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Surgical Outcome of Laminectomy for Cervical Spondylotic Myelopathy.

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Abstract

Spondylotic myelopathy is a common spinal cord disorder encountered frequently by neurosurgeons. It can produce a variety of clinical signs and symptoms secondary to neural compromise and biomechanical involvement of the spine. The surgical approach depends on patient's age, the presence of spinal instability, and the pathology of compression. The surgical treatment is still debatable, anterior and posterior approaches have been used with various reported success rates. Thirty consecutive patients with cervical spondylotic myelopathy (CSM) were studied retrospectively. They had extensive laminectomy for the affected levels. The early result of surgical treatment was evaluated. Patient's age ranged between 27 and 70 years (mean 47.8 years). Males constituted 83.3% of the patients. The higher incidence was in the 5th and 6th decades. Limb weakness was the main presenting symptom. The duration of the deterioration of the neurological condition ranged from 1 month to 2.5 years, with a mean of 6 months. Twenty six patients (86.7%) had some degree of improvement post-operatively. Severe radiculopathy (11patients), wound infection (2 patients), and CSF collection (1 patient) were the main complications. There was no mortality.Although decompressive laminectomy is an indirect procedure in patients with anteriorly located lesions, like osteophytes and herniated discs, it is an effective method to relieve or arrest the progression of myelopathy. Best outcome was associated with shorter duration of symptoms prior to surgery, younger age, and good general condition.

Keywords: Cervical spodylosis, cervical myelopathy, Laminectomy, Radiculopathy, Laminoplasty.

Introduction

Spondylotic myelopathy is a common spinal cord disorder above the age of 50. As late as twenty years ago, the major goal in the management of CMS was to arrest the progression of the disorder rather than to expect a major improvement in the neurologic outcome. [1].

Cervical spondylosis is caused by degenerative disc disease and usually produces intermittent neck pain in middle-aged and elderly patients. This pain usually responds to activity modification, neck immobilization, isometric exercises, and medication [2].

In most cases of spondylotic radiculopathy, the results of conservative treatment are so favorable that surgical intervention is not considered unless pain persists or there is progressive neurologic deficit [2].

Recent understanding of the biomechanics of the cervical spine in patients affected with spondylosis and autopsy study of the spinal cord emphasize the mechanical component of the syndrome which lends itself to surgical correction [1].

The mobile cervical spine is particularly subject to osteoarthritic change in joints, and progressive degenerative changes in the cervical discs. This occurs in more than half the population over 50 years of age; of these, approximately 20% develop symptoms [1].Spondylotic changes may impair the circulation within the cord,

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leading to cord ischemia and a resultant myelopathy. Osteophytes can compress the anterior spinal artery or a critical medullary feeder, or can compress venous drainage, leading to a neuroischemic myelopathy usually affecting the anterior cord [3].

There is a dynamic component of spinal cord compression, as extension of the cervical spine can cause buckling of the ligamentum flavum and flexion can cause disc bulging [4].

The clinical features include radiculopathy and/or myelopathy. The myelopathy presents as lower motor neuron signs and symptoms in the upper limbs at the level of the lesion and/or upper motor neuron signs and symptoms below the level of the lesion. The sphincteric disturbance is seldom a prominent early feature [1].

CSM is the most serious and disabling condition of this disease [2] and it is a disorder of the cervical spine stemming from compression of the cervical spinal cord by spondylitic degeneration, often in a congenitally narrowed canal [4].

Various techniques are used for the various aspects of cervical spondylosis.

A variety of ventral and dorsal approaches were used in the surgical management of multilevel CSM. The choice of surgical procedures included laminectomy (with or without fusion), laminoplasty, ventral discectomy with fusion, and corpectomy with fusion (with or without instrumentation), remains controversial [5].

Cervical laminectomy is usually applied in the treatment of cervical myelopathy caused by cervical canal stenosis due to multiple level spondylosis [6].

The surgical treatment of cervical spondylotic myelopathy remains a controversial issue after many years of study, evolution, and refinement [7].

