

The Role of Selective Exploratory Protocol in Penetrating Injuries of the Abdomen

Muhammad Touseef Asghar, Khalid Javed Khan, Sadaqat Ali Khan and Syed Tahir Ahmed Shah

Objective: To evaluate the role of non operative management in penetrating injuries of the abdomen.

Design: Descriptive study.

Place and duration of study: West Surgical Ward, Mayo hospital, Lahore, from April 1998 to April 2000.

Patients and Methods: Twenty four Patients presenting in emergency department with penetrating injuries of the abdomen were included. Patients underwent physical examination, nasogastric intubation, foley catheterization, wound explorations in local anesthesia and serial clinical examinations.

Results: Fourteen patients had firearm injuries, 9 patients had stab injury and one had impacted foreign body. Distributions of site of injury over abdominal wall was variable, pulse rate of patients on presentation varied between 80 to 120 per minute, with systolic blood pressure between 100 to 130 mm Hg, none of the patients required laparotomy. Mean hospital stay of the patients was 3.45 days.

Conclusion: Not all patients presenting with penetrating injuries of the abdomen need laparotomy. Patients with stable vitals, no abdominal tenderness and no bleeding from gastrointestinal and genitourinary systems should be given a trial of conservative management.

Key words: Selective exploratory protocol, Abdomen and Penetrating Injuries.

Introduction

Abdominal injuries are present in only 7-10 percent of the patients admitted to trauma centers. The diagnostic exercise carried out in these patients is very limited and time consuming, most of the time the decision to explore the patient is based on findings of clinical examination especially in our circumstances. However, it is well established that the injuries to the intra-abdominal organs is difficult to identify by physical examination alone. In order not to miss the injuries, trauma surgeon must have a high index of suspicion of their presence.

The various diagnostic modalities comprising of Diagnostic Peritoneal Lavage, CT scan, Ultrasonography, Laparoscopy and other radiologically assisted procedures have not proved to be cost effective. The high index of suspicion in trauma patients leads to significant number of negative exercises. Similarly, the mandatory exploratory protocol, i.e. every patient presenting to emergency with penetrating abdominal trauma has to be operated is also not cost effective, as negative explorations carry high expenses and morbidity. Moreover it increases the hospital stay and hospital expenses. Negative laparotomy carries a morbidity rate of between 4.9 and 35 percent and mortality rate of up to 6.3 percent.

Consequently, many centers adopt a selective approach in the management of patients in

abdominal stab wounds, a policy initially proposed by Shaftan in 1960. This approach based on clinical examination has undergone repeated reappraisal and has been shown to be safe and reliable form of patient management.

The financial limitations are giving rise to selective approach towards these injuries. A group of patients can be identified in which the treatment plan is designed considering the general condition of the patient, nature and site of injury.

The selective exploratory protocol is one in which we select a case of penetrating abdominal trauma and look for the possibility of conservative management.

Patients and Methods

This descriptive study was carried out in West Surgical Ward, Mayo Hospital, Lahore from April 1998 to April 2000. All patients were registered for the study and data was collected over the period. All these patients presented in the Emergency Department of Mayo Hospital during the working hours of one surgical unit.

The subjects were selected by methods of convenient sampling. All patients presenting with the penetrating injuries of the abdomen with no obvious signs of hemorrhage, peritonism or peritonitis, clinically stable vital signs with suspected subcutaneous tract were included in the study.

Patients below the age of 12 years, patients with penetrating injuries with obvious indications of celiotomy like shock, generalized peritonitis, leakage of intestinal contents through the wound, abdominal viscera presenting in the wound, haematemesis and frank haematuria were excluded from the study.

The surface anatomical definition of the abdomen for this study was from nipples to pubis anteriorly and from inferior scapular angle to gluteal folds posteriorly. However, because intra-abdominal injury may occur with entrance wound outside these boundaries, radiological assessment of all patients were undertaken where feasible and those with radio-opaque missiles within the defined boundaries were included in the study regardless of the site of entry wound.

All the patients included in the study were admitted with the following protocol:

Nothing per oral, intravenous line, complete history and physical examination, antibiotics Penicillins or first generation cephalosporins whatever was available in the emergency, tetanus prophylaxis, baseline investigations including Hb%, blood grouping, serum electrolytes were sent, nasogastric intubation, foley catheterization, wound exploration to determine the size and depth of the wound and viability of the injury area, this was done preferably under local anesthesia, observation of a period of 24-48 hours depending upon the progress of the patient, observation included repeated clinical examination recording vital signs, tenderness of the abdomen, measurement of abdominal girth and auscultation for bowel sounds, repeated clinical examination was carried out preferably by one doctor so that any change in the clinical findings was not missed.

