

Wide Open Laminectomy, Posterior Decompression and Discectomy in Lumbar Spine with Preservation of Posterior Ligamentous Complex in Cauda Equina Syndrome - Case Series, Early Outcome and Literature Review

Ong Kean Loong¹, Ng Bing Wui², Thuraikumar Kanniah¹, Wang Chee Seiang¹,
Lim Sze Wei¹, Nor Azlin Zainal Abidin¹

Abstract

Introduction: Spinous process osteotomy has been described as an alternative approach to allow better visualization during laminectomy and decompression of the spinal cord in cases of lumbar spinal stenosis. In this study, the authors describe the experience and early outcome of using this technique in treatment 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. Oswestry 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

Introduction

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.

Methodology

This is a retrospective study conducted between March 2018 until March 2019. All patients who were diagnosed with Cauda Equina Syndrome and undergone spinous process osteotomy, laminectomy and discectomy without instrumentation will be included in this study. Patients details and data such as duration of onset of symptoms prior to admission, duration between admission to surgery, operating time, post-operative neurological recovery, pain score and

Owestry Disability Index during follow-up were obtained from review of operating theater registry and individual patients' case notes and clinic notes. Exclusion criteria include patients who were diagnosed with Cauda Equina Syndrome and underwent open laminectomy, facetectomy and discectomy with removal of posterior ligamentous complex.

Result

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

¹Spine unit, Department of Orthopaedic, Hospital Sungai Buloh, Malaysia.

²Department of Orthopaedic, Hospital Segamat, Malaysia.

Address of Correspondence

Dr. Ng Bing Wui,
Spine unit, Department of Orthopaedic, Hospital Sungai Buloh, Malaysia.
Email : bingwui@gmail.com



Dr. Ong Kean Loong



Dr. Ng Bing Wui



Dr. Thuraikumar Kanniah



Dr. Wang Chee Seiang



Dr. Lim Sze Wei



Dr. Nor Azlin Zainal Abidin

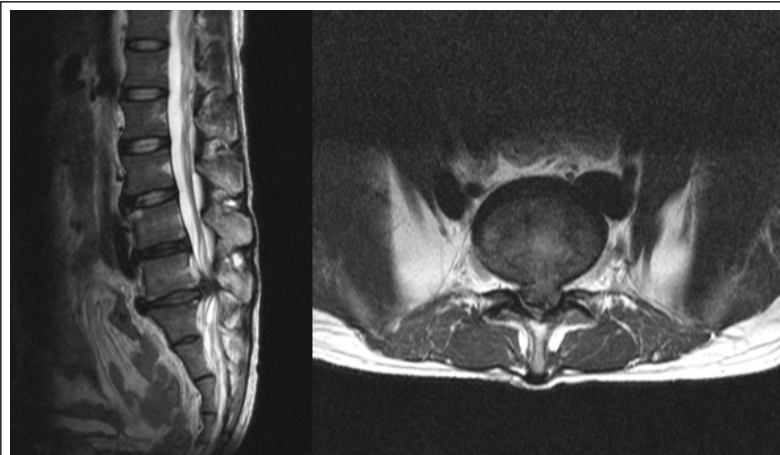


Figure 1: L5/S1 central disc herniation causing severe nerve root impingement.

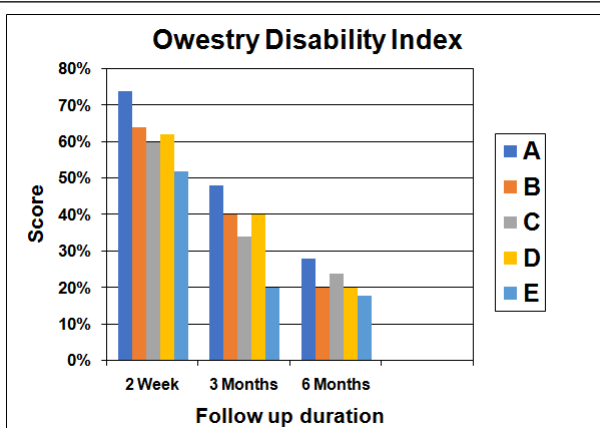


Figure 2: Owestry Disability Index scored by patients during follow up post-surgery.

