Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/t5f5d371

CERVICAL LAMINECTOMY WITHOUT STABILIZATION FOR CERVICAL SPONDYLOTIC MYELOPATHY - A SAFE AND EFFECTIVE OPTION?

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Abstract

Introduction-Posterior decompression of the cervical spine without stabilization is an effective treatment option for cervical spondylotic myelopathy in elderly without cervical instability. Laminectomy decompresses the spinal cord by enabling cord fall back. However, the debate as to consider fusion or not, is constant. In this study we aim to assess the clinical outcome of posterior laminectomy without stabilization in elderly patients with cervical spondylotic myelopathy.

Methods-This is a prospective study conducted on 45 patients with cervical spondylotic myelopathy who underwent posterior laminectomy without fusion between 2023 Jan and 2024 Jan. All patients were followed up for a period of one year. Outcome parameters included sensory and motor improvement, assessment of radiculopathy, gait assessment and improvement of spasticity.

Results- Gait disturbance improved in 25 (83%) patients. A total improvement of sensory loss in the LL was seen in 19 cases (68%). Overall improvement of motor deficits was observed in the Upper Limb in 18 Patients (69%) and in the Lower Limb 14 Patients (60%). A total improvement of radicular pain was documented in 16 patients (72%) in upper limb and 6 (60%) in the lower limb.

Conclusion-In older patients without preoperative instability or cervical spine deformity, laminectomy without fusion can be recommended as a safe and successful surgical approach to treat cervical spondylotic myelopathy. Post-operative complications such as neurological deterioration and morbidity are reasonably low. In a significant number of patients, overall improvement of neurological deficits and amelioration of radicular pain can be expected.

Keywords: Cervical Myelopathy, Laminectomy without stabilization, Clinical Outcome

Introduction

Cervical spondylotic myelopathy is an operative challenge to spine surgeons due to the potentially irreversible damage and poor prognosis without timely intervention. The prevalence of cervical spondylotic myelopathy could be as high as 23% [1] [2] among western populations particularly in older patients [3] [4]. There is an increasing trend predicted due to ageing population.

CSM is a progressive condition leading to deformity and spinal cord compression [6] [7]. Clinical features include gait disturbances, spasticity, ataxia, paresthesia, hyperreflexia, radicular pain, weakness or stiffness of the legs, and occasionally neck pain [8].

At the end of the 19th century, Sir Victor Horsley carried out the first spinal decompression surgery [9]. Mummaneni et al. [10] recently evaluated different surgical methods used to treat cervical spondylotic myelopathy, including corpectomy, ventral decompression with or without fusion, and dorsal decompression through laminectomy with or without fusion or laminoplasty, although there is ongoing debate on the best course of action [7].

The common goal of surgery is neuronal decompression while maintaining spinal stability in order to prevent further neurological deterioration and deformity [6].Isolated laminectomy in an indicated group with a positive K line can be considered as the treatment of choice for Cervical spondylotic myelopathy [11] [12].

In this study, we study the functional and neurological outcomes of cervical laminectomy without stabilization for cervical spondylotic myelopathy.

Materials and Methods

Forty-five consecutive patients, presenting with clinically confirmed Cervical spondylotic myelopathy, who underwent dorsal decompression without fusion between 2023 Jan and 2024 Jan were included in this study.

Inclusion Criteria

a) Patients more than 45 years of age
b) Clinically confirmed cervical spondylotic myelopathy with a positive K line on lateral cervical spine Xrays

Exclusion Criteria

a) Patients not willing to give written consent
b) Cervical instability as evidenced on dynamic x-rays
c) Preexisting Cervical Kyphosis
d) Previous Cervical spine surgery

All patients showed cervical stenosis and compression of the spinal cord documented by MRI.

Data was analyzed with Microsoft Excel and SSPS.

The patients' neurological status was obtained through neurological examination. Thorough neurological examination was performed and the following parameters were recorded: gait disturbance, sensory loss, motor deficits, and hyperreflexia. Radiological assessment included pre- and post-surgery (MRI), computed tomography (CT), and plain anteroposterior, lateral, and lateral flexion-extension radiographic views.