Results

A total of 24 patients fulfilled the criteria of being included in the study over a period of two years. All the patients presented with penetrating injuries of the abdomen during the working hours of Emergency of one of the four surgical units. All patients were males. The age of the patient varied from 20 to 65 years with mean age 30 years.

Patients were divided into three categories according to the mode of injury. The first and the largest group including 14 patients was firearm injuries group. This included both the shotgun and gunshot injuries of the abdomen. The second group consisted of stab injuries with a total of 9 patients. Only one patient presented with impacted foreign body.

The distribution of injuries over the anterior abdominal wall and to the back was follows: Anterior chest wall- 2.08 percent, Left hypochondrium, 2.08 percent, Right lumbar region-4.16 percent, Umbilical region-8.33 percent, Right iliac fossa- 4.16 percent, Hypogastrium-2.08 percent, Thighs- 16.66 percent External genitalia-12.50 percent, Buttock 14.58 percent, Back 25 percent (Table 1).

Table 1: Area of distribution of injuries.

Area Involved	Percentage
1. Anterior Chest Wall	2.08
2. Left Hypochondrium	2.08
3. Right Lumbar Region	4.16
4. Right Iliac Fossa	4.16
5. Hypogastrium	2.08
6. Thighs	16.66
7. External genitalia	12.50
8. Gluteal region	14.58
9. Back	25
10. Umbilical Region	8.33
11. Left Lumbar Region	4.16

On presentation in the emergency, pulse rate of these patients was also taken into account which varied between 80 to 120 per minute. Mean 95.29 per minute.

Systolic blood pressure of these patients at presentation varied between 100 and 130 mm (Hg). Five types of treatments were offered to these patients which included Wound exploration and Wound closure, Wound debridement, Removal of foreign body and additional treatment like orchidectomy. Wound closure was done in 41.66 percent cases, Wound debridement in 50 percent, removal of foreign body in 1 and orchidectomy in 1 case.

None of these patients included in the study required laparotomy. The diagnostic modalities used in these patients were Ultrasonography in three cases to see the status of the kidneys in penetrating injuries of the back. Proctoscopy was done in two cases to see the integrity to lower rectum.

Hospital stay these patients varies from one to 18 days. Only for patients needed to stay beyond four days. Mean hospital stay of these patients was 3.45 days. Wound infection was the major complication Seen in the study which resulted in prolonged hospital stay.

Discussion

The incidence of penetrating abdominal injuries is increasing. This study is based upon the patients presenting in the emergency department of working hours of one surgical unit. The study design selected is descriptive which is also the case in other studies carried out in recent past.^{4,5} Study design was prospective in four studies^{9,13} and retrospective in five studies.^{14,24}

Patients were selected by means of convenient sampling in this study. Sampling method is the same in majority of the studies.^{3,5} In only one study the method of random sampling was used¹³ and in two studies, quota sampling was carried out.

Total number of patients selected for the study is 24. In other studies the number of patients vary widely as follows: surgeons⁶ single case report^{12,13} and 96 patients²⁶.

In this study of 24 patients, mode of injury was stabs in 9 cases, firearm injuries in 14 cases which include both gunshot and shotgun injuries and one case was impacted foreign body in the buttock due to industrial trauma. Comparing this with the other observed groups, exclusive study of the stab wounds of the chest both penetrating and non-penetrating⁵, study of anterior abdominal wall stab wounds⁶, stab wounds of the back and flank¹⁰, study of the abdominal stabs^{11,13}, a case of renal trauma mode of injury not mentioned¹², 17 cases of penetrating and 11 cases of blunt trauma with renal injuries managed conservatively¹⁴. The distribution of the mode of injury in other observed groups included a study of 102 patients with stab wounds in Bulawayo, Zimbabwe¹⁵, a study of 12 patients with firearm injuries of the abdomen managed conservatively¹⁸, a study of 410 patients with penetrating abdominal trauma which included 260 gunshot wounds and 150 stab wounds²⁴. The detail of the mechanism of injury is not mentioned in most of the studies in detail.

Now coming to the distribution of these injuries over the front and back of the abdomen as already mentioned the anatomical distribution for this study also includes the lower chest, abdomen, mid thighs, buttocks and external genitalia. The distribution is as follows: Anterior chest wall 2.08 percent, Left hypochondrium 2.08 percent, Right lumbar region 4.16 percent, Umbilical region 8.33 percent, Left lumbar region 4.16 percent, Right iliac fossa 4.16 percent, Hypogastrium 2.08 percent, Upper part of thighs 16.66 percent, External genitalia 12.50 percent, Buttocks 14.58 percent and back 25 percent (Table 1). So in this study the majority of injuries are distributed

over the back, thighs, buttocks and external genitals. In the last three mentioned areas, injury to the pelvic peritoneum, bladder and rectum needs to be ruled out by abdominal examination, bladder catheterization and digital rectal examination which was made mandatory in all of such cases. If we compare the distribution of injuries with the rest of the observed groups, in a study of stabs in a city majority 51 percent were distributed over the chest and 31 percent over the abdomen¹⁵, in a study of 368 cases of penetrating trauma, 240 were distributed over the abdomen, 49 chest, 48 neck and 35 were on the extremities²³, in another study of 96 patient, 55 involved the abdomen, 35 thorax and 10 both abdomen and the thorax²⁶. The comparison of the observed group is very difficult to interpret just because of the difference in the number of patients included in the study groups. However, there is hardly any mention of the areas of the abdomen involved in penetrating injuries in rest of the studies. The distribution of various areas has been mentioned just for statistical significance.

