Posterior Decompression and Posterior Fusion with Lateral Mass Fixation for Patients with Cervical Spondylotic Myelopathy

A Systematic Review of Literature

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in **Orthopaedic Surgery**

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بسم الله الرحمن الرحيم

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ
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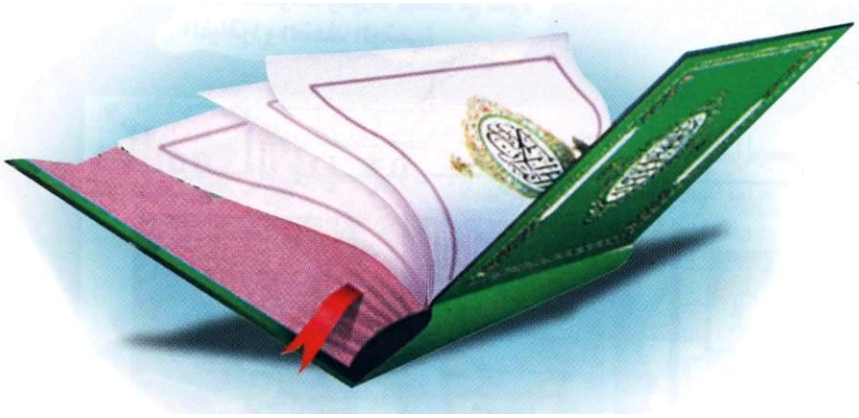

صدق الله العظيم

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List of Abbreviations

Abb.	Full term
CCI	*Cervical curvature index*
CI	*Confidence intervals*
CINAHL	*Cumulative Index to Nursing and Allied Health Literature*
CMA	*Comprehensive Meta-Analysis*
CSF	*Cerebrospinal fluid*
CSM	*Cervical spondylotic myelopathy*
CT	*Computed tomography*
CTM	*CT myelography*
DM	*Diabetes mellitus*
DVT	*Deep Venous Thrombosis*
ECRI	*Emergency Care Research Institute*
EL	*Expansive laminoplasty*
EMG	*Electromyography*
IHD	*Ischemic Heart Disease*
IVD	*Intervertebral Disc*
JOA	*Japanese orthopaedic association*
LF	*Laminectomy and fusion*
LMNL	*Lower motor neuron lesion*
MeSH	*Medical Subject Headings*
mJOA	*Modified Japanese orthopaedic association*
MRI	*Magnetic resonance imaging*
NCS	*Nerve conduction study*
opll	*Ossification of posterior longitudinal ligament*
PE	*Pulmonary Embolism*
RCT	*Randomized controlled trials*
RevMan	*Review Manager*
RR	*Relative risk*
SD	*Standard deviation*
SE	*Standard error*
SEP	*Somatosensory evoked potentials*
UMNL	*Upper motor neuron lesion*
WMD	*Weighted mean differences*

Abstract

"Cervical spondylotic myelopathy is increasingly prevalent in the elderly and is the leading cause of spinal cord dysfunction in this population. Surgical management of patients with multilevel CSM aims to decompress the spinal cord and restore the normal sagittal alignment. Laminectomy with fusion and laminoplasty halt progression of myelopathy in these patients; however, both procedures have well-documented complications and associated morbidity.

Lateral mass plating has become the technique of choice for posterior cervical fixation. Although these systems are safe and reliable, they can be difficult to use in patients with abnormal cervical anatomy; screw placement can be compromised by the fixed hole spacing of the plate; screw back-out and other forms of implant failure can occur."

Key words: Posterior Decompression, Posterior Fusion, Lateral Mass Fixation, Cervical Spondylotic Myelopathy, Systematic Review

INTRODUCTION

Cervical spondylotic myelopathy refers to clinical changes that are frequently related to compression of the spinal cord due to degenerative spinal stenosis. The rate of patients with cervical spondylotic myelopathy increase with aging [(1)].

The prognosis is often poor. With surgical decompression, a stabilization of the neurological deficit or even recovery may take place in the majority of patients. Surgical decompression can be performed either anteriorly, posteriorly or combined and is variably supplemented by additional fusion. For those patients with multilevel cervical myelopathy, many surgical options exist. Anterior cervical discectomy, decompression, and interbody fusion may be used to treat multilevel cord compression, but pseudoarthrosis rates have been shown to be increased in proportion to the number of the levels managed [(2-3)].

