
Indications for Operation in Abdominal Stab Wounds

A Prospective Study of 651 Patients

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This prospective study comprises 651 patients with knife wounds of the anterior abdomen. Three hundred and forty-five patients (53%) had symptoms of an acute abdomen on admission and were operated on immediately. The remaining 306 patients (47%) were managed conservatively with serial clinical examinations. This group included 26 patients with omental or intestinal evisceration, 18 patients with air under the diaphragm, 12 patients with blood found on abdominal paracentesis, and 18 patients with shock on admission. Only 11 patients (3.6%) needed subsequent operation, and there was no mortality. The overall incidence of unnecessary laparotomies was 5% (completely negative, 3%). Of the 467 patients with proven peritoneal penetration, 27.6% had no significant intra-abdominal injury. It is concluded that many abdominal stab wounds can safely be managed without operation. The decision to operate or observe can be made exclusively on clinical criteria. Peritoneal penetration, air under the diaphragm, evisceration of omentum or bowel, blood found on abdominal paracentesis, and shock on admission are not absolute indications for surgery. Alcohol consumption by the patient does not interfere with the clinical assessment.

IN A PREVIOUS STUDY we reported our experience with 156 patients with penetrating abdominal wounds.¹ We continued with this study prospectively, and the purpose of the current study is to review this experience and stress certain new points.

Patients and Methods

A prospective study was done over 4 years and 3 months (December 1981–February 1986). During this period, 651 patients with knife injuries in the anterior abdominal wall were admitted and treated in one of the surgical units at Baragwanath Hospital, Johannesburg. For the purposes of this study the anterior abdominal wall was defined as the area between the xiphoid and the pubic symphysis, and both posterior axillary lines. The treatment protocol

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remained unchanged during the study. All patients with signs of acute abdomen (tenderness, guarding, rebound tenderness, absent bowel sounds) were operated on immediately. Patients with no peritoneal signs or minimal signs (mild local tenderness) were managed conservatively. Alcohol-intoxicated patients were assessed and treated in the same way as the rest of the patients. The presence of peritoneal penetration, evisceration of omentum or bowel, abdominal paracentesis positive for blood, air under the diaphragm on x-ray, and shock were not absolute indications for surgery. All patients selected for conservative treatment had an intravenous line established, a nasogastric tube inserted, and an abdominal x-ray taken. The wound was then explored digitally to detect any peritoneal penetration. If the wound was too small no digital exploration was attempted. If there was suspicion of intraperitoneal bleeding, an abdominal paracentesis was performed. If omentum or bowel were protruding through the wound, the bowel was returned into the peritoneal cavity, and after ligation and resection of the omentum, the omental stump was also replaced. The patients were observed with hourly blood pressure and pulse recordings, and 2–4-hourly clinical assessments of the abdomen for the first day, and thereafter less often. If signs of peritonitis occurred, an operation was performed, otherwise the patient was discharged in 2–3 days. No prophylactic antibiotics were administered to the conservatively treated group.

Results

Of the 651 patients, 345 (53%) had signs of an acute abdomen and were operated on immediately. The remaining 306 patients (47%) had minimal or no peritoneal signs and were observed. Detailed analysis and discussion

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TABLE 1. Evidence of Peritoneal Penetration in the Conservatively Treated Group

	No. of Patients
Peritoneal penetration proven	129
Digital exploration	73
Omental evisceration	24
Bowel evisceration	2
Air under the diaphragm	18
Positive paracentesis	12
Peritoneal penetration equivocal	177
Total	306

will be restricted to this conservatively treated group. In this group, 274 patients (90%) were males and 32 patients (10%) were females, with ages ranging from 15–68 years (mean: 26 years). The patients received medical attention in a mean time of 1.9 hours after injury.