Surgical Technique

a) Patient positioned prone on skull tongs, in neutral or slight flexion of neck
b) Posterior midline incision with sub periosteal muscle dissection ensuring hemostasis
c) High speed burr is used to make lateral gutters between lateral edge of lamina and lateral masses
d) 1 mm Kerrison's is used to nibble off the remnant bone in the gutters
e) Using a dissector, the dura is dissected off all adhesions and laminectomy is completed.

Standard laminectomy from C3-C6 was performed for all case and no instrumentation or graft implantation was performed. (Image 1-4)

Image 1-Pre op MRI

Image 2- Patient positioning

Image 3- Posterior Midline Incision

Image 4 – Post Cervical Laminectomy

Results

Forty-five consecutive patients (30 males and 15 females) underwent dorsal decompression between 2023 Jan and 2024 Jan. The male-female ratio was 2:1 (Chart 1) and the mean age of the patients was 60 ± 12 years old.

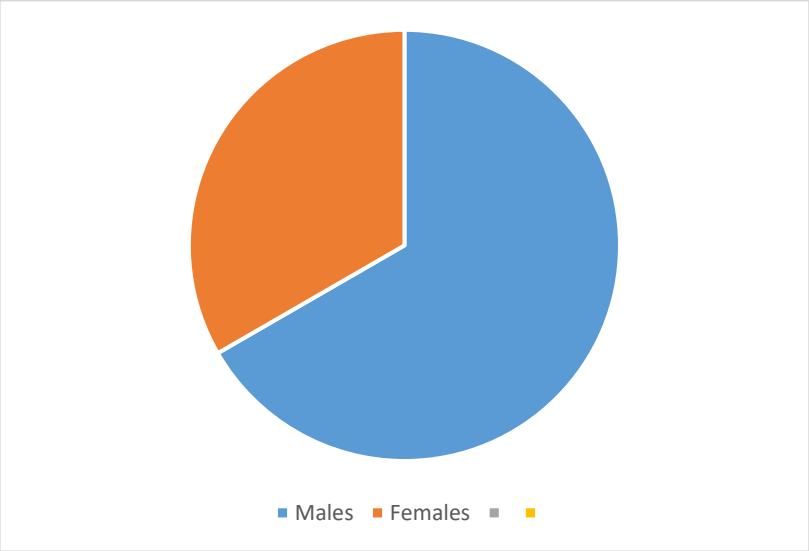

Chart 1- Gender Distribution

The patients presented the following symptoms. Gait disturbances in 30 patients (66%), Sensory loss in the upper limbs in 25 (55%) and in the lower limbs in 28 cases (62%), respectively. Motor deficits, such as spasticity, weakness, or stiffness of the upper limbs, were documented in 26 patients (57%), and 23 patients (51%) presented signs of motor deficits in the lower limbs. Hyperreflexia was found in a total of 42 patients (87%). 22 patients (49%) complained of radicular pain in the upper limbs and 10 (22%) in the lower limbs. (Chart 2)

