There was a total of 35 cases of patients diagnosed with Cauda Equina Syndrome and undergone spinal operation between March 2018 to March 2019 in Hospital Sungai Buloh, Malaysia. Out of this, Cauda Equina Syndrome (CES) is deemed a surgical emergency that require urgent decompression [2]. Conventionally, open procedures with wide bilateral laminectomy, facetectomy and discectomy was done which may result in instability due to disruption of posterior ligamentous complex [3]. Different techniques has been introduced to preserved the integrity of the posterior ligamentous structures and one of them is by using spinous process osteotomy to gain access to region of pathology. Thus, the main objective of this study is to analyse the clinical outcome of using spinous process osteotomy technique for spinal canal decompression in cases of cauda equina syndrome.

**Method:** This is a retrospective study conducted between March 2018 until March 2019. Cases of Cauda Equina Syndrome treated with spinous process osteotomy, wide laminectomy, decompression and discectomy without instrumentation will be included in this study. Owestry Disability Index (ODI) and outcome of patients will be studied.

**Result:** 5 cases were found during the study period. All patients have shown marked improvement in terms of neurology and ODI score.

**Conclusion:** Spinous process osteotomy, wide laminectomy and discectomy can be used effectively for the treatment of Cauda Equina Syndrome. This study intend to be a pilot study in understanding the effectiveness and early outcome of patients treated with this approach. Larger prospective study is needed to provide meaningful comparison between this technique with the conventional approach used in treatment of Cauda Equina Syndrome.

**Keywords:** Cauda Equina Syndrome, Spinous process osteotomy, Posterior ligamentous complex
cohort, only 5 patients underwent open laminectomy and discectomy with spinous process osteotomy for preservation of posterior ligamentous complex. The demographic data, comorbidities, neurology during presentation, duration of symptoms prior to admission, time from admission to surgery, operating time, blood loss, length of hospital stay and complications are presented in Table 1. Age of these patients ranges from 24 to 43 (Mean age of 31.2) and all were operated by single same surgeon. All patients had large central disc herniation either at L4/L5, L5/S1 or both regions [Figure 1]. Onset of symptoms to surgery range from 2 days to 2 weeks. All patients have severe back pain, saddle anaesthesia, urinary incontinence and bowel incontinence upon presentation while two of them has foot drop of right lower limb. Mean operating time for the surgery ranges from 1 hour 15 min. to 3 hours. All patients were permitted to sit up on first day after operation and allowed to ambulate as tolerated on the second day. All patients were able to walk on day 2 or day 3 post operatively. Lumbosacral orthosis was used until one month after surgery. No peri-operative complications were observed. Only one patient has superficial surgical site infection and resolved with antibiotics and debridment. Mean follow up time was 6 months. Neurological improvement was observed in all patients. All patients have more than 50% reduction in Owestry Disability Index score. [Figure 2]

**Discussion**

Description about lumbar spinous process osteotomies as a surgical procedure to increase surgical exposure in unilateral and bilateral laminotomy has been described by Yong-Hing et al as early as 1978 [1]. In his paper, the author described a unilateral approach by stripping the paraspinal muscles on the affected side followed by osteotomy of the spinous process using a curved osteotome. The spinous process is displaced by using a self-retaining retractor to permit better visualization of the lateral recess. The spinous process will return to its initial position after removing the retractor and bony union at the osteotomy site of the spinous process was observed.

Multiple studies have shown that conventional open approach for spinal surgery could cause paraspinal muscle damage, atrophy and denervation. Waschke et al in his study has shown significant denervation activity, reduced muscle recruitment and reduced paraspinal muscle volume 1 year after open lumbar interbody fusion by using electromyography and computed-tomography volumetric investigation [4]. Few other studies have also shown that these parameters significantly influence trunk muscle performance and correlate with physical outcome of the spinal surgery [4,5]. The importance of maintaining the integrity of the posterior ligamentous complex has also been highlighted in a study by Chen LH et al. Interspinous ligament integrity is essential in preventing adjacent segment instability [6]. Thus, it is understandable that surgical approach by using spinous

### Table 1: Demographic data of patients who underwent laminectomy, discectomy and spinous process osteotomy with preservation of posterior ligamentous complex.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Patient A</th>
<th>Patient B</th>
<th>Patient C</th>
<th>Patient D</th>
<th>Patient E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>33</td>
<td>40</td>
<td>26</td>
<td>24</td>
<td>42</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td>Female</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Comorbidities</td>
<td>Nil</td>
<td>Diabetes mellitus / Hypertension</td>
<td>Bronchial Asthma</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Neurology</td>
<td>Back pain and CES</td>
<td>Back pain + CES + Foot drop</td>
<td>Back pain + CES</td>
<td>Back pain + CES + foot drop</td>
<td>Back pain + CES</td>
</tr>
<tr>
<td>Duration of symptoms prior to admission</td>
<td>2 days</td>
<td>2 days</td>
<td>2 days</td>
<td>14 days</td>
<td>4 days</td>
</tr>
<tr>
<td>Time to surgery since admission</td>
<td>1 day</td>
<td>2 days</td>
<td>1 day</td>
<td>5 days</td>
<td>2 days</td>
</tr>
<tr>
<td>Surgery Time</td>
<td>75 mins</td>
<td>120 mins</td>
<td>95 mins</td>
<td>70 mins</td>
<td>60 mins</td>
</tr>
<tr>
<td>Blood loss</td>
<td>100 cc</td>
<td>300 cc</td>
<td>200 cc</td>
<td>100 cc</td>
<td>100 cc</td>
</tr>
<tr>
<td>Length of hospital stay</td>
<td>5 days</td>
<td>9 days</td>
<td>5 days</td>
<td>6 days</td>
<td>6 days</td>
</tr>
<tr>
<td>Complications</td>
<td>None</td>
<td>SSI</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
From this small case series, we conclude that this surgical technique appears to be a safe and viable approach for decompression of Cauda Equina Syndrome. However, a larger group of patients and a longer follow up is needed in order to ensure statistically significant data.

Process osteotomy could potentially minimize the damages to these posterior structures. Weiner et al in his study on follow up of patients who undergone lumbar decompression using similar approach has found an average 47% improvement of Low Back Outcome Score and 66% of pain reduction [7]. Similar clinical improvements can be found in our study where all patients reported more than 50% reduction in Oswestry Disability Index score. However, Erland et al has investigated the union rate of spinous process after osteotomy and only 44% of the studied cohort were found to have a united spinous process after mean follow up of 21 months [8].

Gun WL et al has found that both spinous process osteotomy and spinous process splitting techniques for posterior decompression in lumbar spine stenosis offer good clinical and radiological outcome during the first year follow up after the surgery [9]. Majority of the studies which utilize this surgical method has been done on patients who suffered from lumbar spine stenosis [7-9].

We think that similar technique could be used in decompression surgery for Cauda Equina Syndrome due to its simplicity and clinical advantages which have been reported. Various minimal invasive and percutaneous endoscopic lumbar posterior decompression and discectomy has been described over the past few years in treatment of Cauda Equina Syndrome, however these procedures require special instrumentation and a steep learning curve [10]. Spinous process osteotomy, posterior decompression and discectomy can be done with just Kerrison punch, large curve osteotome, nerve root retractor and pituitary forceps which is available in most hospital. The authors believe that this is one of the first study describing the use of this technique in treating Cauda Equina Syndrome.

Conclusion

From this small case series, we conclude that this surgical technique appears to be a safe and a viable approach for decompression of Cauda Equina Syndrome. However, a larger group of patients and a longer follow up is needed in order to ensure statistically significant data.

References


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Source of Support: NIL