Clinical and Paraclinical Findings on Initial Assessment

All 306 conservatively treated patients had minimal abdominal signs, namely localized mild tenderness around the stab wound. Peritoneal penetration was verified in 129 patients (42%) by digital exploration of the wound, evisceration of omentum or bowel, air under the diaphragm, and positive abdominal paracentesis (Table 1). In the remaining 177 patients, the peritoneal penetration was equivocal. Eighteen patients in this group (6%) were admitted in shock and required a total of 23 units of blood. In 12 of these patients the tract of the knife wound was suggestive of liver injury. The remaining six patients had other associated injuries such as hemothorax, scalp wounds, etc. None of these patients required operation, and no complications occurred.

In 26 patients (8.5%) there was evisceration of the omentum (24 cases) or small bowel (2 cases). One patient with omental evisceration had peritoneal signs 14 hours after admission, and a laparotomy was performed with negative findings. No complications were recorded in this group. In 18 patients (6%) there was free air under the diaphragm on the abdominal x-ray. Two patients required operation 8 and 36 hours after admission, for repair of small perforations in the stomach and colon, respectively. Both patients had an uneventful recovery. In 12 patients (4%) the abdominal paracentesis was positive for blood. All patients had knife injuries over the liver. None of them required subsequent surgery and no complications occurred. More than half (62%) of the conservatively treated patients had a history of alcohol consumption. They were managed exactly as the rest of the group.

Associated Injuries

Forty-eight patients (16%) in the conservatively treated group had extra-abdominal associated injuries (hemothorax, soft tissue wounds).

Results of Treatment

In the 345 patients who were operated on immediately there were eight (2.3%) completely negative laparotomies (only the peritoneum was penetrated) and another eight (2.3%) unnecessary laparotomies (small paracolic or mesenteric hematomas, small amount of free intra-peritoneal blood, etc.). Five of these patients did not meet our criteria for immediate surgery. However, it was considered unwise to treat these patients conservatively because they had major chest or neck injuries that required operation. Another three patients who had a negative laparotomy had bowel or omental evisceration.

Of the 306 patients who were initially chosen for conservative treatment, 11 patients (3.6%) required subsequent operation but retrospectively it was necessary in only 9 patients (2.9%). The delay in the operation ranged from 4 hours to 5 days. The injured intra-abdominal structures included the colon (3 patients), the stomach, the liver, and the kidney (2 patients each). The remaining two laparotomies were completely negative but with peritoneal penetration. There were no deaths in the patients in whom the operation was delayed, but there were two patients with wound sepsis. Overall, there were no deaths in the 306 patients who were selected for conservative management. The rate of knife wound sepsis was 1% and the mean hospital stay was 2.8 days.

Discussion

The management of penetrating abdominal injuries varies widely in different trauma centers. Some surgeons advocate routine exploration of potentially penetrating abdominal wounds.²⁻⁴ Their main argument is that the initial clinical examination is not reliable and, therefore, serious intra-abdominal injuries may be missed. Various authors have reported an incidence of falsely normal initial abdominal assessments of between 14% and 35% and a falsely "acute" abdomen of between 15% and 28%.^{2,5-8} However, these studies were retrospective. We found the initial clinical examination very reliable with an incidence of a falsely normal initial examination of 2.9% and a falsely acute abdomen of 3.2% (Table 2). We believe that there is no place for mandatory exploration in the management of penetrating abdominal wounds for the following reasons: (1) the reported incidence of negative laparotomies is very high. Forde and Ganepola reported an incidence of 43.9%.⁴ The problems associated with a negative lap-

arotomy are not insignificant. Maynard and Oropeza² reported a mortality rate of 6.3%. Lowe et al.⁹ reported a mortality rate of 1.6% and a morbidity rate of 19%. Forde and Ganepola⁴ reported a morbidity rate of 8.7%. Nance et al.¹⁰ reported eight serious iatrogenic visceral injuries in a series of 250 negative laparotomies. (2) The dangers of operating on unprepared patients with full stomachs and after alcohol intoxication are obvious. (3) The hospitalization and costs are also considerable problems.

