Evaluation of blunt abdominal trauma: current practice in Taiwan

C-F Chong, T-L Wang, H Chang

Objective: To gain an overview of the current practice of different major institutions in Taiwan in the evaluation of abdominal injuries. A further comparison was made between general surgeons and emergency physicians in this aspect.

Method: A telephone survey was conducted of all emergency departments of 58 major institutions (14 medical centres, 44 district hospitals) that are capable of providing definitive care for trauma victims in Taiwan in June 2002. Respondents were asked to select the diagnostic modality of choice in the evaluation of a haemodynamically abnormal blunt trauma victim with suspected intra-abdominal injuries. In the same study period, this particular telephone scenario was also used to survey 109 individual doctors (45 emergency physicians, 64 general surgeons).

Results: Most respondents preferred ultrasound (also known as focused assessment with sonography for trauma or “FAST”) instead of diagnostic peritoneal lavage (DPL) because DPL is invasive and most doctors in Taiwan have limited experience in performing DPL or interpreting the results.

Conclusions: It seems reasonable to devote greater resources for emergency departments to incorporate a FAST based algorithm into their initial management of trauma victims, and to improve training in its use. It is also suggested that future ATLS teaching in Taiwan should include didactic material on FAST.

RESULTS

In the telephone survey of institutions, we received responses from all of the major institutions, including 14 medical centres (MC) and 44 district hospitals (DH). As table 1 shows, 78.6% of MC respondents and 81.8% of DH respondents preferred FAST. Only 7.1% of MC respondents and 6.8% of DH respondents preferred DPL. The remaining 14.3% respondents preferred CT.

Abbreviations: FAST, focused assessment with sonography for trauma; DPL, diagnostic peritoneal lavage; CT, computed tomography; ED, emergency department; GS, general surgeon; EP, emergency physician; MC, medical centre; DH, district hospital.
bleeding. It is recommended in the ATLS guidelines that diagnostic modalities include DPL, CT, and FAST.589 An effective method of evaluation remains controversial. Current intervention for intra-abdominal injuries. However, the most rapid and accurate identification of those patients requiring operative intervention for multiple blunt injuries, when associated with altered sensorium, injury to adjacent structures, equivocal physical findings, or when a prolonged loss of contact with patient is anticipated (lengthy radiological studies, general anaesthesia for extra-abdominal injuries, etc.).46 47 The advantages of DPL are simplicity, accuracy, and low complication rates.11 12 DPL is considered oversensitive. Only a small volume of free intraperitoneal blood can lead to a positive result. False positive results can occur from a retroperitoneal leak, which cannot detect contained solid organ injury but can confound later computed tomograms by introducing both air and fluid into the peritoneal cavity. Furthermore, there is justified concern regarding familiarity with the lavage techniques, collection, processing, quantification, and interpretation of results in many institutions where DPL is only occasionally seen.60 61 62 This, together with a high incidence of non-therapeutic celiotomy and a shift to a more conservative approach to the treatment of solid organ injury, has resulted in DPL being redefined in the diagnosis of blunt abdominal trauma.

Ultrasound has an expanding role in the assessment of blunt abdominal injuries. It is a valuable tool for the diagnosis of haemoperitoneum requiring celiotomy.13 The advantages of ultrasound, in comparison with CT and DPL, are rapidity of the examination to detect free fluid, portability, and lack of need for patient transport. Ultrasound can be performed during trauma resuscitation, on patients with previous celiotomies, on patients with clotting disorders, and on pregnant patients. Limitations of ultrasound include technical difficulties in obese patients and in patients with ascites, subcutaneous emphysema, or hollow organ injury. Although ultrasound cannot replace CT or DPL, it is a rapid screening method for detection of haemoperitoneum and for guidance of further diagnostic studies.16

Our survey showed that most major institutions and most individual doctors in Taiwan prefer FAST as the initial test of choice when encountering a haemodynamically abnormal trauma victim with suspected abdominal injuries. This is true in all study groups (MC, DH, EP, and GS), although the degree of exposure to ATLS training among these groups is quite different (more ATLS providers found in the MC and EP groups). In Taiwan, ultrasound machines are commonly available and FAST is considered as the initial diagnostic modality of choice to exclude haemoperitoneum. Most trauma doctors in Taiwan will decide to carry out DPL only when ultrasound is unavailable and the patient is in shock.

