Division of Acute Care Surgery Clinical Practice Policies, Guidelines, and Algorithms:  
Cervical Spine Clearance in Trauma Patients  
Clinical Practice Guideline

Original Date: 02/2009  
Supersedes: 05/2014  
Last Review Date: 11/2017  

Purpose: To identify a method of clearing the cervical spine in the trauma patient to prevent without missing any clinically significant injuries.

Recommendations:
1) In patients who are awake and alert (GCS 15), the need for imaging of the cervical spine may be determined by using either the Canadian Cervical Spine Rules or the NEXUS Low Risk Criteria:[1, 2]

2) For both alert patients who fail the Canadian Cervical Spine Rule or NEXUS Low Risk Criteria and obtunded patients:
   - The cervical collar may be removed if the following are met:
     - The patient has shown gross motor function of all four extremities.

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McGovern Medical School
The University of Texas Health Science Center at Houston

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The patient has no paresthesias or neurologic symptoms.
The patient is able to range the neck.
The attending radiologist has dictated a final report of a high quality CT scan of the cervical spine and it shows no cervical spine fracture or acute abnormality (e.g. widening)

Any questionable findings on CT cervical spine should be discussed with responsible attending

- The cervical collar should remain if:
  - Any focal neurologic deficit on physical examination.
  - The patient is unable to range the neck.
  - Any acute abnormal findings on CT cervical spine.
  - Please change to Philadelphia collar or Miami J collar within 12 hours

3) If a patient’s cervical collar cannot be removed in the emergency department, please change to a Philadelphia Collar or Miami J.

Definitions:

- Obtunded patient = GCS <15 or ≤11T if intubated
  - Note: obtunded ≠ intubated
- High quality CT:
  - Narrow slices <3mm with reconstructed multiple planes and final read by a qualified attending radiologist
Background:
There continues to be no consensus as to the appropriate guidelines for removal of cervical collars (C-collars) in obtunded trauma patients. The common imaging modalities used include computed tomography (CT) of the cervical spine, magnetic resonance imaging (MRI) of the cervical spine, and flexion-extension cervical spine X-rays (F-E images). Given that the consequences of a missed cervical spine injury could result in devastating injury, clarification of an acceptable algorithm for clearing C-collars is critical.

Relevant Literature Search:
There is no large, prospective, randomized controlled trial comparing modalities for detecting clinically significant cervical spine injury. A systematic review of the literature was performed limiting the results to adult patients, observational studies, and systematic reviews. As the Eastern Association for the Surgery of Trauma (EAST) guideline for C-collar clearance in obtunded patients was also updated in 2015, our search was limited to the last 5 years.

Table 1: Systematic Reviews Evaluated

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Patients, n</th>
<th>Inclusion Criteria</th>
<th>Population</th>
<th>Outcome</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malhotra, 2017[3]</td>
<td>5,286</td>
<td>Initial negative CT and follow up MRI</td>
<td>Blunt patients</td>
<td>Unstable cervical injuries</td>
<td>-15% rate of abnormal finding on follow up MRI -0.003%-0.30% rate of unstable injuries on follow up MRI</td>
</tr>
<tr>
<td>Plackett, 2016[4]</td>
<td>1,714</td>
<td>Initial negative CT and follow up MRI</td>
<td>Blunt patients unable to be examined</td>
<td>Treatment after MRI</td>
<td>-16% rate of abnormal finding on follow up MRI -4% were treated with cervical collar after MRI -0.3% had surgery after MRI</td>
</tr>
<tr>
<td>Badhiwala, 2015[5]</td>
<td>3,627</td>
<td>Initial negative CT and follow up MRI</td>
<td>Obtunded, blunt patients</td>
<td>Unstable injuries and treatment after MRI</td>
<td>-0-1.5% rate of unstable injury -0-7% rate of surgery after MRI</td>
</tr>
<tr>
<td>EAST, 2015[6]</td>
<td>1,814</td>
<td>Initial negative CT and follow up MRI</td>
<td>Obtunded, blunt patients</td>
<td>Unstable injuries</td>
<td>-0% rate of unstable injuries</td>
</tr>
<tr>
<td>Russin, 2013[7]</td>
<td>1,322</td>
<td>Initial negative CT and follow up MRI</td>
<td>Obtunded, blunt patients</td>
<td>-10% rate of abnormal findings on</td>
<td></td>
</tr>
</tbody>
</table>
MRI -7% rate of prolonged immobilization after MRI
-0.4% rate of surgery after MRI

Additional systematic reviews found and reviewed: Kanji, 2014[8]; Raza, 2013[9]; Smith 2014[10]

Table 2: Prospective Observational Studies Evaluated

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Patients, n</th>
<th>Inclusion Criteria</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inaba, 2016 [11]</td>
<td>10,276</td>
<td>Blunt trauma patients who fail NEXUS and underwent CT</td>
<td>-198 (2%) had clinically significant injury -3 (0.03%) had clinically significant injury that was missed on CT (each had focal neurological deficits)</td>
</tr>
<tr>
<td>Bush, 2016 [12]</td>
<td>1,668</td>
<td>Blunt, intoxicated trauma patient</td>
<td>-5 (0.02%) clinically significant injuries (each associated with focal neurologic deficit)</td>
</tr>
<tr>
<td>Resnick, 2014 [13]</td>
<td>830</td>
<td>Blunt trauma patients who fail NEXUS and underwent CT</td>
<td>-23 (3%) clinically significant injuries identified -0 (0%) clinically significant injuries missed</td>
</tr>
</tbody>
</table>
# Search Strategies:

<table>
<thead>
<tr>
<th>Search</th>
<th>Database</th>
<th>Search Term</th>
<th>Limits</th>
<th>Total Yield: # of Articles</th>
<th># Excluded Articles</th>
<th># Included Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PubMed</td>
<td>(&quot;cervical spine&quot; OR &quot;cervical vertabrae/diagnostic imaging&quot;) AND &quot;cervical vertebrae/injuries&quot;</td>
<td>Last 5 years, observational</td>
<td>15</td>
<td>12</td>
<td>3</td>
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<td>2</td>
<td>PubMed</td>
<td>(&quot;cervical spine&quot; OR &quot;cervical vertabrae/diagnostic imaging&quot;) AND &quot;cervical vertebrae/injuries&quot;</td>
<td>Last 5 years, Randomized Controlled Trial</td>
<td>10</td>
<td>10</td>
<td>0</td>
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<tr>
<td>3</td>
<td>PubMed</td>
<td>(&quot;cervical spine&quot; OR &quot;cervical vertabrae/diagnostic imaging&quot;) AND &quot;cervical vertebrae/injuries&quot;</td>
<td>Last 5 years, Systematic Review</td>
<td>26</td>
<td>19</td>
<td>7</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>51</td>
<td>41</td>
<td>10</td>
</tr>
</tbody>
</table>

Exclude Multiples 0

Included Papers 10 (0 RCTs, 3 Observational, 7 SRs)
References: