

Selective Non Operative Management in Penetrating Abdominal Trauma Patients

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Abstract: Introduction Penetrating abdominal trauma (PAT), caused by gunshot wounds (GSW) or stab wounds (SW), remains a leading cause of trauma admissions at Baghdad Teaching Hospital. While exploratory laparotomy was traditionally the standard treatment to prevent contamination and hemorrhage, it often leads to high rates of non-therapeutic laparotomies. These unnecessary procedures increase hospital costs, prolong stays, and risk complications such as wound infections, adhesions, and incisional hernias. Selective non-operative management (SNOM) has emerged as a strategy to minimize these risks in hemodynamically stable patients. Methods A prospective study was conducted at Baghdad Teaching Hospital from January 2016 to May 2017. The study included 286 patients with PAT (GSW vs. SW). Patients underwent primary survey and resuscitation followed by clinical examination and imaging, including FAST and CT scans where indicated. Immediate laparotomy was performed for patients with hemodynamic instability, peritonitis, evisceration, or evidence of diaphragmatic injury. Stable patients without these indications were selected for non-operative management. Results Of the 286 patients received, 227 (79.4%) suffered gunshot wounds and 59 (20.6%) suffered stab wounds. Surgical intervention was performed in 198 patients (69.23%), while 88 patients (30.77%) were managed conservatively. Among those managed conservatively, 67 (76.1%) were successfully discharged without surgery. The remaining 21 patients (23.9%) failed conservative management and required surgery within 3–5 days. Conclusion Selective non-operative management is a necessary and effective approach for clinically stable patients with penetrating abdominal trauma. Utilizing contrast-enhanced CT scans and diagnostic laparoscopy alongside serial clinical examinations can significantly reduce the frequency of non-therapeutic explorations. While minimizing unnecessary surgery is vital, it must not delay the diagnosis and treatment of life-threatening injuries. Stable patients with tangential GSWs or SWs without signs of peritonitis can often be safely observed and discharged after 24 hours.

Keywords: Penetrating Abdominal Trauma, Exploratory Laparotomy.

INTRODUCTION

Penetrating abdominal trauma (PAT) can be defined as violation of the abdominal cavity by a gunshot wound (GSW) or stab wound (SW). Penetrating abdominal trauma continues to be a major cause of trauma admission in Baghdad teaching hospital in the last years. The decision to go the operating room is still a challenge for most of the surgeons and missed injuries and delays in treatment may lead to life threatening complications as well as prolonged hospital stays. Exploratory laparotomy was the main treatment for penetrating abdominal trauma. The early exploration is used to prevent spread of contamination caused by damage to hollow viscus and to stop bleeding from injured organs and vessels. However studies have shown that this approach may result in increasing rate of non therapeutic laparotomies.

Laparotomies can be labeled as:

- Negative laparotomy, as a laparotomy without any evidence of intra-abdominal injury.
- Therapeutic laparotomy, if intra-abdominal injuries required surgical intervention and repair done.
- Non therapeutic laparotomy, if serosal tears and or non-expanding retroperitoneal, mesenteric and visceral hematomas that do not

require therapeutic intervention (Hoffmann, C. *et al.*, 2013)

The frequency of non-therapeutic laparotomies can be minimized by offering good history taking, clinical examination and imaging studies like contrast enhanced computerized tomography (CT scan), diagnostic laparoscopy or serial ultrasound scan to stable patients or those who are stabilized after initial resuscitation. Non therapeutic laparotomy is not only a burden to hospital resources but also a cause of discomfort and misery for the patients. It is shown to be associated with post-operative complications like wound infection, post-operative adhesions, intra-abdominal abscesses, incisional hernia, as well as complications of anesthesia. Mandatory laparotomy for penetrating abdominal trauma detects some unexpected injuries earlier and more accurately but results in a higher nontherapeutic laparotomy rate, longer hospital stays, and increased hospital costs. The morbidity of the nontherapeutic laparotomy in the trauma patient has been recognized for decades; thus, unnecessary explorations should be avoided if possible. Conversely, the risks of delayed operative intervention are prohibitive and must be absolutely avoided. So the selective non operative

management in stable patients with penetrating abdominal trauma is practiced to minimize complications, duration of hospital stay and cost (Farooq A. 2004)