In Taiwan, CT scanners are available in all institutions that manage traumatised patients. CT takes longer, costs more, and should not be done in the unstable patients, but it gives more definitive information about the abdominal organs and retroperitoneum.17 CT is the diagnostic modality of choice for non-operative management of solid visceral injuries. The literature suggests that CT carries comparable sensitivity and specificity as DPL in the assessment of the haemodynamically unstable patient. There was no significant difference between the two groups. Table 2 shows that nearly all (>90%) respondents selected not to perform DPL because they believed that DPL carries more risks. The DH group consisted of more respondents who had limited experience in performing and interpreting DPL than the MC group (70.5% compared with 35.7%, p = 0.02). A significantly higher percentage of ATLS provider was found in the MC group than the DH group (85.7% compared with 59.1%, p = 0.03).

In the telephone survey of individual doctors, 45 (77.6%) of the 58 randomly selected EPs and 64 (64.7%) of the 99 randomly selected GS respondents responded to our questions. As table 1 shows, 88.9% of EP respondents and 73.4% of GS respondents preferred FAST. Only 4.4% of EP respondents and 6.3% of GS respondents preferred DPL. There were significantly more GS respondents than EP respondents (20.3% compared with 6.7%, p = 0.01) that preferred CT examination in the scenario. Table 2 showed that nearly all EP and GS respondents selected not to perform DPL because of its invasiveness although most of them had experience in performing and interpreting DPL. A significantly higher percentage of ATLS provider was found in the EP group than the GS group (53.3% compared with 12.5%, p<0.01).

**DISCUSSION**

Unrecognised abdominal injury is a frequent cause of preventable death after trauma. Clinical signs may be subtle or masked by other injuries or intoxicants.4 Successful care of patients with blunt abdominal trauma depends on accurate and rapid identification of those patients requiring operative intervention for intra-abdominal injuries. However, the most effective method of evaluation remains controversial. Current diagnostic modalities include DPL, CT, and FAST.13 14 15

DPL is a rapidly performed, invasive procedure that provides useful information in the evaluation of blunt trauma victims.63 and is considered 98% sensitive for intraperitoneal bleeding.64 It is recommended in the ATLS guidelines that DPL should be performed in haemodynamically abnormal patients with multiple blunt injuries, when associated with altered sensorium, injury to adjacent structures, equivocal physical findings, or when a prolonged loss of contact with patient is anticipated (lengthy radiological studies, general anaesthesia for extra-abdominal injuries, etc.).46 47 The advantages of DPL are simplicity, accuracy, and low complication rates.11 12 DPL is considered oversensitive. Only a small volume of free intraperitoneal blood can lead to a positive result. False positive results can occur from a retroperitoneal leak, which cannot detect contained solid organ injury but can confound later computed tomograms by introducing both air and fluid into the peritoneal cavity. Furthermore, there is justified concern regarding familiarity with the lavage techniques, collection, processing, quantification, and interpretation of results in many institutions where DPL is only occasionally seen.60 61 62 This, together with a high incidence of non-therapeutic celiotomy and a shift to a more conservative approach to the treatment of solid organ injury, has resulted in DPL being redefined in the diagnosis of blunt abdominal trauma.

