Comparison of Outcomes following Minimally Invasive and Open Posterior Cervical Foraminotomy: Description of Minimally Invasive Technique and Review of Literature

Andrew Platt¹, John E. O’Toole²
¹ Section of Neurosurgery, University of Chicago
² Department of Neurosurgery, Rush University Medical Center
Financial Disclosures

Andrew Platt: None
John O’Toole
  Consultant: Globus Medical, RTI Surgical, FDA
  Royalties: Globus Medical, RTI Surgical
Background: Cervical Radiculopathy

- Characterized by a constellation of symptoms related to cervical nerve root compression including upper extremity pain, paresthesia, and weakness
- Following failure of non-operative management there are multiple possible treatment modalities
  - Anterior Cervical Discectomy and Fusion (ACDF)
  - Cervical Total Disc Arthroplasty (TDA)
  - Anterior Cervical Foraminotomy (Jho)
  - Open Posterior Cervical Foraminotomy
  - Posterior Cervical Laminectomy and Fusion
  - Posterior Cervical Laminoplasty
  - Minimally Invasive Posterior Cervical Foraminotomy (MIS-PCF)
Background/Methods

- **Potential benefits of MIS-PCF**
  - Avoids pseudoarthrosis, anterior approach related complications
  - Motion preserving
  - Minimally invasive: limits operative blood loss, operative time, and postoperative length of stay

- **There are few significant studies directly comparing**
  - MIS-PCF to Open PCF
  - MIS-PCF(tubular) to MIS-PCF (Full-Endoscopic/Percutaneous)

- **There are no systematic reviews and meta-analyses of exclusively comparative studies**
## Results MIS-PCF vs Open PCF

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Type</th>
<th>Intervention(# of patients)</th>
<th>Follow-up (months)</th>
<th>Operative Time (minutes)</th>
<th>Estimated Blood Loss (cc)</th>
<th>Postoperative Length of Stay(hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fessler et al.</td>
<td>PCS</td>
<td>Open (26) MIS/Endoscopic(25)</td>
<td>15.2 4.6</td>
<td>171^ 115^</td>
<td>246^ 138^</td>
<td>68^ 20^</td>
</tr>
<tr>
<td>Kim et al.</td>
<td>RCT</td>
<td>Open (22) MIS/Microscopic (22)</td>
<td>34.2 33.1</td>
<td>76.5 78.5</td>
<td>NR</td>
<td>160.8* 98.4*</td>
</tr>
<tr>
<td>Winder et al.</td>
<td>RCS</td>
<td>Open (65) MIS/Microscopic (42)</td>
<td>NR</td>
<td>103.25 100.74</td>
<td>233.20* 96.10*</td>
<td>58.60* 26.86*</td>
</tr>
<tr>
<td>Uehara et al.</td>
<td>RCS</td>
<td>&quot;Mini-open&quot; (10) MIS/Microscopic (10)</td>
<td>33.0 41.8</td>
<td>60.5* 86.2*</td>
<td>43.5 42.0</td>
<td>304.8 273.6</td>
</tr>
<tr>
<td>Eicker et al.</td>
<td>RCS</td>
<td>Open (23) MIS/Microscopic (17)</td>
<td>66.4 23.3</td>
<td>104* 77.65*</td>
<td>NR</td>
<td>178.32* 115.68*</td>
</tr>
</tbody>
</table>
Results MIS-PCF vs FE-PCF

Only one study met inclusion criteria: Kim et al. 2015
• Retrospective cohort study
• 34 patients MIS-PCF vs 24 patients FE-PCF
• All patients were followed for >2 years
• Postoperatively at 24 months, the mean NDI and VAS-N were significantly lower after percutaneous endoscopic cervical foraminotomy than minimally invasive tubular assisted microscopic cervical foraminotomy
• No significant change in VAS-A between the two groups
Conclusions

Direct comparative studies between minimally invasive posterior cervical foraminotomy and open cervical foraminotomy are limited in number and suffer from significant heterogeneity.

There appears to be a trend of decreased hospital length of stay and postoperative analgesic usage in the minimally invasive cohort.

There is not enough data currently to suggest a difference in complication rate and reoperation rate between minimally invasive and open cervical foraminotomy.

There is not enough data to currently compare MIS-PCF and FE-PCF in a meaningful manner.