Patients and Method

Patients with penetrating (firearm versus stab) abdominal injuries who presented to A & E department in Baghdad teaching hospital from January 2016 to May 2017 were included in this prospective study. Doctors and nurses trained in accident and emergency receive the injured patients in A&E department. Primary survey/resuscitation is carried out as approved by Advanced Trauma Life Support; thereafter the patients are referred to the surgical unit according to the specialty/specialties required.

After taking history and proper clinical examination, investigations were done for each patient as indicated, imaging as chest X-ray, pelvic X-ray and Focused Assessment with Sonography for Trauma (FAST). Bedside ultrasonography is useful in abdominal evaluation to detect free peritoneal fluid or hemoperitoneum. It is a rapid, portable, noninvasive, and accurate examination that can be performed to detect hemoperitoneum. CT scan was used in hemodynamically stable patient if indicated. Indications for Immediate Laparotomy:

- Patients who are hemodynamically stable with an unreliable clinical examination (i.e., brain

injury, spinal cord injury, intoxication, or need for sedation or anesthesia)

- PAT with hemodynamic instability or peritonitis.
- Wounding instrument in situ
- Omental or intestinal evisceration
- Peritonitis
- Upper or lower GI bleeding
- Evidence of diaphragmatic injury (NG tube in chest, enteric contents through chest tube).

Patients with penetrating abdominal injuries who presented to Accident and Emergency department were included in the study, and categorized into two groups, First group includes patients who need exploratory laparotomy; and those who can be managed non operatively. Laparotomies were labeled as therapeutic if intra-abdominal injuries required surgical intervention and repair done, while laparotomies with injuries that did not require surgical intervention i.e., serosal tear, non-expanding retroperitoneal, mesenteric and visceral hematoma were labeled as non-therapeutic. Patients with penetrating abdominal trauma managed nonoperatively may be discharged after 24 hours of observation in the presence of a reliable abdominal examination and minimal to no abdominal tenderness. Data were collected including: age and sex of the patient, mode of injury (firearm versus stab), injured organ, associated thoracic, limb, vascular, head, neck and spinal injuries and intra-operative findings.

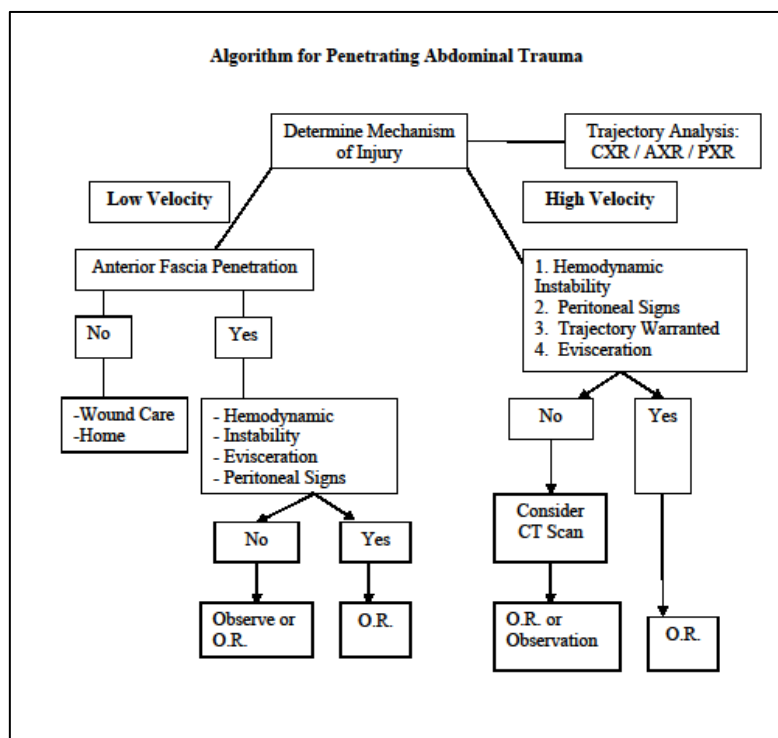


Figure 1: Algorithm for Patient management.