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**Table 1** Diagnostic preferences

<table>
<thead>
<tr>
<th>Institutions</th>
<th>MC (%)</th>
<th>DH (%)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAST</td>
<td>11 (78.6)</td>
<td>36 (81.8)</td>
<td>0.81</td>
</tr>
<tr>
<td>DPL</td>
<td>1 (7.1)</td>
<td>3 (6.8)</td>
<td>1.00</td>
</tr>
<tr>
<td>CT</td>
<td>2 (14.3)</td>
<td>5 (11.4)</td>
<td>0.55</td>
</tr>
<tr>
<td>Total</td>
<td>14 (100)</td>
<td>44 (100)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants</th>
<th>EP (%)</th>
<th>GS (%)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAST</td>
<td>40 (88.9)</td>
<td>47 (73.4)</td>
<td>0.21</td>
</tr>
<tr>
<td>DPL</td>
<td>2 (4.4)</td>
<td>4 (6.3)</td>
<td>0.53</td>
</tr>
<tr>
<td>CT</td>
<td>3 (6.7)</td>
<td>13 (20.3)</td>
<td>0.01</td>
</tr>
<tr>
<td>Total</td>
<td>45 (100)</td>
<td>64 (100)</td>
<td></td>
</tr>
</tbody>
</table>

MC, medical centre; DH, district hospital; EP, emergency physician; GS, general surgeon; FAST, focused assessment with sonography for trauma; DPL, diagnostic peritoneal lavage; CT, computed tomography.

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**Table 2** Reasons for not performing DPL

<table>
<thead>
<tr>
<th>Institutions</th>
<th>MC (%)</th>
<th>DH (%)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inexperience</td>
<td>5 (35.7)</td>
<td>31 (70.5)</td>
<td>0.02</td>
</tr>
<tr>
<td>Invasiveness</td>
<td>13 (92.9)</td>
<td>43 (97.7)</td>
<td>0.66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants</th>
<th>EP (%)</th>
<th>GS (%)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inexperience</td>
<td>43 (95.4)</td>
<td>54 (84.4)</td>
<td>0.37</td>
</tr>
<tr>
<td>Invasiveness</td>
<td>45 (100)</td>
<td>60 (93.8)</td>
<td>0.61</td>
</tr>
</tbody>
</table>

Abbreviations as in table 1.
superior specificity as compared with DPL and it is contra-
indicated in haemodynamically abnormal patients. In our
study, we found a minority of respondents (more surgeons
than emergency physicians) decided to send haemody-
namically abnormal patients to the radiology department for CT. They claimed that all patients are well monitored, the CT
scanner is in the ED or immediately adjacent to the trauma
resuscitation room, and rapid examination is anticipated with
 newer generation CT scanners.

Some authors recommended that the next edition of the
ATLS manual should include didactic material on ultra-
sound. However, the inclusion of practical ultrasound
instruction in future ATLS courses will not be universally
applicable because of limited availability of ultrasound
equipment and lack of competent instructors. This seems
not to be a problem in Taiwan as ultrasound equipment is
commonly available and FAST has long been part of the
standard ED residence training programme.

There are several limitations to this study. Firstly, only one
telephone call is made for each hospital ED. A different
respondent from the same ED may have given a different
answer. Secondly, only large scale institutions are included in
the study. Local hospitals especially those in the rural areas
are not included. Thirdly, the representativeness of our
database is limited to Taiwan only and may not applicable
to other localities.

Although it is well known that DPL is accurate, rapid, safe,
and avoids the disruption of patient care, it is not the primary
test for the evaluation of trauma victims with suspected
intra-abdominal injuries in Taiwan, as shown in this study.
Recognising its value as a rapid, accurate, non-invasive
diagnostic modality, most EDs in Taiwan has included
ultrasound in their algorithm for the assessment of trauma
victims. It seems reasonable to devote greater resources for
EDs to incorporate a FAST based algorithm into their initial
management of trauma victims, and to improve training in
its use. We also suggested that future ATLS teaching in
Taiwan should include didactic material on FAST.

CONTRIBUTORS

CF Chong collected, organised, and interpreted the data and wrote
the paper. TL Wang and H Chang supervised the study.

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