Many trauma centers use some form of selective conservative management. Some advocate operation on every patient with proven peritoneal penetration. Various techniques, such as local exploration of the wound or a "stabogram," have been used to assess the integrity of the peritoneum.^{2,11-13} We believe that peritoneal penetration should not be an indication for operation in itself because it is not necessarily associated with an intra-abdominal injury. In the current study 27.5% of the 467 patients with proven peritoneal penetration had no significant intra-abdominal injury. Furthermore, a "stabogram" is an unreliable method of detecting peritoneal penetration. Aragon and Eiseman¹² reported an incidence of 14% of false-positive "stabograms."

It is generally accepted that omental or bowel evisceration is an absolute indication for an emergency operation.^{6,14} We do not support this view, and in the current study we treated conservatively 24 patients with omental evisceration and two patients with bowel evisceration with no mortality or morbidity.

An abdominal paracentesis that is positive for blood is considered an indication for surgery.^{12,15,16} We believe this alone should not be an absolute indication for exploration. Twelve such patients were treated conservatively with no mortality or morbidity. Free blood in the peritoneal cavity in the absence of a hollow viscus perforation often does not give signs of acute abdomen. Such patients can safely be managed conservatively. The free blood may originate from the abdominal wall wound or a superficial laceration of the liver. It has been shown that many liver injuries are treated with only a laparotomy because they do not bleed at operation. Levin et al.¹⁷ reported that 14% of 535 liver injuries had only a laparotomy without any other specific treatment. Fischer et al.¹⁸ reported a figure of 21.3%. In a recent prospective study from our center, one third of the patients with penetrating liver injuries were treated without operation with no morbidity or mortality.¹⁹

The radiologic presence of free air under the diaphragm is considered an absolute indication for surgery.^{12,13,15,16} Although we assess these patients with great caution, the final decision to operate or not is made exclusively on the physical abdominal findings. Air may enter the peritoneal cavity from outside through the abdominal wall wound

TABLE 2. Reliability of Initial Clinical Abdominal Assessment (N = 651)

Physical examination	No. of Patients (%)	
	Significant Intra-abdominal Injury	No Significant Intra-abdominal Injury
Normal abdomen	9 (2.9%)	302 (97.1%)
Acute abdomen	329 (96.8%)	11 (3.2%)

or from a right pneumothorax with associated perforation of the right hemidiaphragm. In the current study 18 patients with free air under the diaphragm were chosen for conservative management. Two patients required subsequent operation: one patient for a small gastric perforation and one patient for a small colonic perforation. There was no serious morbidity or mortality.

It has been suggested that shock on admission is invariably associated with significant intra-abdominal injuries.²⁰ Our experience does not confirm this. Eighteen patients in shock, including 12 patients with wounds suggestive of liver involvement, were successfully treated conservatively. We have previously shown that many penetrating liver injuries can safely be observed.¹⁹ Furthermore, the shock might be due to extra-abdominal injuries, such as a hemorrhage or soft tissue wounds.

Alcohol intake by the patients does not interfere with the reliability of clinical abdominal assessment, as suggested by various reports.^{2,4} Sixty-two per cent of our patients had a history of alcohol consumption before the injury. These patients were managed in the same way as the rest of the patients. This is in agreement with the findings of Wilder and Kudchadkar.¹⁵

In conclusion, we have shown that almost half of the patients with stab wounds in the abdomen can be managed conservatively. The decision to operate or observe can safely be made on careful initial and repeated clinical examinations. The presence of peritoneal penetration, omental or bowel evisceration, free air under the diaphragm, blood on abdominal paracentesis, and shock are not absolute indications for operation. If we had followed the policy of mandatory exploration, the incidence of unnecessary laparotomies would have been 48%. If we had operated on all patients with proven peritoneal penetration, 27.5% of the operations would have been unnecessary. If selective conservatism had been applied, but evisceration, positive abdominal paracentesis, air under the diaphragm, and shock were absolute indications for surgery, we would have had 20.6% unnecessary laparotomies. By using our criteria the incidence of unnecessary operations was only 5%, with no mortality and minimal morbidity.

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