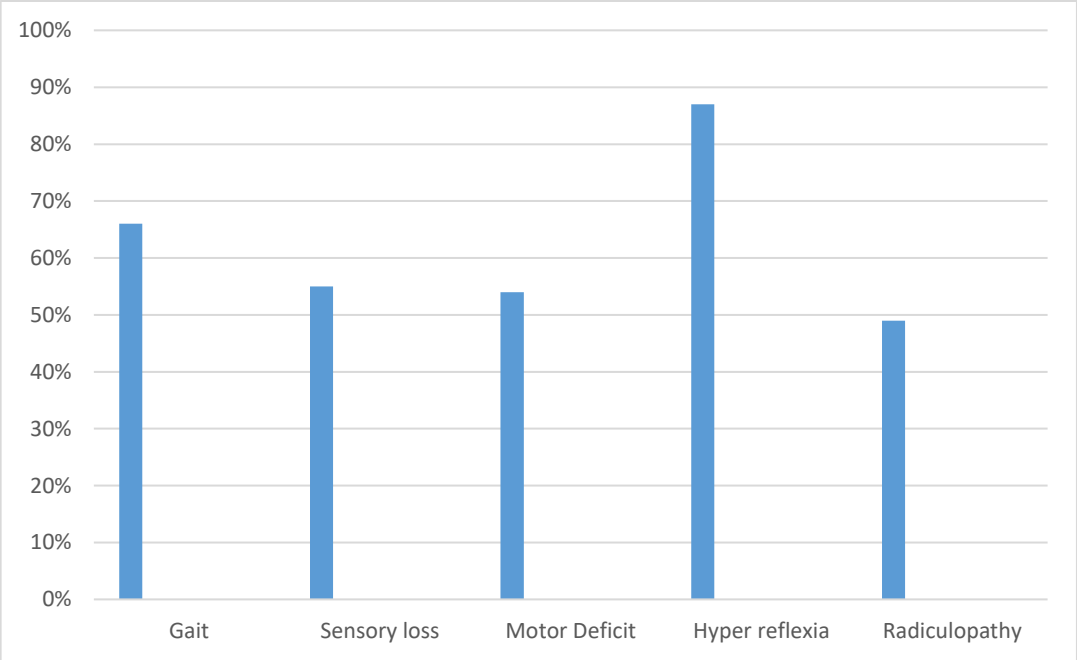

Chart 2- Symptoms and Clinical Findings

The mean duration from the onset of symptoms until the time of surgery was 30 ± 15 weeks. Radiological evaluation showed that in 10 patients (22%) CSM was due to one-level stenosis, in 20 (45%) patients due to two-level stenosis, and in 15 patients (33%) due to three-level stenosis. No signs of instability were documented prior to surgery in the patients included in this series. (Chart 3)

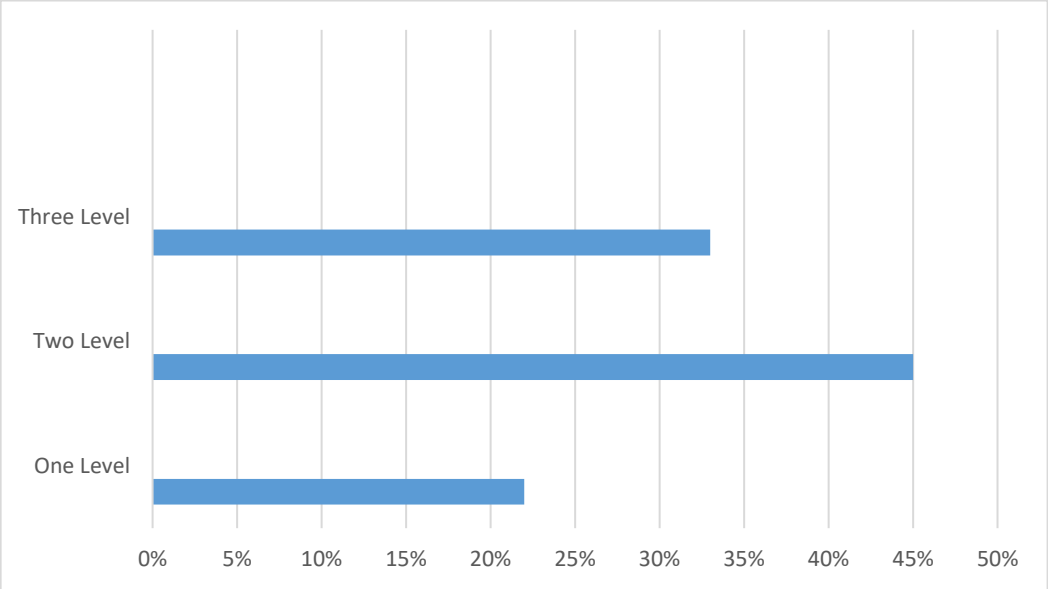

Chart 3 – Levels of stenosis

Follow-up was done at 2 weeks, 4 weeks, and two monthly once for 12 months. Gait disturbance improved in 25 (83%) patients. In a total of 4 (13%) cases no improvement of gait disturbances could be documented. One patient showed a worsening of gait postoperatively.
Sensory loss in the UL showed overall improvement in 18 cases (72%), with improvement in 12(49%) patients and a disappearance of symptoms in 6 (23%) cases.A total improvement of sensory loss in the LL was seen in 19 cases (68%). (Chart 4)

