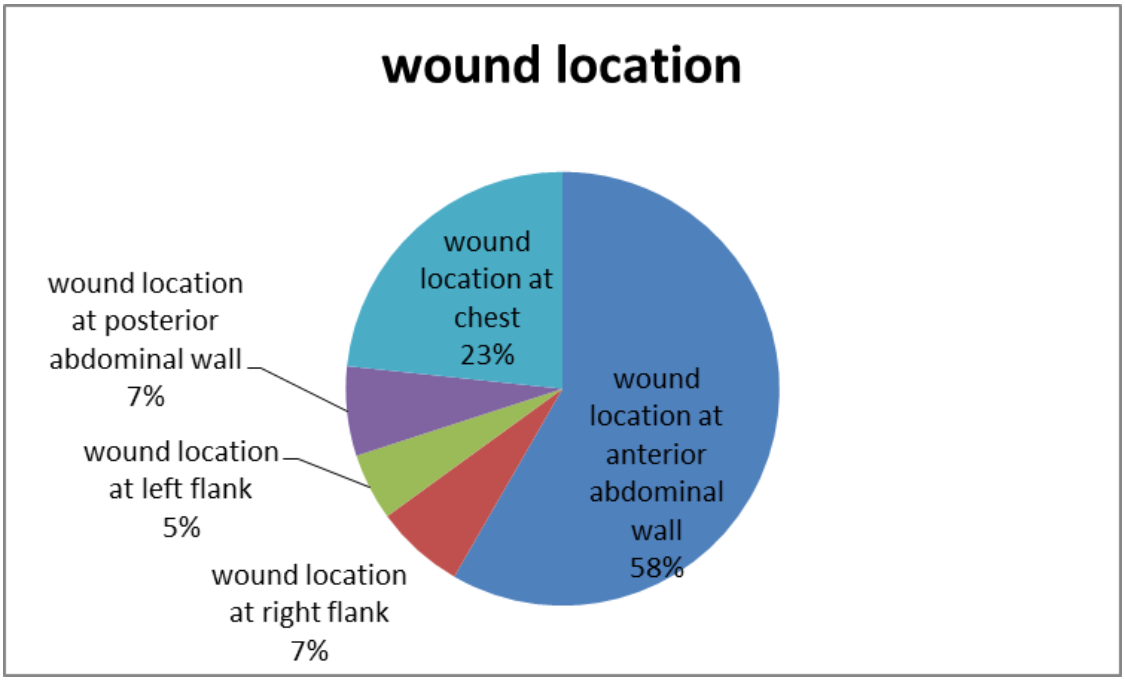
5.1.2Clinical presentation

The leading causes of PAI were stab wounds (53.3%) Gunshot wounds (25.6%) (Table.3). Most of the patients presented with abdominal pain (42) and 19 patients had signs of peritonitis and had SBP >90mmHg 35(81.4%) (Table3) and hemorrhagic shock and SBP<90mmhg were significantly associated with mortality rate (p.value.001and 0.005) respectively. The majority of wounds were located in the anterior abdominal wall followed by posterior abdomen and right flank (Figure.1). Wound location to the chest was significantly associated with mortality (p.value.043) (Figure 1).

Table2 1 Clinical presentation of penetrating abdominal injury patients in JUMC, 2022.

Clinical presentations		Frequency	Percent
Mechanism of injury	Stab	23	53.5
	Gunshot	11	25.6
	Horn	2	4.7
	Falling	6	14.0
	Others	1	2.3
Condition on presentation	Hemorrhagic shock	3	4.1
	Peritonitis	19	25.7
	Abdominal pain	42	56.8
	Evisceration	10	13.5
Systolic blood pressure	SBP>90	35	81.4
	SBP<90	3	7.0
	Na	5	11.6

Figure 2 location of wound in penetrating abdominal injury patients, J UMC, 2022



5.1.3 Management

Majority were operated in the first 1-2 hrs after presentation 26(60.5%) (Figure2). The three commonest organ injuries identified intraoperative were small bowel 18(30.0%), colon 15(25.0%) and Diaphragm 12(20.0%) (Figure3). Diaphragmatic and gastric injuries were significantly associated with death (p.value 0.002 and 0.039) respectively.