RESULTS

The age distribution for included patients is illustrated in table 1, and the sex distribution is figured next.

Table 1: Age distribution.

Age (years)	No. of Patients
12-20	19
21-30	91
31-40	76
41-50	82
> 50	18



Figure 2: No. of patients according to Age groups.

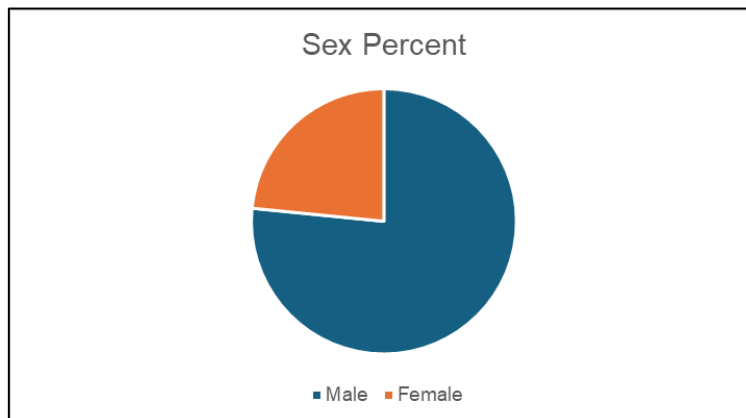


Figure 3: Sex distribution.

The cause of injury in the patients whom admitted was firearm in 227 patients and 59 were victims of stabbing wounds.

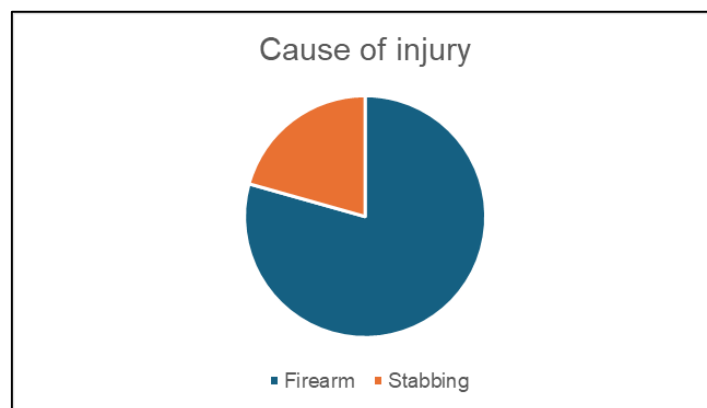


Figure 4: cause of injury.

A total 286 patients with penetrating abdominal injuries were received in emergency unit of Baghdad teaching hospital, 198 patients were

managed surgically and there percent was 69.23%. The rest (88) were managed conservatively

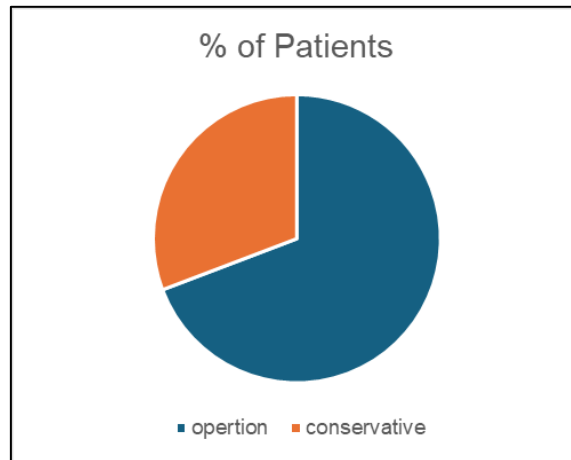


Figure 5: Management of Patients

From the 88 patients who were managed conservatively, 67 discharged well and the rest failed and got a surgery within 3-5 days.