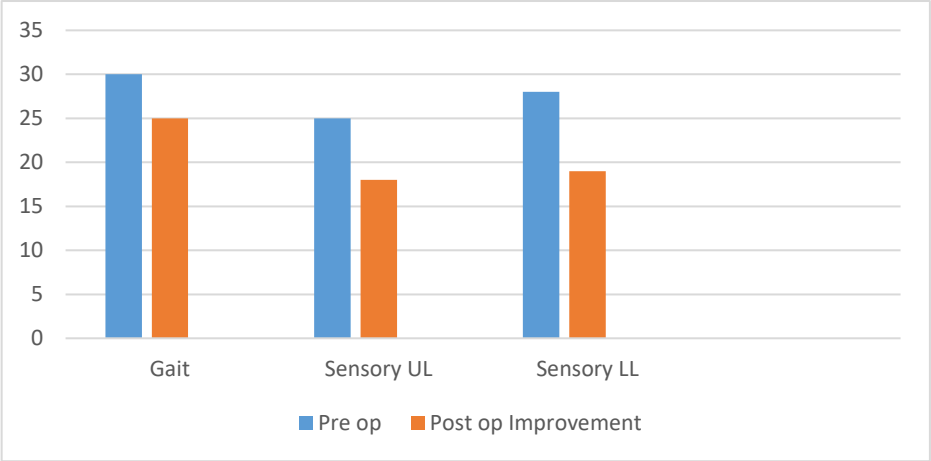

Chart 4 – Pre and post-operative comparison of gait and sensory deficit

Overall improvement of motor deficits was observed in the Upper Limb in 18 Patients (69%) and in the Lower Limb 14 Patients (60%) Motor deficits of the upper limb were unchanged in eight patients and motor deficits of the lower limb were unchanged in nine patients. 1 patient's motor deficits of the LL showed further deterioration postoperatively. 26 patients (62%) with hyperreflexia showed improvement post operatively and two patients returned to normal reflexes at the end of 1 year. (Chart 5)

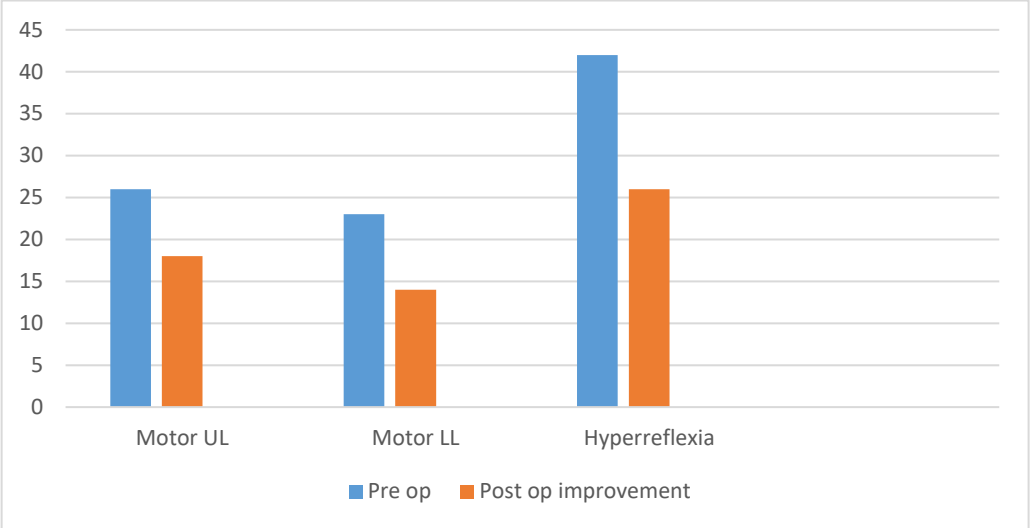

Chart 5- Pre and post-operative comparison of motor deficits.

