Traumatic adrenal haematoma: A condition rarely recognised in the emergency department

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Summary

Objective: To delineate the clinical features of traumatic adrenal haematoma, to help emergency physicians recognise the condition early and so to prevent adrenal crisis.

Methods: Review of the records of all patients admitted to Chi-Mei Medical Center, Tainan, Taiwan, with traumatic torso injuries, between 1 August 2003 and 31 August 2005. Of the 305 patients reviewed, 8 had adrenal haematoma. Injury Severity Scores, hospital course, need for intensive care unit admission and surgery or vascular embolisation, and concomitant injuries, were compared between patients with and without adrenal haematoma.

Results: No adrenal haematoma was recognised in the emergency department. No case of adrenal haematoma needed surgery or vascular embolisation, but each had associated injuries to other internal organs. All eight patients with, but only 106 patients without, adrenal haematoma sustained injuries to more than one internal organ ($p < 0.01$). The mean Injury Severity Scores and lengths of hospital and intensive care unit stays among the two groups were not significantly different. There was no statistical significance in the differences in rates of admission to the intensive care unit, mortality, laparotomy or vascular embolisation between the two groups.

Conclusions: Emergency physicians were liable in trauma cases to miss adrenal haematoma, which of itself was a benign condition but was associated with increased internal organ injuries and days in the intensive care unit. Emergency physicians
Introduction

The adrenal gland is a small retroperitoneal organ and seldom causes somatic discomfort. The best diagnostic image of adrenal haematoma (AH) is shown on abdominal CT. In trauma cases, the demonstration of life-threatening injuries by abdominal CT may distract the attention and AH is often overlooked.

Bilateral AH can lead to adrenal crisis which, in cases of severe trauma, may be overlooked as the reason for acute physiological deterioration, and death can result. Internal bleeding, infection or occult injuries may be sought and the real cause of death may not be found. Even if an adrenal crisis is identified as the cause of clinical deterioration, once shock has supervened the largest doses of steroids may be ineffective.

The low diagnostic rate of AH by emergency physicians has partly contributed to a lack of knowledge about the condition. The present study was undertaken to depict the clinical features of AH in individuals with traumatic torso injuries.

Methods

Between 1 August 2003 and 31 August 2005, we retrospectively reviewed the records of all patients who sustained traumatic torso injury and were admitted to Chi-Mei Medical Center, which has approximately 26,000 emergency department trauma patient visits annually. Every patient with injuries of the lungs, heart, aorta, liver, spleen, kidney, bowel, adrenal gland or urinary tract, as well as haemopneumothorax, haemoperitoneum or retroperitoneal haematoma, was reviewed in the study. These diagnoses were established using imaging (CT, ultrasonography, cystography and plain film) or documented during surgery. Clinical suspicions of intraabdominal injuries without the support of imaging studies or surgical findings were excluded. Surgical findings were considered authoritative when they contradicted imaging studies. A detailed chart review was performed in order to determine the Injury Severity Score (ISS), hospital course, intensive care unit (ICU) requirements, need for surgery or vascular embolisation and presence of concomitant injuries of each patient. The data of AH+ and AH− patients were compared.

The diagnosis of AH was derived from the results of laparotomies or abdominal CT. Four radiologists, blinded to the study, read all the CT examinations. The CT criteria for AH included a round or oval mass occupying the adrenal region, strand-like haemorrhagic infiltration of the adjacent fat, and a thickened diaphragmatic crus. All AH+ patients met at least one of these three CT criteria. We used Fisher’s exact test to compare the rates of ICU admission, mortality, and need for laparotomy or vascular embolisation between the two study groups. We used the Wilcoxon rank sum test to compare ISS, number of days in hospital and number of days in the ICU. All statistical analyses were performed at the two-sided significance level of 0.05 using the SPSS software package (SPSS 12.0).

Results

Retrospectively 305 patients were reviewed. The majority in both AH+ and AH− groups were injured in traffic accidents. Eight patients (four men and four women) were AH+ and 297 were AH−. The incidence of AH was 2.62%; there were eight unilateral AH identified in eight patients, who all had sustained blunt injury. Seven AHs were on the right side and one was on the left side. The mean age of the AH+ patients was 25.8 years (18–33 years) and of the AH− group was 36.6 years (1–83 years). There were 201 males and 104 females; 287 patients sustained blunt injuries and 18 had penetrating injuries. Every AH could be identified retrospectively from abdominal CT. None of the AH was diagnosed in the emergency department.

All AH+ patients also sustained associated torso injuries, including hepatic injury (7), rib fracture (4), renal injury (2), splenic injury (2) and haemopneumothorax (2). All the injuries and AH were ipsilateral. AH− patients sustained fewer injuries of their internal organs. Injuries in more than one internal organ were found in 106 cases. The difference in the rates of associated torso injuries between the AH+ and AH− groups was statistically significant (p < 0.01) (Table 1).