Laminectomy was the original treatment for CSM when it was first described as a discrete entity. It is the disillusionment with the original results of laminectomy procedures that lead to the development of the anterior approach and of laminoplasty [4]. Polyetheretherketone (PEEK), in a spinal cage used in performing cervical fusion for the correction of cervical kyphosis [8] and double-door laminoplasty for individuals with cervical stenotic myelopathy [9].Various prognostic factors were identified that can affect outcome. Age and abnormal cervical curvature predict less postoperative neurological improvement. The presence of preoperative high signal intensity within the spinal cord on MRI may also predict less neurological improvement [10]. Patients with cervical spondylotic myelopathy (CSM) tend to have better clinical results than those with ossification of the posterior longitudinal ligament (OPLL) [11]. In general, early surgery can improve prognosis [12]. Careful selection of patients is an absolute necessity since a primary cause of failure occurred in individuals who subsequently proved to have motor neuron disease [13]. Morimoto, et.al concluded that dynamic MR imaging aids the search for the cause of recurrent post-laminectomy cervical myelopathy after initial improvement following decompressive surgery [14].

Aim

Is to study the various factors that affect prognosis, and to evaluate the results of laminectomy regarding outcome and complications.

Patients and methods

Thirty consecutive patients with advanced signs and symptoms of CSM were studied retrospectively, regarding age, clinical features, and duration of symptoms, MRI findings (9 patients), outcome and complications. All of the operations were performed between 1996 and 2000 at the Surgical Specialties Hospital, Medical City, in Baghdad. All patients were treated by extensive multi-level laminectomy without fusion. Twenty-seven patients were operated on in prone position, while the others in sitting position. Only four patients had post-operative MRI, due to lack of facilities; which showed decompressed thecal sac.

Results

The age of patients ranged from 27 to 70 years. The mean of age was 47.8 years. They were 25 males (83.3%) and 5 females (16.7%). The higher incidence (18 patients, 60%) was in the 5th and 6th decade of life.

The duration of symptomatology and progressive deterioration in the neurological status ranged from 1 month to 2.5 years, with a mean of 6 months. Weakness of the limbs was the most common presenting symptom.

The intervertebral disc between the C5 and C6 was the most common site affected.

Twenty-seven patients (90%) had degenerated and herniated disc at this level. Complete block of the spinal canal and severe extradural compression were seen in 6 patients (31.6%).

Immediate loss of lordosis was seen in all patients postoperatively, as appeared in Plain X-rays. The MRI appearance was of different types of degenerative spondylosis with reduced hydration of the affected intervertebral disc material and height of the space.

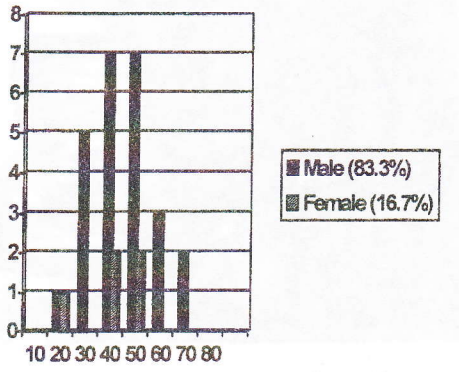


Fig. (1): Age and gender

Table 1: Preoperative muscle weakness

Motor weakness (muscle power grade< 4)	No.	%
Tetraparesis	26	86.7
Right hemiparesis	3	10
Left hemiparesis	1	3.3

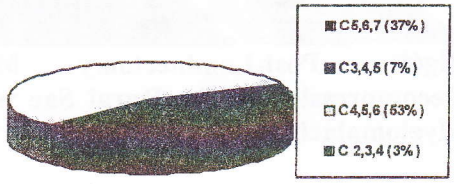
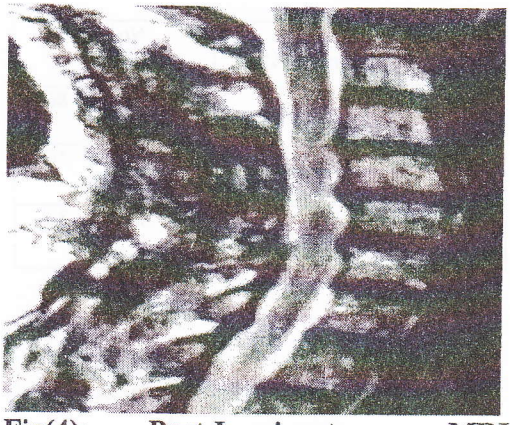


Fig. (2): Pre-operative level of cervical spine involvement.

Myelomalacia was seen in all patients who had Pre-operative MRI (9 patients). Impingement upon the ventral aspect of the dural sac with corresponding ligament flavum hypertrophy, causing spinal cord stenosis at the levels affected was seen in all patients.

