The clinical factors most likely to result in an abnormal CT Head – a UK trauma centre experience

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Background - What are the NICE Guidelines?

• Set of parameters used to identify if a patient presenting with head injury warrants an **urgent CT Head**
  *(Urgent = CT scan performed and reported within 1 hour of identifying the head injury)*

• Published in 2014

• Developed from the Canadian CT Head Rule (2001)

• Strong evidence base encourages adherence
Methods

• Retrospective data collection over 4 months

• 15 Oct 2021 – 15 Jan 2022

• Identified all Acute CT Heads in ED that used the local ‘head injury’ proforma (n=1542)

• Analysed clinical history for GCS and other factors (as per NICE)

• Also analysed proportion of intracranial(IC)/extracranial(EC) injuries and correlation with clinical factors
Why GCS is an important factor

Chi Square testing showed a significant correlation between GCS and abnormal findings.
Grading IC Injury – Rotterdam Score

• Published in 2006

• 4 components assessed

• Total score between 1 – 6

• Predictor of 6-month mortality
  - (0% for Score of 1, 61% for Score of 6)
Chi Square testing showed a significant correlation between GCS and Rotterdam Score.

- GCS >13 (n=1408)
  - Rotterdam 1 (Mortality 0%): 96%
  - Rotterdam 2-3 (Mortality 7-16%): 4%
  - Rotterdam 4-6 (Mortality 26 - 61%): 0%

- GCS 9 – 13 (n = 105)
  - Rotterdam 1 (Mortality 0%): 88%
  - Rotterdam 2-3 (Mortality 7-16%): 7%
  - Rotterdam 4-6 (Mortality 26 - 61%): 5%

- GCS <9 (n = 29)
  - Rotterdam 1 (Mortality 0%): 48%
  - Rotterdam 2-3 (Mortality 7-16%): 17%
  - Rotterdam 4-6 (Mortality 26 - 61%): 35%
Other Clinical Factors

Most common indication for Imaging

- Haemotympanum: 44%
- Bruising around ears or eyes: 17%
- Vomiting: 15%
- Retrograde Amnesia: 20%
- Anticoagulation: 3%
- Post-traumatic Seizure: 1%

Normal vs Abnormal Breakdown of the different clinical indications

- Haemotympanum: Normal = 1%, Abnormal = 44%
- Bruising around ears or eyes: Normal = 3%, Abnormal = 17%
- Vomiting: Normal = 15%, Abnormal = 20%
- Retrograde Amnesia: Normal = 20%, Abnormal = 17%
- Anticoagulation: Normal = 3%, Abnormal = 15%
- Post-traumatic Seizure: Normal = 1%, Abnormal = 44%
# Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Normal</th>
<th>Abnormal</th>
<th>P&lt;0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Haemotympanum</td>
<td>8</td>
<td>0.61</td>
<td>10</td>
</tr>
<tr>
<td>Bruising around ears or eyes</td>
<td>182</td>
<td>13.95</td>
<td>70</td>
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<tr>
<td>Vomitting</td>
<td>185</td>
<td>14.18</td>
<td>36</td>
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<tr>
<td>Retrograde amnesia</td>
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<td>32.80</td>
<td>71</td>
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<tr>
<td>Anticoag</td>
<td>563</td>
<td>43.14</td>
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<tr>
<td>Post traumatic seizure</td>
<td>28</td>
<td>2.15</td>
<td>12</td>
</tr>
</tbody>
</table>
Conclusion

• GCS is an important factor as the lower it is, the greater the incidence of an abnormal scan and also the more severe the intracranial injury

• Being on ‘Anticoagulation’ is by far the most common indication for an acute CT Head; but this is not significantly associated with abnormal findings

• Factors significantly associated with abnormal findings are:
  • Haemotympanum
  • Bruising around the eyes / ears
  • Post-traumatic seizure

• Further subgroup analysis is ongoing to devise a way of identifying which patients need imaging more urgently than others
References
