# Laminectomy and Postero-Lateral Mass Plating for Multilevel Cervical Spondylotic Myelopathy

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*There are many procedures in treating patients with multilevel cervical spondylotic myelopathy (CSM). Successful treatment of multilevel CSM requires adequate decompression and stability of the cervical spine that prevents further neurological deterioration. Multilevel laminectomy and instrumentation with lateral mass plates is associated with minimal morbidity, provides excellent decompression of the spinal cord, produces immediate stability of the cervical spine, prevents kyphotic deformity, and precludes further development of spondylosis at fused levels.Neurological outcome is equal or superior to multilevel anterior procedures because of minimal complication and prevent spinal deformity associated with laminoplasty or noninstrumented laminectomy. From the study of 7 patients with multilevel CSM who were treated with multilevel laminectomy and posterolateral mass plating. The neurological outcome of all 7 patients was improved without complications after follow-up for 6 months.*

***Keywords :*** *Postero-lateral mass plating, Cervical spondylotic myelopathy, Ossified posterior longitudinal ligament (OPLL), Myelopathy grade*

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Cervical spondylotic myelopathy is a chronic disease that causes progressive cord compression by spondylotic spurs and disc herniation. The earliest methods used to decompress the spinal cord of this disease consisted of multiple laminectomies, that making instability of the spine. Poor results were often seen after these procedures, with significant incidences of neurological deterioration when the kyphosis or instability was met[1-5]. The anterior approach with decompression and placement of bone grafts at multilevels causes pseudoarthrosis. In addition, multilevel vertebrectomies with anterior instrumentation was associated with a significant rate of graft dislodgment, anterior plate failure, and neurological deterioration[6-10]. Outcome comparisons between laminectomy and anterior decompression and fusion have found no clear superiority for either procedure[11]. Laminoplasty, also proposed to decrease instability with decompression, however, affords little immediate stability and may permit the development of progressive kyphosis[12-14]. Laminectomy with postero-lateral mass plating produces immediate stability of the decompressed levels, thus preventing the development of kyphosis and making further growth of compressing osteophytes unlikely to occur. In the present study the author evaluated the risks and clinical outcomes of patients with multilevel cervical spondylotic myelopathy who underwent cervical laminectomies with postero-lateral mass plating.

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## Material and Method

Patients who were diagnosed with multilevel cervical spondylotic myelopathy and were treated with multilevel cervical laminectomy and immediate stabilization with lateral mass plates in the year 2003 were included in Thailand. Inclusion criteria was that patients must have cervical spondylosis at three or more motion segments with or without ossified posterior longitudinal ligament (OPLL), and clinical findings consistant with myelopathy. Patients who had traumatic cervical spine injury were excluded. Seven patients met the inclusion criteria, and follow-up of at least 6 months. Of the 7 patients, there were 6 men and 1 woman with a mean age of 64 years (range, 53-74years).

**Table 1.** Chief complaint and presenting symptoms and signs

| No | Age | Sex | Chief complaint | Duration of onset (month) | Presenting signs | Myelopathygrade |
|---|---|---|---|---|---|---|
| 1 | 53 | Male | Numbness of both legs | 3 | Tetraparesis,Hypereflexia, Spastic gait,barbinski+ve | 3C |
| 2 | 62 | Female | Weakness of both legs | 2 | Tetraparesis,counldn't walk | 4 |
| 3 | 62 | Male | Numbness of both arms | 1 | Tetraparesis,Neckpain | 3A |
| 4 | 69 | Male | Numbness of all extremities | 2 | Tetraparesis,Hypereflexia, Spastic gait | 3A |
| 5 | 66 | Male | Neck pain | 5 | Tetraparesis,counldn't walk, barbinski+ve | 4 |
| 6 | 74 | Male | Weakness of both hands | 5 | Tetraparesis,Hypereflexia, Spastic gait | 3A |
| 7 | 68 | Male | Weakness of both legs | 4 | Tetraparesis,Hypereflexia, counldn't walk | 4 |

***Preoperative neurological symptoms and signs***

All patients reported here had symptoms and signs of myelopathy, and mean duration of onset was 3 months (range 1-5 months). The chief complaint, the presenting symptoms and signs, and duration of onset are shown in Table 1. All 7 patients presented with tetraparesis. 3 (43 %) of 7 patients could not walk,the other four (57%) had difficulty with walking. Specific signs detected were hypereflexia in 4 (57%) of 6 patients,spastic gait (57%), barbinski sign (29%).

