Gunshot wound of the abdomen: role of selective conservative management

This prospective study includes 146 patients with gunshot wounds of the abdomen. One hundred and five patients (72 per cent) had signs of an acute abdomen on admission and were operated on immediately. The remaining 41 patients (28 per cent) had minimal or equivocal abdominal signs and were observed with serial clinical examinations. Seven of the observed patients needed subsequent laparotomy, but there was no mortality or serious morbidity. Had a policy of mandatory exploration for abdominal gunshot wound been applied the incidence of unnecessary or negative laparotomies would have been 27 per cent. By using a policy of selective conservatism this figure was only 5 per cent. We suggest that abdominal gunshot wounds should be assessed and managed exactly like 'knife' wounds. Physical examination is reliable in detecting significant intra-abdominal injuries. Many carefully selected patients with abdominal gunshot wounds can safely be managed non-operatively.

Results
One hundred and forty-six patients fulfilled the criteria for inclusion in the study. The mean age was 28 years (range 14–61 years) and 97 per cent of the patients were men. The mean time from injury to admission was 100 min, with 50 per cent of the patients being admitted within 60 min of injury, 70 per cent within 90 min and 78 per cent within 120 min. In 68 per cent of cases there was an exit wound and in the remaining 32 per cent the bullet remained lodged in the body. In 74 per cent the bullet had entered through the anterior abdomen and in the other 26 per cent the entrance was in the back.

One hundred and five patients (72 per cent) had signs of an acute abdomen and were operated on immediately. Significant intra-abdominal injuries requiring repair were found in 99 (94 per cent) patients. One patient had a liver laceration that did not require suturing and five (5 per cent) patients had a completely negative laparotomy. There was a mean of 2.1 injured organs with a mean of 4.4 significant lesions per patient. The most commonly injured organs were the small bowel (57 per cent of patients), the colon (43 per cent), the stomach (25 per cent) and the liver (21 per cent).

Forty-one (28 per cent) patients had minimal or equivocal abdominal signs and were selected for observation. In 16 (39 per cent) the bullet was still in the patient. In 12 (29 per cent) cases the bullet had entered through the back and in the other 71 per cent it entered through the anterior abdomen. Forty patients were haemodynamically stable and only one patient with associated chest injuries was in shock (systolic blood pressure 75 mmHg). One patient who was shot in the suprapubic area presented with gross haematuria and the cystograms showed extraperitoneal extravasation. This patient was successfully managed without operation using bladder catheterization. Seven patients developed abdominal signs at a later stage (from 4 h to 4 days after admission) and needed a laparotomy. In all seven patients there was a significant injury requiring repair. The injured intra-abdominal organs included the colon (three patients), the small bowel (three patients) and the liver (one patient). The patient with the 4-day delay in diagnosis inadvertently received prophylactic antibiotics during the period of observation, and it is possible that this might have been a contributing factor. There was no mortality, but...
performed ‘regardless of physical examination or estimated strong feelings regarding the management of gunshot wounds patients in the group selected for conservative management had one patient developed wound sepsis with dehiscence and penetrated the abdominal cavity’4 or a laparotomy should be the presence of a gunshot wound that appears to have wound is highly controversial. Most trauma centres recommend the incidence of intra-abdominal injury in gunshot wounds is of the abdomen has been widely adopted, its role in gunshot of significant intra-abdominal injury requiring surgical exploration the incidence of unnecessary operations would have been shown in numerous studies that this type of delay is not associated with serious consequences12-14. It seems illogical to accept that clinical examination is reliable for knife wounds but not for gunshot wounds. In theory, the sensitivity of physical examination for abdominal gunshot wounds should be higher than for knife wounds because the average number of significant intra-abdominal lesions is greater for gunshot wounds. We have been using the policy of selective conservatism for abdominal gunshot wounds for many years and are convinced that the management of these injuries should not differ from that for knife wounds.

The biggest concern regarding selective conservatism is that significant injuries may be missed during the initial examination. However, any significant lesion will be detected during the subsequent clinical reassessments of the patient. It has been shown in numerous studies that this type of delay is not associated with serious consequences12-14. The proponents of mandatory exploration often underestimate the importance of a negative laparotomy. Although some authors have reported minimal morbidity and mortality, most have reported significant morbidity and even mortality5,9,15,16. There can be no argument that general anaesthesia and laparotomy, performed on unprepared patients who often have full stomachs or are drunk, can be dangerous. Furthermore, late complications, such as adhesive bowel obstruction or incisional hernia, should be borne in mind. Medical expenses and lost working days should also be taken into account.