Anterior corpectomy and strut grafting, as reported by Bohlman [(4)], are an effective technique; however, when more than one vertebral body is removed the biomechanical durability of this construct has been questioned, even with the addition of plate fixation [(5)].

In these cases additional posterior stabilization may be required. Finally, the complication of graft displacement, although rare, can be catastrophic [(6)]. In CSM patients with

more than 3 affected spinal cord segments, the posterior approach looks better than anterior approach regarding the complications rate especially fusion-related problems with long strut grafts to reconstruct multilevel corpectomies [7].

The posterior surgery techniques for cervical myelopathy have considerably evolved over the past 40 years. In the past, decompressive laminectomy alone was regarded as the gold standard treatment for multilevel cervical myelopathy. However, postlaminectomy complications, such as kyphosis and segmental instability, have required additional fixation using lateral mass screws [8-9].

Recently, laminectomy followed by lateral mass screw placement and fusion (LF) or expansive laminoplasty (EL) are usually performed as a posterior cervical surgery for CSM. Laminectomy followed by fusion is associated with low rates of kyphosis and segmental instability as compared with those for EL. However, LF alters normal cervical biomechanics, as axial and rotational forces are no longer physiologically distributed to subjacent spinal structures [10]. Expansive laminoplasty preserves motion with less substantial alterations to the natural biomechanics of the cervical spine. On the other hand, EL creates less extensive cord decompression as compared with laminectomy and reduces the range of motion to approximately 40% [11].

Advantages of the posterior cervical approach include the familiarity with the surgical procedure, technically easier, with shorter operative times and fewer perioperative complications when compared with an equivalent anterior procedure [(12)]. The risk of swallowing dysfunction or recurrent laryngeal nerve palsy is eliminated with the posterior approach. Finally, posterior fusion techniques eliminate the complications associated with intervertebral strut grafting, such as subsidence or dislodgement, particularly in the osteoporotic patients. Disadvantages of the posterior cervical approach include increased postoperative pain and morbidity because of the denervation and devascularization of the paraspinal muscles [(13)].

Although the theoretical risk of spinal cord injury may be lower with posterior approaches, there are more specific neurologic deficits that are associated with a posterior decompression as dysfunction of the C5 nerve root producing dissociated motor loss [(14)].

Indications for multilevel cervical laminectomies: for patients presenting with CSM, poor prognostic indicators and, therefore, absolute indications for surgery are: (1) progression of neurologic signs and symptoms; (2) presence of myelopathy for 6 months or longer; or (3) severe spinal cord compression [(14)].

For cases with anterior compression limited to one or two levels, fixed kyphotic deformity, and no significant developmental narrowing of the canal, an anterior or

circumferential decompression and stabilization is favored [15]. In contrast, patients with compression extending more than two levels, developmental narrowing of the canal, lordotic alignment, and primary posterior compressive pathology are candidates for the multilevel laminectomy [16].

The primary surgical goals when performing a posterior cervical stabilization and fusion include restoring stability, maintaining alignment, providing stability until fusion has matured, and alleviation of pain. The presence of a straight cervical spine should alert the surgeon to increased potential for postlaminectomy kyphosis [17]. While the presence of a fixed kyphotic deformity is an absolute contraindication when considering a multilevel laminectomy [10].

AIM OF THE WORK

The aim of the study is to evaluate the pooled clinical results of laminectomy and posterior decompression and lateral mass fixation for myelopathy secondary to cervical spondylosis.

REVIEW OF LITERATURE

Clinical presentation of cervical spondylosis

The clinical manifestation of cervical spondylosis depends on the neural element involved in the disease process. The diseases include radiculopathy, myelopathy and radiculomyelopathy. The cervical spondylosis causes an insidious clinical picture [(18)].

Neck Pain:

This is the most common clinical manifestation of cervical spondylosis and its onset may be precipitated by minor trauma. The pain usually settles over a period of a few days or weeks but frequently recurs and is associated with increasing stiffness of the neck. [(19)].

Radiculopathy:

Brachial neuralgia (radiating arm pain) results from a nerve root being compressed in the neural foramen by osteophyte formation, with subsequent narrowing of the bony canal. There may be other features of nerve root compression, including numbness and tingling in the appropriate dermatome distribution, weakness of the arm and wasting of a muscle group in the appropriate nerve root [(20)].