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 debridement. 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.					
Variables	Patient A	Patient B	Patient C	Patient D	Patient E
Age	33	40	26	24	42
Gender	Male	Female	Female	Female	Male
Comorbidities	Nil	Diabetes mellitus / Hypertension	Bronchial Asthma	Nil	Nil
Neurology	Back pain and CES	Back pain + CES + Foot drop	Back pain + CES	Back pain + CES + foot drop	Backpain + CES
Duration of symptoms prior to admission	2 days	2 days	2 days	14 days	4 days
Time to surgery since admission	1 day	2 days	1 day	5 days	2 days
Surgery Time	75 mins	120 mins	95 mins	70 mins	60 mins
Blood loss	100 cc	300 cc	200 cc	100 cc	100 cc
Length of hospital stay	5 days	9 days	5 days	6 days	6 days
Complications	None	SSI	None	None	None

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

1. Yong-Hing K, Kirkaldy-Willis WH. Osteotomy of lumbar spinous process to increase surgical exposure. *Clinical orthopaedics and related research*. 1978(134):218-20.
2. Dhatt S, Tahasildar N, Tripathy SK, et al. Outcome of spinal decompression in cauda equina syndrome presenting late in developing countries: case series of 50 cases. *Eur Spine J* 2011; 20:2235–2239.
3. Gitelman A, Hishmeh S, Morelli BN, Joseph SA Jr, Casden A, et al. (2008) Cauda equina syndrome: a comprehensive review. *Am J Orthop (Belle Mead NJ)* 37: 556-562
4. Waschke A, Hartmann C, Walter J, Dünisch P, Wahnschaff F, Kalff R, Ewald C. Denervation and atrophy of paraspinal muscles after open lumbar interbody fusion is associated with clinical outcome—electromyographic and CT-volumetric investigation of 30 patients. *Acta neurochirurgica*. 2014 Feb 1; 156(2):235-44.
5. Kim DY, Lee SH, Chung SK, Lee HY. Comparison of multifidus muscle atrophy and trunk extension muscle strength: percutaneous versus open pedicle screw fixation. *Spine*. 2005 Jan 1; 30(1):123-9.
6. Chen LH, Lai PL, Tai CL, Niu CC, Fu TS, Chen WJ. The effect of interspinous ligament integrity on adjacent segment instability after lumbar instrumentation and laminectomy—an experimental study in porcine model. *Bio-medical materials and engineering*. 2006 Jan 1; 16(4):261-7.
7. Weiner BK, Fraser RD, Peterson M. Spinous process osteotomies to facilitate lumbar decompressive surgery. *Spine*. 1999 Jan 1; 24(1):62-6.
8. Erland Hermansen, Gunnar Moen et al. Spinous Process Osteotomy to Facilitate the access to the spinal canal when decompressing the spinal canal in patients with lumbar spinal stenosis. *Asian Spine Journal*. 2014 Apr; 8(2): 138-144
9. Gun WL, Myun WA. Comparative study of two spinous process osteotomy techniques for posterior decompression surgery in lumbar spinal stenosis. *European spine journal* 2018
10. Namboothiri S, Gore S, Raja P (2016) Novel Surgical Technique for Discogenic Cauda Equina Syndrome - Transforaminal Intra Discal Access by Annulotomy outside Central Spinal Canal. *J Spine S7:008*. doi:10.4172/2165-7939.S7-008

Conflict of Interest: NIL
Source of Support: NIL

How to Cite this Article

Loong OK, Wui NB, Kanniah T, Seiang WC, Wei LS, Abidin NAZ | Wide Open Laminectomy, Posterior Decompression and Discectomy in Lumbar Spine with Preservation of Posterior Ligamentous Complex in Cauda Equina Syndrome - Case Series, Early Outcome and Literature Review | *International Journal of Spine* | January-June 2020; 5(1):9-11.