Myelopathy grades were defined using a modification of the method presented by Harsh et al[15]. It was the measurement of myelopathy and defined primarily by lower extremity function (Table 2). All of the 7 patients had myelopathy grade, 3 cases were grade 3A, 1 case was grade 3C, and 3 cases were grade 4.

***Preoperative imaging***

Preoperative plain cervical spine radiograph and MRI of the cervical spine was performed in all of the patients. The cervical alignment was assessed by calculating the curvature index (CI) with the method described by Ishihara[16] (Fig. 1). The mean preoperative CI of the patients was 4.2 (range, -0.23 to +10). Signal change in the spinal cord was detected on sagittal $T_2$ - weighted MRI scans in 2 (29%) of 7 patients. OPLL was found in 2 (29%) cases, Spondylosis was the compressive pathology in 5 (71%) of 7 patients, and both OPLL and spondylosis in 2 (29%) of 7 patients.

**Table 2.** Myelopathy grade representration of the patients

| | |
|---|---|
| Myelopathy grade 0 | = no evidence of myelopathy |
| Myelopathy grade 1 | = able to run but abnormal strength, toneor reflexes revealed by examination |
| Myelopathy grade 2 | = difficulty in running or climbing stairs |
| Myelopathy grade 3A | = difficulty in walking,independent but unsteady |
| Myelopathy grade 3B | = dependent on cane or crutch |
| Myelopathy grade 3C | = dependent on walker or assistant |
| Myelopathy grade 4 | = difficulty in standing |

***Operative technique***

After intubation, the patient was prone in the head rest. Incision was made in the mid-line cervical region. Paraspinal muscle was retracted to lateral of both sides. The facet joints and lateral

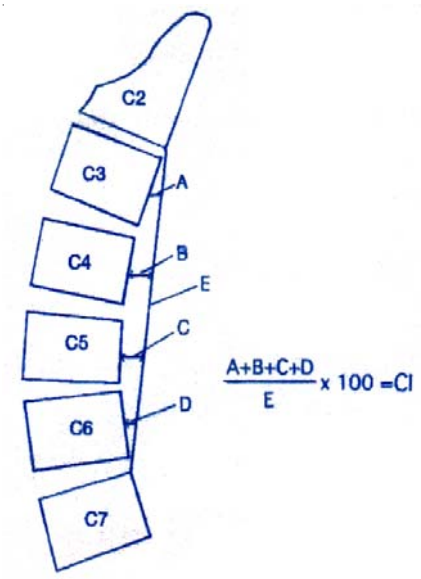


**Fig. 1** Method for calculating the CI

masses were identified, and holes were drilled in the lateral masses bilaterally with the technique described by Magerl and Seeman[17]. If $C_2$ was included in the laminectomy for decompression, holes were also placed in the $C_2$ pedicles. Axis bone plates of appropriate size were selected and bent to match the contour of the lateral masses. The bone plates were then secured to the lateral masses by use of 14 mm - long screws, 3.5mm in diameter. Then laminectomy was done from $C_7$ to $C_3$ totally and to $C_2$ if $C_2$ needed laminectomy for decompression. The ligamentum flavum was removed. Reduvac drain was inserted, and the wound was closed in standard fashion. A cervical collar was used for maintenance for 2 months.

## Results

The levels of laminectomy were $C_7$-$C_3$ in 6 cases, except in 1 case $C_2$ level was included in laminectomy for decompression. The average operating time was 3.3 hours (range, 2-4.5 hours). The average anesthesia-estimated blood loss was 450 ml (range, 150-550ml). The mean hospital stay was 17 days (range, 8-28 days).

### *Postoperative clinical data*

All of the 7 patients (100%) experienced good outcome. No patient demonstrated neurological deterioration outcome. All patients had improved sensation and better movement of the extremities. The myelopathy score improved in all cases especially in the cases of myelopathy grade 3 which improved to grade 2. In grade 4, one improved to grade 3A, the other two that had signal change in the spinal cord improved to grade 3C (Fig. 2).

