Biportal Endoscopic versus Open Microscopic Lumbar Redo-discectomy for Symptomatic Recurrent Lumbar Disc Herniation

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INTRODUCTION

Biportal endoscopic technique (BE) for spine surgery

• First published by Soliman HM (Eur Spine J 2013;22(5):1037-1044)

• Two independent trans-muscular surgical channel (viewing and working portal)

• Viewing portal: for endoscope (4.5mm diameter, 0° or 30°) & endoscopic sheath containing inflow irrigation channel, located on non-dominant hand

• Working portal: for endoscopic surgical tools [i.e., waterproof drill system, bipolar radiofrequency thermo-controlled ablator (bRFc), and general spine instruments] & outflow irrigation channel, located on the dominant hand

• Performing under continuous fluid irrigation through two surgical portals
**Is the Use of a Unilateral Biportal Endoscopic Approach Associated with Rapid Recovery After Lumbar Decompressive Laminectomy? A Preliminary Analysis of a Prospective Randomized Controlled Trial**

Park SM, Kim GU, Kim HJ, et al.

- **Prospective randomized controlled study** (N = 64; BE = 32, MI = 32)

  - **Enrollment (n = 70)**
    - Excluded (n=6)
      - 1 did not meet inclusion criteria
      - 1 due to age over 80 year
      - 1 declined to participate

  - **Randomization (n = 66)**

  - **Group 1 (n = 32)**
    - MI-D
    - Lost to follow-up (n=0)
    - 3 had complications
      - 2 had dural tears
      - 1 had respiratory due to hypoventilation
    - Analyzed (n=32)

  - **Group 2 (n = 32)**
    - BE-D
    - Lost to follow-up (n=1)
      - 1 had diagnosed as cancer esophagus
    - Analyzed (n=31)

BE-D was associated with *rapid pain recovery, low fentanyl usage, and early discharge* after surgery, but its other benefits have not yet been shown.

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**Biportal endoscopic versus microscopic lumbar decompressive laminectomy in patients with spinal stenosis: a randomized controlled trial.**


- **Prospective randomized clinical trial** (N = 53; BE = 28, MI = 25)

  - **70 Patients were assessed for eligibility**
    - 6 were excluded

  - **64 Underwent randomization**

  - **Micro (N=32)**

    - FU Lost 2

  - **Biportal (N=32)**

    - FU Lost 3

The modified intention-to-treat analysis

- N=30

- Final N=28

- The modified intention-to-treat analysis

- N=29

- Final N=25

Biportal endoscopic decompressive laminectomy is an alternative to and offers similar clinical outcomes as microscopic open surgery in patients with symptomatic lumbar spinal stenosis.
Benefits of Biportal Endoscopic Technique

- Low surgical morbidity, Less postop. pain & quickly functional recovery
- Bipolar Radiofrequency thermo-controlled ablator: new electrosurgical tools, meticulous bleeding control without lateral tissue & thermal nerve injury
- Low surgical site infection d/t continuous saline irrigation

MS Kang
Purpose

• Nevertheless, clinical evidence of revision lumbar discectomy assisted with biportal endoscopic technique (BE-RLD) is still lack.

• The purpose of this study is to evaluate the clinical outcomes of redo-discectomy assisted ‘biportal endoscopic (BE)’ versus ‘open microscopic (OM)’ Technique for symptomatic recurrent lumbar disc herniation.
Material and Methods

• A retrospective study of a prospectively collected database
• 72 patients with symptomatic recurrent lumbar disc herniation were treated with either BE-LRD or OM-LRD, From January 2018 to March 2019
• Definition of recurrent lumbar disc herniation (RLDH):
  • A case in which the lumbosacral radicular pain recurs after a pain-free period for more than six months after primary Micro-LD, and a re-herniation in the same direction as in the past was observed in the MRI.
• Inclusion criteria
  • 18 years or older, has not responded to more than one selective nerve root block, and has at least 12 months of follow-up postoperatively.
• Exclusion criteria
  • Chronic discogenic pain without leg radicular pain
  • Definite segmental instability combined with spondylolisthesis
Surgical Technique of BE-RLD

(A) Preoperative anteroposterior radiograph.
(B) Preoperative magnetic resonance T2-weighted axial image
(C) Clinical photography of surgical incisions
(D) Postoperative anteroposterior radiograph.
Surgical Technique of BE-RLD

- Easy detachment of fibrotic scar tissue from the bony lamina
- Easy isolation of sequestration disc
- Easy access to the operation field without touching fibrotic scar tissue
- Dissector or curet
- Transversing nerve root
- Ruptured HNP
- Curet

MS Kang
**Measured Data**

- Demographic & Preoperative data: gender, age, body mass index, & ASIA class.
- Clinical outcomes at preoperative & at 2 days, 1, 6, & 12 months after surgery.
  - Visual analogue scale (VAS),
  - Oswestry Disability Index (ODI),
  - Modified MacNab’s criteria.
- Operative Data:
  - The operation time (skin to skin), Amount of surgical drain,
  - Length of hospital stay (LOS; the duration of hospital stay after operation),
  - Kinetics of serum creatine phosphokinase (CPK) and C-reactive protein (CRP)
- Surgical-related complications
## Results