There were no statistically significant differences in rates of ICU admission, mortality, or laparotomy or vascular embolisation between the AH+ and AH− groups (Table 1). All AH+ patients survived, but 29 (9.8%) of the 297 AH− patients died. No patients
underwent vascular embolisation, but two underwent laparotomy for torso injuries other than AH. There were no statistically significant differences in the ISS, mean hospital stays or days in the ICU between the two groups (Table 2).

**Discussion**

Adrenal haematoma is relatively rare in trauma cases. The incidence of AH in our study was 2.62%, similar to that reported in other series.\(^1\)\(^,\)\(^7\) AH generally does not cause clinical symptoms and therefore is often overlooked by physicians in the emergency department; most cases of AH were diagnosed by radiologists using abdominal CT. Because AH usually has a benign clinical course, surgical intervention is generally not required. In our study, the mean hospital and ICU stays were similar in AH\(^+\) and AH\(^-\) patients, which indicates that AH alone rarely leads to a serious outcome. Nonetheless, this does not mean that AH can be ignored. AH\(^+\) patients had significantly more internal organ injuries. Bilateral AH may cause an adrenal crisis, a catastrophic condition, which is often overlooked as the reason for a patient’s deterioration. In such cases, internal bleeding, systemic or focal infection, and undetected injuries are often suspected as the cause of deterioration, and therefore surgical exploration or broad-spectrum antibiotics are often resorted to instead of repeated imaging studies. The consequent delay in treating the adrenal crisis may lead to the death of the patient.

The best diagnostic tool for AH is abdominal CT, because of the position of the adrenal glands in the retroperitoneum (Fig. 1). In our study and other

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**Table 1** Rates of intensive care unit (ICU) admission, mortality, associated torso injuries, laparotomy and vascular embolisation in cases with (AH\(^+\)) and without (AH\(^-\)) adrenal haematoma

<table>
<thead>
<tr>
<th>Rate</th>
<th>AH(^+), n (%)</th>
<th>AH(^-), n (%)</th>
<th>Ratio</th>
<th>p-Value(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU admission</td>
<td>5 (62.5)</td>
<td>188 (63.3)</td>
<td>0.99</td>
<td>&gt;0.95</td>
</tr>
<tr>
<td>Embolisation</td>
<td>0 (0)</td>
<td>14 (4.7)</td>
<td>1.21</td>
<td>&gt;0.95</td>
</tr>
<tr>
<td>Mortality</td>
<td>0 (0)</td>
<td>29 (9.8)</td>
<td>0.59</td>
<td>&gt;0.95</td>
</tr>
<tr>
<td>Laparotomy</td>
<td>2 (25)</td>
<td>128 (43.1)</td>
<td>0.58</td>
<td>0.47</td>
</tr>
<tr>
<td>Injuries to (&gt;1) internal organ</td>
<td>8 (100)</td>
<td>106 (35.7)</td>
<td>2.80</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

\(^a\) Fisher’s exact test.

**Table 2** Comparison of Injury Severity Scores and hospital and intensive care unit (ICU) stays between groups with (AH\(^+\)) and without (AH\(^-\)) adrenal haematoma

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>AH(^+), mean (S.D.)</th>
<th>AH(^-), mean (S.D.)</th>
<th>p-Value(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury Severity Score</td>
<td>13.5 (17)</td>
<td>13.3 (18.8)</td>
<td>0.69</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>14.3 (23.7)</td>
<td>13.2 (21.1)</td>
<td>0.68</td>
</tr>
<tr>
<td>ICU stay (days)</td>
<td>7.6 (13.8)</td>
<td>3.8 (6.5)</td>
<td>0.67</td>
</tr>
</tbody>
</table>

S.D., standard deviation.

\(^a\) Wilcoxon rank sum test.

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**Figure 1** The left picture is an AH\(^-\) patient and the right one is an AH\(^+\) patient. The black arrow shows a mass obliterating the right adrenal gland and strand-like hemorrhage infiltration of the adjacent fat. The white arrow shows thickened diaphragmatic crus, which is caused by hemorrhage into posterior pararenal space tracking along diaphragm.
series, the cause of AH was predominantly blunt injury. Right-sided AH is overwhelmingly more frequent than left-sided AH. The proposed reasons for this are that the right adrenal gland is surrounded by liver and spine and so is more vulnerable to external compression; and that the right adrenal vein drains directly into the inferior vena cava so that sudden external compression may raise the venous pressure and disrupt the right adrenal vessels.\textsuperscript{4,9}

All eight AH\textsuperscript{+} patients in our study had associated torso injuries. Therefore, our results suggest that when injuries are observed, the ipsilateral adrenal gland should be checked on CT for AH. If ipsilateral AH is detected, the physician should search for contralateral AH. If bilateral AH is found, the physician should check adrenal function and treat for adrenal crisis if the patient’s condition deteriorates.

In summary, traumatic AH is easily overlooked in trauma patients in the emergency department. Most AH are accompanied by torso injuries, which should be regarded as warning signs. Adrenal haematoma itself is benign but, because it is always accompanied by other internal organ injuries, it may be associated with a longer ICU stay. Emergency physicians must be aware of the possibility of bilateral as well as unilateral AH in trauma patients; bilateral AH may lead to a deadly adrenal crisis.

**References**