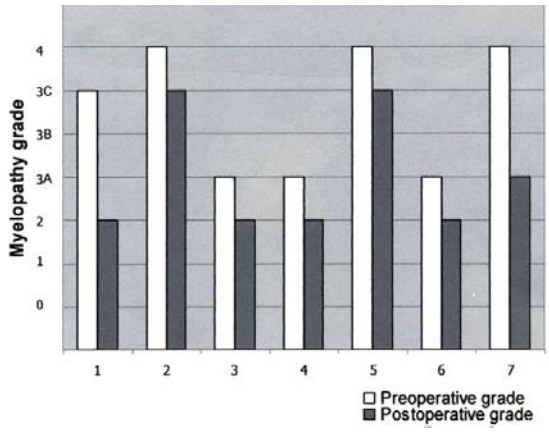


**Fig. 2** Comparison of the preoperative and postoperative myelopathy grade

### *Postoperative image*

The patients were sent for plain radiography and MRI of the cervical spine postoperation (Fig. 3). The cervical index was not changed and no kyphotic deformity developed after follow-up for 6 months. There was no screw back out or broken and no plate breakage or plate pull-away from the lateral masses. Furthermore, there was no radiographic evidence of compression from scar tissure posterior to the spinal cord in any patient.

There was no complication in any patient except one case who had a superficial wound infection successfully treated with orally administered antibiotics. There was no injury to exiting nerve roots or vertebral arteries.

## Discussion

Successful treatment of cervical spondylotic myelopathy requires adequate decompression and prevention of neurological deterioration and later instability that could cause delayed injury to the spinal cord.

The author thinks that posterior cervical plating will prevent the development of kyphotic deformity. Avoidance of spinal deformity and maintenance of alignment are the most important reasons for excellent outcome. The nuchal masculature acts as an important posterior tension band and stabilizes the cervical spine in lordosis. Because detachment of these muscles after laminoplasty can result in significant atrophy[18,19], it is not surprising that patients with uninstrumented laminoplasty or laminectomy may develop kyphosis[20,21]. Although in the present report, there were only 7 patients and duration of follow-up was 6 months, clinical signs improved in all the patients and there were no complications. In the presented cases, the neurological outcome of patients treated with multilevel laminectomy and posterior cervical plating compares favorably with that reported in a series of patients with myelopathy treated with anterior decompression or laminoplasty[8,9,22].

## Conclusion

Multilevel laminectomy with posterior lateral mass plating is an easy procedure with a low number of complications, relatively low blood loss, and short operative time. It provides excellent decompression of the spinal cord, produces immediate stability of the cervical spine, prevents kyphotic deformity, and probably precludes further development of spondy-