All patients underwent repeated clinical examination including recording of vital signs, palpation of the abdomen for tenderness, measurement of abdominal girth, and auscultation for bowel sounds. The various methods used for wound management will be discussed later. Radiographs of the chest, abdomen and pelvis were taken where necessary and abdominal ultrasound was used in selective cases.

Other protocols used were in a study of abdominal stab wound violating the fascia of anterior abdominal wall, all wounds explored and if found to be fascia deep, underwent paracentesis and if necessary peritoneal Lavage was undertaken in the absence of previous abdominal surgery²⁰, in another study protocol of repeated clinical examination complemented by ultrasound or peritoneal Lavage was followed²¹, in penetrating posterior abdominal wall injuries, patients undergoing conservative management were subjected to repeated examinations, abdominal radiographs, and urinalysis where IVP and CT scan abdomen was done in selected cases²².

The results of patients undergoing conservative management were good. Out of the 24 patients included in the study, none of them required laparotomy. Comparing this with the other study groups clinically stable patients with stab wounds of the abdomen having omental evisceration were managed conservatively with not late complications.¹¹

In other groups 17 percent of the patients managed conservatively for penetrating stab injuries of the back required laparotomy,¹³ 12 patients fulfilling specific criteria for firearm injuries of the abdomen were managed successfully¹⁸ on conservative treatment. In a review of 23 patients undergoing conservative management of penetrating posterior abdominal wall trauma, only one patient developed late complication of liver abscess.²² In another large study 58 patients with penetrating posterior abdominal wall trauma were managed conservatively with only one patient requiring delayed laparotomy.²⁶

In this study mean hospital stay of the patients was 3.45 days. The most common complication seen in the patients was wound infection which resulted in prolonged hospital stay in 3 cases equaling 7.7 percent and 18 days. Comparing this with the other observed groups, criteria for discharge in patients managed conservatively for penetrating abdominal wall trauma was relief of pain, feeling hungry and passing flatus,⁹ median hospital stay was 2 days in patients undergoing conservative management for penetrating abdominal trauma.¹³

In case of firearm injuries, it is often not possible to determine the depth of the penetration because of small entry wounds. However, all patients who are clinically stable and have suspicion of subcutaneous tract should be managed conservatively. In case of stab injuries, only plain radiographs of the abdomen and chest may be required to determine the integrity of pleura and hollow viscus, however, in cases of firearm injuries further views may be required so that the bullet is not missed. Every patient admitted for conservative management should undergo a treatment protocol already recommended.

Patients on non-operative management for penetrating abdominal trauma should be operated abandoning the conservative approach if patient is getting shock, increasing abdominal girth and abdominal tenderness is increasing.

Conclusion

- Not all of the patients presenting in the emergency with penetrating abdominal trauma need

laparotomy.

- Patients presenting in the emergency with stable signs, no abdominal tenderness and no bleeding from gastrointestinal or genitourinary tract should be given a trail of conservative management.
- All the patients admitted with such policy should undergo a specific protocol of management including intravenous access, antibiotic plus tetanus prophylaxis and careful repeated clinical examination supplemented by the investigations like radiographs, Ultrasonography where appropriate.
- All these patients admitted on this protocol need to have wound exploration to determine the size, depth of the wound and viability of the injured area preferably under local anesthesia.
- Conservative treatment should be abandoned if patient develops shock, abdominal tenderness is increasing, abdominal girth is increasing, bowel sounds are becoming inaudible or the track of the bullet or stab is found to be peritoneal deep on exploration.
- This policy of non-operative treatment should, however, not lead the surgeon to go for conservative management in patients requiring immediate laparotomy like patients who are bleeding and in shock.
- Following this approach of conservative management in appropriate cases, the mean hospital stay can be reduced and the morbidity and mortality of negative laparotomy/ anesthesia can be decreased thus saving money and other hospital resources.
- In future such studies can be expanded evaluating the role of other diagnostic modalities like Diagnostic Peritoneal Lavage and abdominal CT scan in the management of patients with penetrating abdominal trauma admitted for conservative management.

*Department of Surgery
Services Institute of Medical Sciences
theesculapio@hotmail.com
sims.edu.pk/esculapio.html*

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