Figure 3 Time from hospital presentation to operation for penetrating abdominal injury, JUMC, 2022.

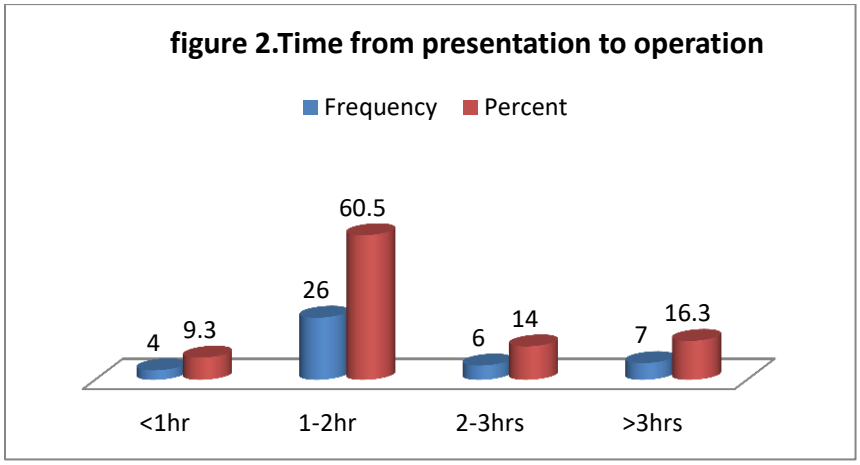
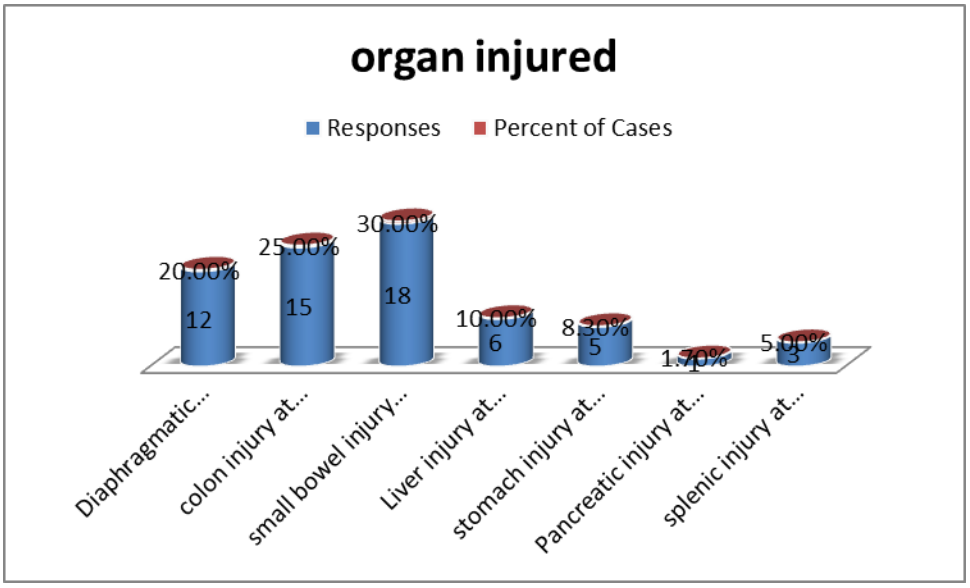


Figure4 Organs injured in penetrating abdominal injury patients, J UMC, 2022.



5.1.4complication and condition on discharge

Of the 43 patients operated, 8(18.6%) were negative laparotomy (Table8), 33 discharged improved and 10 (23.6%) died from the injuries sustained (Table 10). The overall complication rate was 37.2 % with most common complications were HAI and dehiscence accounting for 14 patients (86%) (table.9) and HAI was strongly associated with mortality (p.value 0.005).The most frequent cause of deaths was MOF and sepsis (90% (Figure.4).

table3 1 Negative laparotomy cross-tabulation in patients with penetrating abdominal injury, JUMC**. 2022.**

Negative laparotomy * type of injury Cross tabulation				
Count				
	type of injury			Total
	stab	gunshot	Falling	
Negative laparotomy	5	1	2	8
Total	5	1	2	8

Figure5 Cause of death in patients with penetrating abdominal injury, JUMC, 2022.

