Utility Of Abdominal CT In Children With Suspected Physical Abuse and Elevated Hepatic Transaminases

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INTRODUCTION

Abdominal injury due to child abuse is one of the leading causes of mortality and morbidity in young children. While it is critical to identify severe abusive abdominal trauma, it is also important to identify any abdominal injury due to physical abuse. These injuries may not require acute medical intervention but may have vital social and legal implications that can help ensure the child’s future safety.

The child protection team (CPT) at the UPMC Children’s Hospital of Pittsburgh (CHP) currently recommends obtaining hepatic transaminases (AST and ALT) to screen for intrabdominal injury when children with suspected physical abuse present.

- Suspected physical abuse: AST or ALT > 80 IU/L to Obtain CT abdomen regardless of signs or symptoms (Sensitivity of 83.8% and specificity of 83.1%)
- General trauma guideline: asymptomatic and AST >200 or ALT >125mL to Obtain CT abdomen

Given the risks associated with ionizing radiation and a perception at our institution that the yield of abdominal CT has dropped significantly since implementing the 80 IU/L cut-off, our goal was to reassess the current cutoff values and determine if it is possible to narrow the subset of children who warrant abdominal CT when there is concern for abuse.

METHODS

- 10-year retrospective review from Jan 2011 - Dec 2020 of children ages 0-60 months evaluated for physical abuse by the CPT at CHP in which AST or ALT > 80 IU/L
- Data collection: demographics (age, gender, race), initial AST and ALT, initial signs and symptoms of abdominal injury, CT report if completed
- Patients were stratified into 2 groups depending on the highest value of both AST and ALT.
  - Lower range: AST 80-200 or ALT 80-125 IU/L
  - Higher range : AST >200 or ALT >125 IU/L
- The abdominal CT was considered positive if there was an abdominal injury identified on the report by the radiologist.

RESULTS

- As seen in Figure 1, 161/367 (44%) patients underwent abdominal CT
- 60/161 (37%) patients had AST/ALT in the lower range
- 7/60 (12%) with AST/ALT in the lower range had positive CTs. All 7 of these patients were symptomatic.
- 0/44 (0%); one-sided 97.5% CI: 0-8% patients with AST/ALT in the lower range and no symptoms had positive CTs.
- 43/161 (26.7%) with abdominal injuries identified on CT

DISCUSSION

- Identified abdominal injuries in 26.7% of patients
- Liver laceration and/or hematoma was the most common injury identified. These findings are similar to other studies.
- While abdominal injuries were identified in 11.7% of patients in the lower range AST/ALT, all had clinical signs and/or symptoms concerning for abdominal injury.
- No injuries were identified in asymptomatic patients with lower range AST/ALT
- Limitations
  - There may be bias if signs and symptoms of abdominal trauma were documented by the provider after the results of the CT obtained.
  - Despite institutional guidelines to obtain a CT scan in patients being evaluated for abuse in which AST or ALT is > 80 IU/L, only 46.5% of such patients underwent CT scan and were able to be included in our study.

CONCLUSIONS

Our data suggest that abdominal CTs may not be necessary in children being evaluated for physical child abuse who have AST 80 – 200 IU/L and/or ALT 80 – 125 IU/L, and do not have signs or symptoms of abdominal injury. A larger, prospective study is needed to validate this approach.

REFERENCES


CONTACT INFORMATION

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Utility of Abdominal CT in Children with Suspected Physical Abuse and Elevated Hepatic Transaminases

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• Inflicted abdominal trauma is one of the leading causes of mortality and morbidity in young children, but occult abdominal trauma is hard to detect
• Preferred initial study: abdominal CT with IV contrast
• Provides important information for clinical diagnosis and forensic evidence
Background

• Our internal guideline to obtain an abdominal CT:
  • Concern for physical abuse: AST or ALT > 80 IU/L
  • Trauma: asymptomatic and AST >200 or ALT >125 IU/L

• Unclear if benefits outweigh risks for all patients
Inclusion Criteria

- 10-year retrospective review
- ages 0-60 months
- AST or ALT > 80 IU/L
- Child Protection Team evaluation
Method

- Data: demographics, initial signs or symptoms, initial AST and ALT level, and abdominal CT report if completed

- Lower range: AST range 80-200 or ALT range 80-125 IU/L
- Higher range: AST > 200 or ALT >125 IU/L

- Positive CT: abdominal injury identified
- Negative CT: no abdominal injury identified
Results

N = 367
Subjects identified

N = 206
No CT

N = 161
with CT

N = 60 (37%)
Lower range AST/ALT

N = 16 (27%)
(+ Symptoms
N = 7 (44%) (+ CT
N = 9 (56%) (- CT

N = 44 (73%)
(- Symptoms
N = 44 (100%) (- CT

N = 101 (63%)
Higher range AST/ALT

N = 36 (36%)
(+ Symptoms
N = 19 (53%) (+ CT
N = 17 (47%) (- CT
N = 65 (64%)
(- Symptoms
N = 17 (26%) (+ CT
N = 48 (74%) (- CT
<table>
<thead>
<tr>
<th></th>
<th>Positive CT (n=43)</th>
<th>All patients (n=161)</th>
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<tr>
<td><strong>Median age (months)</strong></td>
<td>20.6</td>
<td>9.9</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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<tr>
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<td>Not specified /Declined</td>
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<tr>
<td><strong>Identified injuries</strong></td>
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<tr>
<td>Liver</td>
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<tr>
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<tr>
<td>Pancreas</td>
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<td>Other*</td>
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</tbody>
</table>

*Other: Bladder injury, gallbladder injury, hemoperitoneum without significant visceral organ injury

1. Hepatic laceration
2. Splenic laceration with perisplenic hematoma
3. Right adrenal gland hemorrhage and retroperitoneal paranephric hematoma
Abdominal injuries were identified in 11.7% of patients with lower range AST/ALT. All had clinical signs and/or symptoms. No injuries were identified in asymptomatic patients with lower range AST/ALT.
Limitation

- Signs and symptoms of abdominal trauma may have been documented by the provider after the results of the CT scan were known and this may have created bias
- Low adherence rate (44%) to CT guideline
Conclusion

• Our data suggest that abdominal CTs may not be necessary in children with concerns for physical abuse who have AST < 200 and ALT < 125 IU/L and do not have signs or symptoms of abdominal injury

• A larger prospective study is needed to validate this approach
Acknowledgement

Rachel Berger, MD, MPH
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References