### Demographic and Perioperative Data

<table>
<thead>
<tr>
<th></th>
<th>Biportal Endoscopic</th>
<th>Open Microscopic</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>30</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>50.93 ± 13.25</td>
<td>49.55 ± 10.94</td>
<td>0.635</td>
</tr>
<tr>
<td>Gender = M/F</td>
<td>17/13</td>
<td>22/17</td>
<td>0.998</td>
</tr>
<tr>
<td>Height</td>
<td>161.6 ± 8.25</td>
<td>160.2 ± 8.58</td>
<td>0.588</td>
</tr>
<tr>
<td>Weight</td>
<td>65.24 ± 9.23</td>
<td>64.51 ± 8.97</td>
<td>0.645</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>24.98 ± 2.87</td>
<td>25.14 ± 3.01</td>
<td>0.679</td>
</tr>
<tr>
<td>ASA score</td>
<td>1.85 ± 0.40</td>
<td>1.82 ± 0.36</td>
<td>0.852</td>
</tr>
<tr>
<td>Level (%)</td>
<td></td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td>L2-3</td>
<td>1 (3.3%)</td>
<td>0 (0.0%)</td>
<td></td>
</tr>
<tr>
<td>L3-4</td>
<td>3 (10.0%)</td>
<td>5 (12.8%)</td>
<td></td>
</tr>
<tr>
<td>L4-5</td>
<td>17 (56.7%)</td>
<td>22 (56.4%)</td>
<td></td>
</tr>
<tr>
<td>L5-S1</td>
<td>9 (30%)</td>
<td>12 (30.8%)</td>
<td></td>
</tr>
<tr>
<td>Direction = Right/Left</td>
<td>13/17 (43.3%/56.7%)</td>
<td>21/18 (53.8%/46.2%)</td>
<td>0.783</td>
</tr>
</tbody>
</table>

### Clinical Outcomes: VAS & ODI scores

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<th>Biportal Endoscopic</th>
<th>Open Microscopic</th>
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<tr>
<td>Preop</td>
<td>8.00 ± 0.82</td>
<td>7.95 ± 1.19</td>
<td>0.54</td>
</tr>
<tr>
<td>Postop #2days</td>
<td>2.56 ± 0.51</td>
<td>3.50 ± 0.76</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Postop #2weeks</td>
<td>2.25 ± 0.86</td>
<td>2.95 ± 0.69</td>
<td>0.012</td>
</tr>
<tr>
<td>Postop #6weeks</td>
<td>2.00 ± 0.82</td>
<td>2.10 ± 1.05</td>
<td>0.72</td>
</tr>
<tr>
<td>Postop #3months</td>
<td>1.94 ± 0.57</td>
<td>2.01 ± 0.85</td>
<td>0.41</td>
</tr>
<tr>
<td>Postop #6months</td>
<td>2.00 ± 0.63</td>
<td>2.00 ± 1.08</td>
<td>0.87</td>
</tr>
<tr>
<td>Postop #12months</td>
<td>1.75 ± 0.50</td>
<td>1.63 ± 0.44</td>
<td>0.68</td>
</tr>
<tr>
<td>Visual analog Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preop</td>
<td>71.03 ± 4.40</td>
<td>72.10 ± 6.22</td>
<td>0.56</td>
</tr>
<tr>
<td>Postop #2weeks</td>
<td>39.27 ± 4.28</td>
<td>52.50 ± 7.85</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Postop #6weeks</td>
<td>27.65 ± 2.49</td>
<td>30.40 ± 5.90</td>
<td>0.027</td>
</tr>
<tr>
<td>Postop #3months</td>
<td>25.38 ± 3.21</td>
<td>26.77 ± 5.06</td>
<td>0.63</td>
</tr>
<tr>
<td>Postop #6months</td>
<td>22.38 ± 4.01</td>
<td>24.77 ± 4.56</td>
<td>0.37</td>
</tr>
<tr>
<td>Postop #12months</td>
<td>21.53 ± 3.56</td>
<td>23.02 ± 5.22</td>
<td>0.32</td>
</tr>
<tr>
<td>Oswestry Disability Index (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
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Results

**Complications**
- Incidental durotomy: 1 case in BE-LRD, two cases in OM-LRD
- There was no recurrence in either group during the follow-up period.
Discussion

• Micro-LD is a predictable and successful surgical option for symptomatic LDH.

• However, Micro-RLD is known to be acceptable but inferior to Micro-LD
  • Because, RLD required more extensive surgical dissection,
  • more paravertebral muscle retraction,
  • resection of vertebral posterior arch and facet joint due to the existence of peridural fibrotic tissue,
  • the risk of secondary instability and persisted postsurgical pain increases.


• Kang T et al, reported in retrospective review of 262 patients who had diagnosed symptomatic primary lumbar disc herniation that BE-LD is obtained satisfactory clinical outcomes regardless the grade of disc migration

Discussion

• Choi KC et al, prospectively evaluated the surgical invasiveness following the minimally invasive technique of lumbar discectomy through the kinetics of CPK and CRP.
  • CPK: reached a maximum on POD #1, and returned to normal range on POD #3 in all techniques.
  • CRP: reached a maximum on POD #3, and returned to normal range on POD #5 in endoscopic techniques, but POD #7 in microscopic technique.

• In our study, Both BE-RLD and OM-RLD were obtained satisfactory outcomes.
  • But significant difference the VAS, ODI, & modified MacNab’s criteria for early postoperative period
  • Significant difference the kinetics of CPK & CRP
  • No difference the surgical related complications

Conclusion

• BE-LRD yielded similar outcomes to OM-LRD, including pain and functional improvement, and patient satisfaction.

• However, a faster pain relief, early functional recovery, & high patient satisfaction were observed in BE-LRD.

• Therefore, it can be said that biportal endoscopic technique is an effective treatment option for recurrent lumbar disc herniation.
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My disclosure is in the EUROSPINE Program Book

None of the authors has any potential conflict of interest