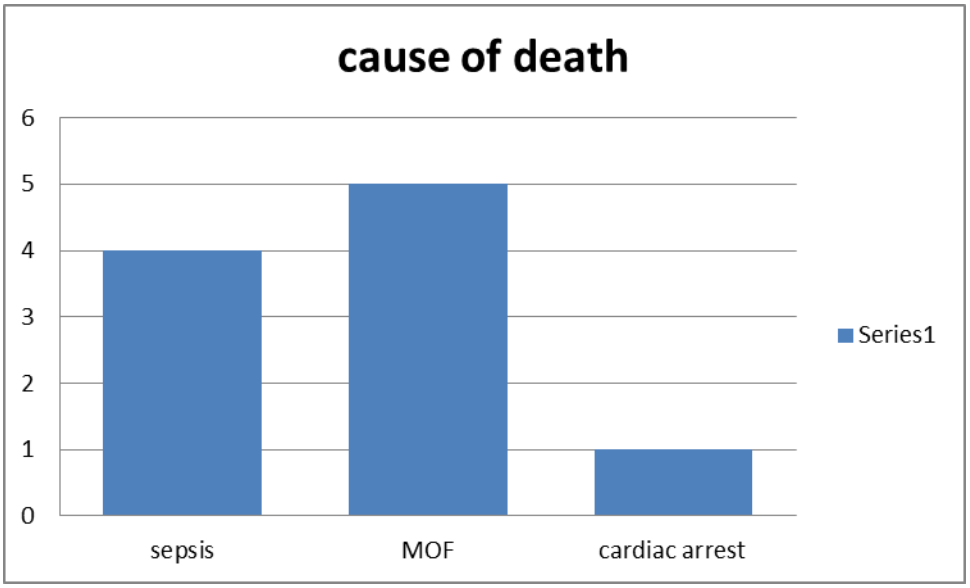


Table4 1Factors associated with outcome of penetrating abdominal injury, p-value<0.05 with CI, 95%, JUMC, 2022.

Variables		**Outcome**		
				P. value
		Improved	Died	
Sex	Male	32	7	0.033
	Female	1	3	
Cause of injury	Stab	21	2	
	Gunshot	6	5	0.043
Wound location	Chest	8	6	
	Others	35	8	0.035
Condition at	Hem.c shock	0	3	
presentation	Peritonitis	12	7	0.001
	Evisceration	6	4	
Organs injured	Diaphragm	5	7	0.002
	Stomach	2	3	0.039
Complication	HAI	2	5	
	Others	5	4	0.005

5.2 Discussion

Abdominal trauma continues to be a major cause of trauma admission all over the world and contributes significantly to high morbidity and mortality (2).

A total of 95 abdominal injury patients were admitted and treated in Jimma university medical center in the past 1 year period, Of whom 52 patients had blunt abdominal injuries(55%) and 43 were penetrating abdominal injury patients(45%). The incidence of penetrating abdominal injury is higher in our setting when compared to study done in Nigeria, which were 39 (49%) over 3yr period(10)and is less in comparison to study done South Africa (11)and kenya,8.7%(12). Most of the victims of penetrating abdominal trauma were the middle-aged groups. In agreement with other studies (13) (14) But is at variance with the report of others(1), the majority of abdominal trauma patients in the present study were found to be in their third decade of life and tended to affect more males than females with male to female ratio (9:1) .This study is similar to research done in Ghana (9.1:1) But different from researches done in Limpopo South Africa (2.3:1) and Nigeria ,(18.5:1)

Mechanisms of injury were stab wounds in 23(53.5%) of the patients, and gunshot wounds in 11(25.6%) patients. This report is similar to other studies, Nigeria (10)and western Europe (15). In another report, GSWs were the most common (49.2%) cause of PAT, followed by stab wounds (41%) (11).

The patterns of organ injury are not different from other reports except that the liver and spleen were not the most damaged organs in the abdomen. In our patients the leading roles were played by small bowel 18(30.0%), colon 15(25.0%) and Diaphragm 12(20.0%), largely consistent with other series(16),(13)and (17). In study done in India, penetrating abdominal injuries whether gunshot or stab, the organ most commonly injured is the small bowel accounting 49 to 60 % of all injuries(14).