DISCUSSION

Males constitute the great majority of patients with penetrating trauma injuries. Most of the surgeons think it was better to be safe than to be sorry with the threat of missed injury related to a negative laparotomy. However, with the rise of selective nonoperative management, the increasing use of modern imaging technologies, it is becoming increasingly important to avoid unnecessary procedures. Mandatory laparotomy for penetrating abdominal trauma detects some unexpected injuries earlier and more accurately but results in a higher nontherapeutic laparotomy rate, longer hospital stays, and increased hospital costs. The morbidity of the nontherapeutic laparotomy in the trauma patient has been recognized for decades; thus, unnecessary explorations should be avoided if possible. The decision whether to operate on the patient who has sustained a penetrating wound to the abdomen must take both of these points into account. Serial examination, if chosen, should be performed frequently and preferably by the same surgeon. Pain medications should be given with caution, if at all, to avoid masking the physical examination of the abdomen. If a patient should develop abdominal pain or hemodynamic instability, NOM should be abandoned and the patient taken to surgery emergently. Unnecessary laparotomy should be avoided if possible, it is important to emphasize that the decision on whether to perform a laparotomy favors not missing injury over the morbidity of a negative

laparotomy. Two patients died on arrival, 125 were not treated surgically, and 53 patients underwent laparotomy. There was no mortality or morbidity in those treated nonoperatively; 40 of 53 patients who were explored had injuries justifying the procedure. It was thought that if strict adherence to indications for laparotomy in these patients had occurred, nine other laparotomies could have been avoided. Shaftan concluded that “the application of trained surgical judgment rather than dogma is the more rational and intelligent approach to the management of abdominal injury.” The expectant policy toward these injuries was later termed “selective conservatism.” In the article by McAlvanah and Shaftan,⁷ it was found that of 221 GSW victims, 101 (45.7%) were treated nonoperatively; of the 120 patients who received operation, 5 were found to have been unnecessary. Gunshot wounds (GSWs) to the abdomen, however, are still commonly treated with mandatory exploration because of high incidence of intra-abdominal injuries and the complications of a missed injury or an injury delayed in recognition and treatment (McAlvanah MJ, 1978)

This was reinforced in 1969 by Nance and Cohn³ for the management of abdominal stab wounds (SWs). Since that time, selective non operative management (NOM) of SWs to the anterior abdomen has become more readily accepted. Although selective conservatism has become well accepted for patients with SWs, this concept remains controversial for GSW victims (Nance FC, 1969)

Dawidson *et al.*, in 1976, reported 277 patients with abdominal GSW, all of whom underwent

abdominal exploration. Forty patients (14%) were found to have no intraabdominal injury. There was no mortality in this group, and morbidity was minor. It is emphasized that SWs and GSWs should be treated differently and concluded that although selective conservatism should be exercised in SW, mandatory laparotomy should remain the standard of care for GSWs.

In 1977, Lowe *et al.*, published a retrospective review of 362 patients with abdominal GSWs. It was found that 30.1% of these in retrospect did not have injuries requiring treatment. It was noted that this group in general had tangential injuries and had either no or minimal abdominal findings on examination. It was also found that of the 259 cases with penetration of the abdominal visceral cavity, 97.6% had injuries requiring repair or drainage, whereas there were found to be no such injuries in the 48 patients without peritoneal penetration. A mandatory laparotomy was recommended for all GSWs suspected of having penetrated the abdominal cavity.

