Morbidity & Mortality Associated with Transoral Approaches to the Cervical Spine

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Background

- Transoral approach to the cervical spine can be a practical way to address anterior pathology at high cervical levels
- Utility in surgical treatment of a spectrum of diseases
  - Congenital, traumatic, spondylotic, autoimmune, and neoplastic conditions
- Significant morbidity and mortality exist, most importantly infection, but is not well characterized
Methods – Database

- Retrospective cohort analysis using prospectively collected database
  - American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP)
    - Multicenter (n = 374 sites in 2012)
    - High-fidelity data
  - 30-day postoperative morbidity and mortality outcomes
Methods – Patients

- Transoral Patient Population
  - Age $\geq$ 18 Years
  - Database Years: 2005 – 2012
  - $N = 126$ patient cases
  - CPT Codes 22548

- Exclusion criteria
  - Combined approaches
  - Underweight (BMI < 18.5 kg/m2)
  - Dependent on ventilator
  - Disseminated Cancer
  - Radiotherapy for malignancy
  - Pregnancy
  - Chemotherapy
  - Emergency Operation
  - Pre-operative sepsis
  - Acute Renal Failure
  - Non-Elective (variable available only for 2011-2012)
  - Missing Data
Methods – Data Analysis

- Patients with postoperative complications isolated & compared

- Univariate Analysis
  - Chi-square and Student tests for categorical variables and continuous variables, respectively

- Multivariate logistic regression models
  - To determine the independent risk factors for postoperative morbidity and mortality
## Results

- Overall complication rate was 21.4%

### 30-Day Complications (N=126)

<table>
<thead>
<tr>
<th>Complication</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Complication</td>
<td>27</td>
<td>21.4%</td>
</tr>
<tr>
<td>Mortality</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Pulmonary Complication</td>
<td>6</td>
<td>4.8%</td>
</tr>
<tr>
<td>VTE</td>
<td>2</td>
<td>1.6%</td>
</tr>
<tr>
<td>UTI</td>
<td>2</td>
<td>1.6%</td>
</tr>
<tr>
<td>Sepsis</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Wound Complication</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Transfusion</td>
<td>20</td>
<td>15.9%</td>
</tr>
<tr>
<td>Return to OR</td>
<td>8</td>
<td>6.4%</td>
</tr>
<tr>
<td>Unplanned Reoperation</td>
<td>6</td>
<td>4.8%</td>
</tr>
<tr>
<td>Unplanned Readmission</td>
<td>7</td>
<td>5.6%</td>
</tr>
<tr>
<td>LOS &gt; 5</td>
<td>31</td>
<td>24.6%</td>
</tr>
</tbody>
</table>
Results

- Operative time > 4 hours and length of stay > 5 days were independently associated with increased complications.
- Peripheral vascular disease also increased odds ratio.

<table>
<thead>
<tr>
<th>Anesthesia Duration</th>
<th>Odds Ratio</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative Time &gt; 4 Hr</td>
<td>7.8 (1.8-33.1)</td>
<td>0.0054</td>
</tr>
<tr>
<td>LOS &gt; 5 Days</td>
<td>7.4 (2.4-23.4)</td>
<td>0.0006</td>
</tr>
<tr>
<td>Peripheral Vascular Disease</td>
<td>9.9 (0.7-140.1)</td>
<td>0.0906</td>
</tr>
</tbody>
</table>
Discussion

- Most common complication was RBC transfusion

- Infection rates as high as 13% in other studies\textsuperscript{1,4,5}
  - Studies in which patients did not use prophylactic antibiotics until postoperative day 5 had higher infection rates

- Association of operative duration with postoperative morbidity\textsuperscript{6} is well established
Conclusion

- First large multi-center study to investigate transoral approach to upper cervical spine
- SSI rate lower than previously reported
- Operative time primary variable associated with complications
  - Rarity of the approach may cause longer operative times which contribute to complications
- High mortality rate
  - Further analysis necessary to determine cause
References