All patients had undergone emergency laparotomy and the incidence of unnecessary laparotomy as per previous reports is 8 patients (18%) ,India, ranges from 5.3 to 53 % %(14)and Ghana,18.2%,(7) and contradicts to a study done in Nigeria,10% (10).

Non operative management was successful, Sudan, 18.1%(18) and German,37.2%(6). This high rate of unnecessary laparotomies is due to the fact that many surgeons working in our setting still adhere to the traditional mandatory laparotomy concept and may also be due to the clinician's inability to diagnose some injuries where diagnostic facilities are lacking, as in our setting. The introduction and refinement of diagnostic procedures and imaging studies, including laparoscopy, CT scan and focused ultrasound, have directed the evolution of PAT management.

Complications develop in 16 patients (37.2%), 14 are Hospital acquired infection and surgical site infection and 2 patients had wound dehiscence. 7 patients developed HAI and 5 of them died which is statistically significant (p.value 0.001) . our study higher complication rates than research done in German,8.7%(4) and Kenyatta hosp12.5%(12).but lower than that done in Germany ,41.5%(6).

The overall survival rate of 77% is the same as that from other centers where a policy of selective conservative management of AGW was practiced. An acceptable survival rate is therefore possible without the practice of a mandatory laparotomy for AGW. This survival rate is lower than a study done in Durban south Africa(11) and research from Sudan, which showed mortality 4.5% (19).

Chapter Six

Conclusion and Recommendation

6.1 Conclusion

- In conclusion abdominal stab and gunshot wounds cause considerable morbidity and mortality in the productive age groups in our community.
- This study demonstrates no difference in the pattern of intra-abdominal injuries.
- The mortality from severe blood loss and low SBP<90mmhg is much higher.
- Also gun-shot wounds and patients who developed HAI are associated with a higher mortality
- The high negative laparotomy rate may be an indication that many patients with PAI may not require a laparotomy.

6.2 Recommendation

- Attention to patients with hemorrhagic shock should be paid to decrease mortality.
- Physicians should encourage patients early ambulation, so that to decrease HAI.
- Researchers can use this study as a guide for future researches.

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Annex I Questionnaire

Jimma University

College of Public health and Medical sciences

Department of Surgery

Questionnaire on pattern and outcome of patients with penetrating abdominal injury in Jimma University Medical Center, South West Ethiopia from January1/2020 – December30/ 2021

PAT data collection questionnaire / tool Card No. _____.

Hospital stay: admission:_____

S.No	Question		Response	Remark
	Socio-demography			
	1.1	Age at presentation	0 - 15 16 - 30 31 - 45 46 - 60 60 +	
	1.2	Sex	Male Female	
	1.3	Race	Oromo Kafa Amhara Welayita Others	
	1.4	Religion	Muslim Orthodox Protestant Others	
	1.5	Marital Status	A. Married B. Single C. Divorced	
	1.6	Educational Status	A. No Formal Education B. Primary Education C. High School & Above	
	1.7	Address	A. Urban B. Rural	

	1.8	Occupation	Unemployed Student Farmer Trader Employee/ Office worker Housewife Driver/Assistant Daily laborers Others	
2	Clinical Presentation			
	2.1	Type of injury	Stab Gunshot Horn Falling Others	
	2.2	Wound Location	Anterior wall Right flank Left flank Posterior wall Buttocks Chest Other	
	2.3	Condition at presentation	Hemorrhagic shock Peritonitis Abdominal pain Evisceration	
	2.4	Vital sign at presentation	BP>90 mmg BP<90 mmg	

3	**Management**			
	3.1	FAST	Negative Positive	
	3.2	Management	Surgical Conservative	
	3.4	Time from presentation to operation.	<1 HR 1-2 HRS 2-3HRS >3HRS	
	3.5	Injuries identified at operation	Diaphragm Colon Small bowel Liver Gallbladder Duodenum Stomach Pancreas Spleen Negative laparotomy	
4	Complication and condition on discharge			
	4.1	Complication	Complete wound dehiscence Surgical site infection HAI Others	
	4.2	Condition on discharge	Improved discharge Died	