Moore *et al.*, in 1980, reported 245 patients with isolated GSW to the abdomen and lower chest and found that of 162 patients that had peritoneal penetration, 156 (96%) were found to have injury to abdominal organs. No patient had a visceral injury from an extraperitoneal wound. The rest were tangential injuries confined to the abdominal wall; these patients were observed for 24 hours, all without incident. This group concluded that for those patients with peritoneal penetration after GSW, laparotomy is mandatory; for those with tangential wounds, observation may be safely performed.

In 1980, Wilder and Kudchadkar reported 403 cases of abdominal SWs which were selectively managed. Of these, 187 (46%) were managed with immediate operation because of clinical findings, and 216 (54%) were initially managed nonoperatively. Of the latter, 16 patients required subsequent operation after the appearance of peritoneal irritation with a maximum delay of 22 hours, with no mortality.

A study by Robin *et al.*, published in 1989, also from Cook County Hospital, reported 333 patients with anterior abdominal SWs. Initial clinical assessment led to laparotomy in 165 (49.5%) of patients. Twenty-eight (16.7%) of the laparotomies were negative. Eighteen patients developed indications for operation after initial observation with a mean delay of 10.7 hours; of these, there

were no deaths, one major complication that was not likely related to the delay, and four negative laparotomies. One hundred fifty patients (45.0%).

Alzamel and Cohn⁴⁸ published a chart review of 650 asymptomatic patients with abdominal SWs who were admitted for serial examination. Fifteen of 650 left against medical advice within 6 hours of presentation. Sixty-eight of 635 underwent exploratory laparotomy. All patients who needed surgery were identified within 12 hours of presentation. Twenty-three (33%) underwent surgery within 2 hours; 26 (38%) between 2 hours and 4 hours; 9 (13%) between 4 hours and 6 hours; 9 (13%) between 6 hours and 10 hours; and 1 (1.4%) at 12 hours. The authors conclude that asymptomatic patients with abdominal SWs may be discharged after 12 hours of observation with little likelihood of missed injury.

Demetriades *et al.*, performed a retrospective review of GSW to the liver from August 1994 to January 1998. Sixteen stable patients were selected for NOM. Five patients in the observed group underwent delayed laparotomy for peritonitis (4 patients with liver injuries) and abdominal compartment syndrome.

Arikan *et al.*, also found that mandatory laparotomy approach for penetrating abdominal trauma patients lead to high frequency of non-therapeutic or unnecessary operations in 40% of patients. Chiu and colleagues reported similar rate (17%) of non-therapeutic or negative laparotomy among firearm abdominal trauma patients.

In a study from Mexico, Pinedo showed that out of 79 laparotomies performed on penetrating abdominal trauma patients only 60.53% were therapeutic. They also recommended a selective approach to the penetrating abdominal trauma patients along with repetitive physical examinations and the appropriate use of imaging studies.

CONCLUSIONS

Selective non operative management for the clinically stable patients with penetrating abdominal trauma is needed. CT scan of abdomen with contrast and diagnostic laparoscopy along with clinical examination can decrease the frequency of non-therapeutic explorations. Although the rate of nontherapeutic laparotomies after penetrating wounds to the abdomen should be minimized, this should never be at the expense of a delay in the diagnosis and treatment of injury. So, a routine laparotomy is not indicated in

hemodynamically stable patients with abdominal penetrating stab wounds without signs of peritonitis or diffuse abdominal tenderness. it is also not routinely indicated in stable patients with abdominal gunshot wounds if the wounds are tangential and there are no peritoneal signs. Abdominopelvic computed tomography should be considered in patients selected for initial nonoperative management to facilitate initial management decisions. The majority of patients with penetrating abdominal trauma managed nonoperatively may be discharged after 24 hours of observation in the presence of a reliable abdominal examination and minimal to no abdominal tenderness. Diagnostic laparoscopy may be considered as a tool to evaluate diaphragmatic lacerations and peritoneal penetration in an effort to avoid unnecessary laparotomy.

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