A total improvement of radicular pain was documented in 16 patients (72%) in upper limb and 6 (60%) in the lower limb. Four patients with radicular pain in the upper limb and two patients with pain in the lower limb presented no radicular symptoms after surgery.
One patient (4.5%) developed postoperative kyphosis including which a total of 3 patients (13.5%) underwent reoperation. One patient was operated with Anterior Cervical Discectomy and Fusion. Kyphosis was managed with posterior stabilization with lateral mass screws. In this series, superficial wound infection was documented in one patient (4.5%). Perioperative co-morbidities such as pulmonary and respiratory co-morbidities were documented in two patients, urinary tract infection in one patient. There was no perioperative mortality.

Discussion

This study shows that more than 60% of individuals with cervical spondylotic myelopathy experienced an overall improvement in their neurological impairments after receiving laminectomy without fusion. In more than 60% of cases, radicular pain was ameliorated. The risk of postoperative instability was low due to no evidence of preoperative instability or kyphosis and non-violation of facet joints intra operatively.
Though many surgical techniques have been described, there is a debatable controversy as to the recommended technique. In order to develop an evidence-based strategy that takes into account the alternatives and their effectiveness in the surgical treatment of CSM, Mummaneni et al. recently examined data published between 1966 and 2007 [10]. The authors came to the conclusion that the two surgical treatment choices for CSM were laminectomy and anterior methods, such as anterior cervical corpectomy with fusion (ACCF) and anterior cervical decompression with fusion (ACDF).
The various pathogeneses that can cause CSM must always be taken into account by the surgeon when choosing a treatment. Patients with absolute cervical stenosis (less than 10 mm canal diameter) will exhibit symptoms in their 40s and 50s [14], whereas patients with relative stenosis (10–13 mm canal diameter) will exhibit radiculopathy and CSM in their 50s and 60s [7], according to the pathophysiology of stenosis.
Planning the surgical strategy requires consideration of the patient's age, co-morbidities, and radiological evaluations. According to Hasegawa et al. [15], age may affect the risk of perioperative complications but does not appear to affect the surgical result for patients with CSM. The choice to do a laminectomy without fusion in our series was based on the pre-operative radiological evaluation, which revealed no indications of cervical spine instability, rather than the patient's age (mean age 66± 13 years old).
Despite increased rates of complications such as hoarseness, dysphagia, or plate-related failures necessitating reoperation, anterior decompression has gained popularity among surgeons in recent years. [16] [17].Only one patient developed instability of the cervical spine in our study. In a study

on 58 patients reported by Guigui *et al*. [18], 15% of the patients developed destabilization of the spine postoperatively and three of them underwent resurgery.

Dorsal decompression has been the surgical choice over many decades, especially in elderly patients suffering from cervical spondylotic myelopathy. The effectiveness of laminectomy, with or without fusion, and laminoplasty in treating cervical spondylotic myelopathy caused by ossification of the ligamentum flavum has been demonstrated on multiple occasions. Posterior laminectomy is a method of indirect decompression which qualifies for the treatment of multi-level cervical spondylotic myelopathy [17].

According to Bapat et al. [19], the clinical results following anterior or posterior surgery are similar for multilevel cervical spondylotic myelopathy. Anterior surgery has a higher rate of complications. On the other hand, laminoplasty patients report more persistent axial pain. Following dorsal decompression for CSM, the observed result was consistent with the findings that were described by Arnold et al Of 44 patients treated with laminectomy, 77% exhibited early improvement (within six months) and 52% show late improvement (mean: eight years)

According to a research by Bapat et al. [19] involving 129 patients having either anterior or posterior decompression, 73% of cases treated by laminectomy exhibit improvement. According to reports from the 1970s and 1980s, recovery rates ranged from 42% to 92%, indicating a favorable outcome [13] [18]. 9.2% of patients require reoperations due to surgical failure, which is characterized by the continuation or exacerbation of symptoms or neurological impairments. This number is comparable to other research that shows failure or complication rates ranging from 6% to 38%. [23].

Conclusion

In older patients without preoperative instability or cervical spine deformity, laminectomy without fusion can be recommended as a safe and successful surgical approach to treat cervical spondylotic myelopathy. Post-operative complications such as neurological deterioration and morbidity are reasonably low. In a significant number of patients, overall improvement of neurological deficits and amelioration of radicular pain can be expected. However, emphasis is to be laid on pre-operative planning including assessment of neurological status and radiological evaluation which play a commendable role in case selection and favorable post-surgical outcomes.

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