The present study describes selective conservatism, based exclusively on physical examination. The incidence of negative or non-therapeutic laparotomy was 5 per cent. In other studies of mandatory exploration on all abdominal gunshot wounds, the incidence of unnecessary operations ranged from 15 to 26 per cent8,9. Had we followed such a policy of mandatory exploration the incidence of unnecessary operations would have been 27 per cent. In other series in which some form of selective conservatism was applied by means of diagnostic peritoneal lavage, the analogous figure ranged from 8 to 12 per cent7,10. In conclusion, abdominal gunshot wounds should be assessed exactly as for knife wounds. We advocate a policy of selective conservatism based on careful initial and subsequent serial clinical examinations.

### Table 1 Accuracy of clinical examination in stab wound and gunshot wound of the abdomen

<table>
<thead>
<tr>
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<th>Overall accuracy (%)</th>
<th>False positives (%)</th>
<th>False negatives (%)</th>
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<tbody>
<tr>
<td>Anterior abdominal stab wounds*</td>
<td>651</td>
<td>93.9</td>
<td></td>
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<tr>
<td>Posterior abdominal stab wounds†</td>
<td>230</td>
<td>95.2</td>
<td></td>
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<tr>
<td>Gunshot wound of the abdomen</td>
<td>146</td>
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*From Demetriades and Rabinowitz †From Demetriades et al

Discussion

Although the policy of selective conservatism in stab wound of the abdomen has been widely adopted, its role in gunshot wound is highly controversial. Most trauma centres recommend a mandatory laparotomy irrespective of clinical signs1-5. The strong feelings regarding the management of gunshot wounds are clearly demonstrated by expressions such as “no attempt is made to identify a specific indication for laparotomy other than the presence of a gunshot wound that appears to have penetrated the abdominal cavity” or a laparotomy should be performed regardless of physical examination or estimated trajectory1 or ‘exploratory laparotomy should be performed in all gunshot wounds to the abdomen when even the slightest question of penetration exists’5.

Two reasons are often quoted to support the policy of mandatory exploration. First, gunshot wound is associated with a high incidence of visceral injury and, second, the initial physical examination is not reliable. There is no argument that the incidence of intra-abdominal injury in gunshot wounds is higher than in stab wounds. In a series of 651 patients with knife injury of the anterior abdomen, the incidence in this hospital of significant intra-abdominal injury requiring surgical intervention was 52 per cent8. In stab wound of the back the equivalent figure was 14.8 per cent8. In the present series 73 per cent of patients with gunshot wounds (75 per cent of the anterior abdomen and 69 per cent of the back) had significant injury requiring operation. Other series have reported similar figures, ranging from 69.9 to 78.3 per cent5,7-6. From these figures it becomes obvious that between 20 and 30 per cent of patients with abdominal gunshot wounds may be managed without operation.

Some authors used diagnostic peritoneal lavage for superficial-looking abdominal gunshot wounds with equivocal abdominal signs to detect intra-peritoneal injury7,8. However, such lavage has been shown to be unreliable in assessing abdominal gunshot wounds. The best documented study was published by Thal et al8. In a prospective study of 168 gunshot wounds, the authors performed lavage and laparotomy on all patients. The incidence of false negative lavage was 25.4 per cent. Hollow viscous perforation may not be associated with enough blood loss to give a positive lavage and the white cell count in the lavage fluid may well be raised for the first 2-3 h after injury. Furthermore, blood in the lavage fluid does not necessarily mean significant visceral injury6.

An estimation of the bullet trajectory has been used in an attempt to predict peritoneal penetration. However, low velocity bullets have an unpredictable trajectory, often following paths of least resistance, e.g. fascial planes. Incorrect assessment of the trajectory means that many patients without peritoneal penetration are subjected to a laparotomy4.

The second argument in favour of mandatory laparotomy is that the initial physical examination is unreliable in abdomen gunshot wounds. Thal et al8 reported false negative physical examination in 20.2 per cent and false positive examination in 15.9 per cent of patients. Moore et al7 found an incidence of 17 per cent of false negative examination. Lowe et al4 reported that 41.5 per cent of patients with no clinical signs on admission had significant intra-abdominal injury requiring repair.

Contrary to these reports, we believe that the initial examination is, indeed, reliable in assessing abdominal gunshot wounds. In the present series the incidence of false negative examination was 4.8 per cent and of false positive examination was 3.4 per cent. As seen in Table 1, in this centre the accuracy of the initial physical examination for gunshot wounds compares favourably with that for stab wounds of the anterior or posterior abdomen12,13. It seems illogical to accept that clinical examination is reliable for knife wounds but not for gunshot wounds. In theory, the sensitivity of physical examination for abdominal gunshot wounds should be higher than for knife wounds because the average number of significant intra-abdominal lesions is greater for gunshot wounds. We have been using the policy of selective conservatism for abdominal gunshot wounds for many years and are convinced that the management of these injuries should not differ from that for knife wounds.

Br. J. Surg., Vol. 78, No. 1, February
Gunshot wound of the abdomen: D. Demetriades et al.

References