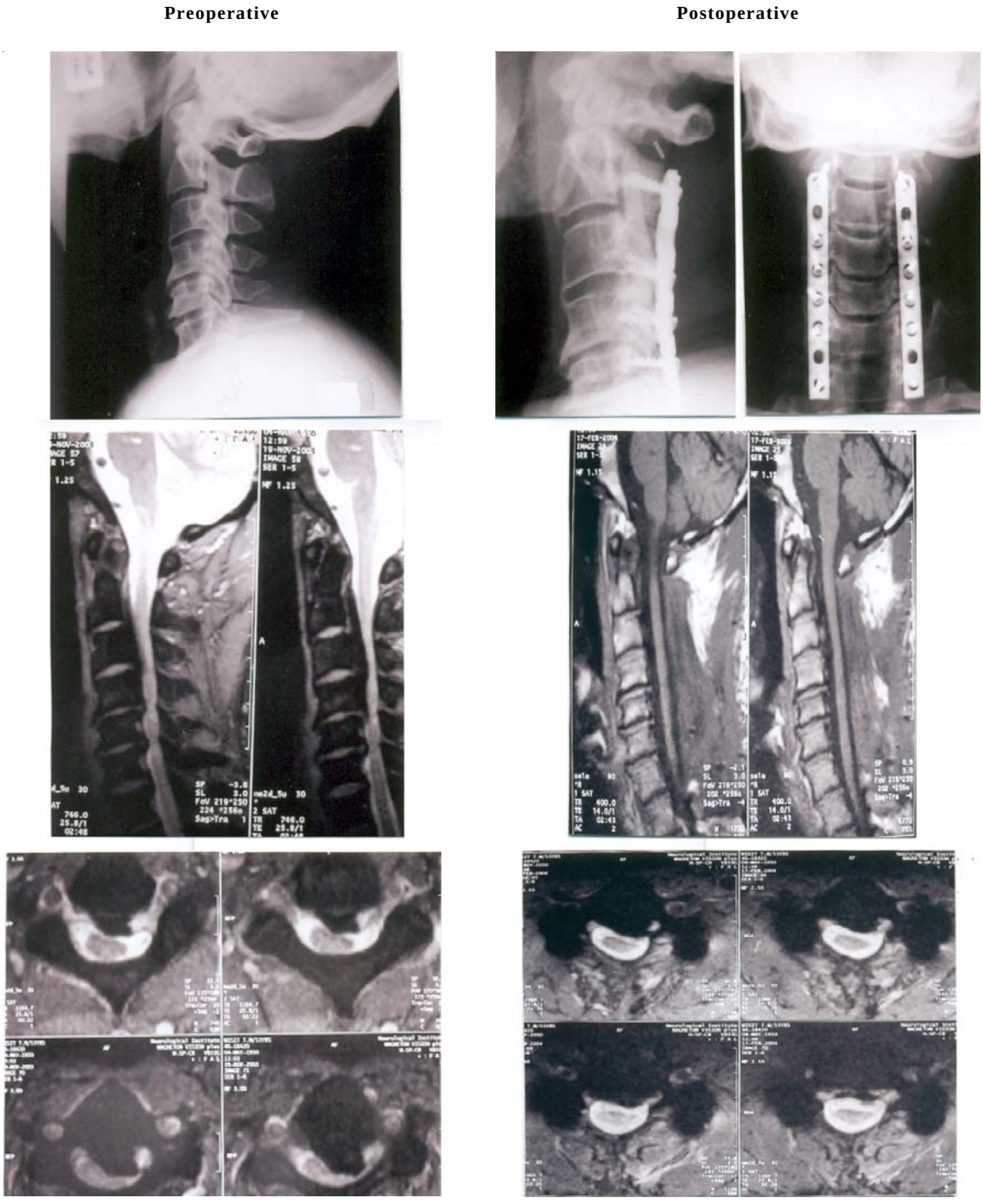


**Fig. 3** Preoperative and postoperative radiographic and MRI of the cervical spine

Note OPLL and CSM of the cervical spine compressed the spinal cord pre-operatively (Left)
The cervical cord was decompressed post-operatively (Right)

losis at fused levels. Neurological outcome is equal or superior to that of multilevel anterior procedures and avoids many of the complications seen with extensive anterior decompressive procedures.

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# การผ่าตัดผู้ป่วย Multilevel Cervical Spondylotic Myelopathy ด้วยวิธี Laminectomy และยึดตรึงกระดูก Lateral mass ของกระดูกต้นคอด้วย Plate

**สวิง ปันจัยสีห์**

*มีวิธีการหลายวิธีในการรักษาผู้ป่วยที่มาด้วยเรื่อง Multilevel Cervical Spondylotic Myelopathy (CSM) แต่การรักษาที่ได้ผลที่สุดใน Multilevel CSM นั้นคือ การ Decompression ได้อย่างเต็มที่ และทำให้กระดูก Cervical spine มี Stability เพื่อป้องกัน Neurological Deterioration ในอนาคต การผ่าตัดด้วยวิธี Multilevel Laminectomy และยึดตรึงกระดูก Lateral mass ด้วย Plate มีผลเสียน้อยมาก และได้ Decompression ไขสันหลังได้อย่างดี และทำให้มี Stability ของกระดูก Cervical spine ทันที ดังนั้นจึงป้องกัน Kyphotic deformity และไม่ทำให้เกิด Spondylosis ในอนาคตที่ตรงระดับที่ยึดตรึง*

*ผลการรักษาด้วยวิธีนี้เท่ากับหรือดีกว่า วิธีการผ่าตัดที่เข้าทางด้านหน้า เพราะมีโรคแทรกซ้อนน้อยกว่า และยังป้องกันการผิดรูปร่างของกระดูก Cervical spine ซึ่งมักจะพบร่วมกับวิธีการผ่าตัดLaminoplasty หรือ วิธีการผ่าตัด Laminectomy ที่ไม่ได้ยึดตรึงกระดูกต้นคอ จากรายงานผู้ป่วย 7 ราย ซึ่งเป็นโรค Multilevel CSM และได้รับการรักษาผ่าตัดด้วยวิธี Multilevel Laminectomy และยึดตรึงกระดูก Lateral mass ของกระดูกต้นคอด้วย Plate ผลจากการรักษาด้วยวิธีนี้ พบว่าผู้ป่วยทั้ง 7 ราย มีอาการดีขึ้นและไม่มีโรคแทรกซ้อนหลังติดตามผลเป็นเวลา 6 เดือน*