Fig(3): Pre-operative MRI of Cervical Region, Multiple Spinal canal Stenosis due to Cervical Spondyolsis and disc Prolapsed.



Fig(4): Post-Laminectomy MRI Decompression of the Dural Sac with Myelomalachia.

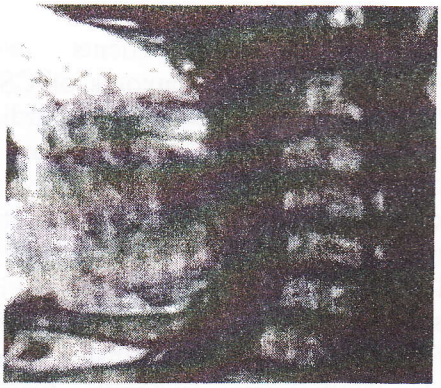


Fig.(5): T1-weighted image Post-laminectomy with decompressed spinal canal.

Fig.(6): T2-weighted image Post-laminectomy with myelomalchia.

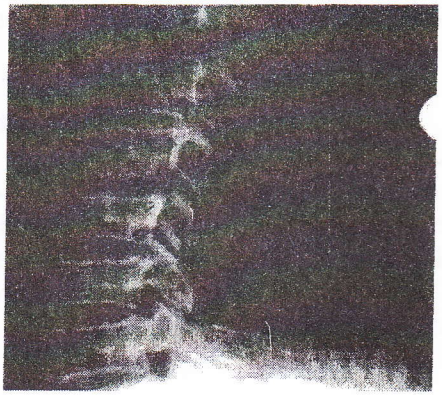


Fig.(7): Lateral X-Ray of cervical spines, multi-level laminectomy.

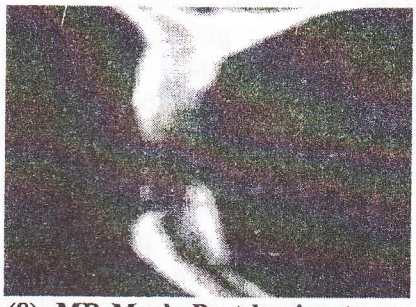


Fig.(8): MR-Myelo.Post-laminectomy

Fig(9): Post- Laminectomy T1- Weighted Image, Showing Prolapsed Disc.

Table (2): Complications

Complications	% (Patients)
Severe radiculopathy	36.6 (11)
Wound infection	6.7 (2)
Cerebrospinal fluid collection	3.3 (1)

The surgical outcome was evaluated after one month from operation.

Twenty six patients (86.7%) had improvement in the grade of muscle power comparing to the pre-operative status. Only one patient (3.3%) had deterioration from his pre-operative condition. Three patients were at the same clinical condition, which had symptoms and signs more than a year. There was no mortality in this series.

Discussion

CSM is a common spinal cord disorder affecting patients more than 50 years of age, but it can occur in patients at all ages due to degeneration of the spine at the level of compression.

The mean of age of patients in this study was 47.8 years. The higher incidence (18 patients, 60%) was in the 5^{th} and 6^{th} decade of life. This is in agreement with the explanation of the pathogenesis of the disease which is a degenerative process of the intervertebral discs, cervical spine joints, and hypertrophy of the ligamentum flavum causing compression on the spinal cord and ischemia due to compression on the vessels [15].

The patients were 25 males (83.3%) and 5 females (16.7%). Although this result may support the idea of occupational risk hazards in males, Hukuda et.al. suggest that a significantly small canal/body ratio in men may implicate the male prevalence of cervical myelopathy [16].

The progression of the disease is highly variable and unpredictable, it is either in a stepwise fashion or gradually progressive [1].

In this study, the duration of symptomatology and progressive deterioration in the neurological status ranged from 1 month to 2.5 years support those patterns.

Weakness of limbs was the most common presenting symptom, with tetraparesis in more than 85% of the patients. This late presentation of the patients with advanced signs and symptoms of the CSM, in form of motor, sensory, sphincteric disturbance, and pathological reflexes, dictated the decision of early surgical intervention. Ebersold et al. found that the only factor correlated with postoperative functional status is duration of symptoms preoperatively [3].

This was clear in this study as those patients who had improvement in their muscle power from pre-operative status, were those who had cervical myelopathy for less than a year. While those who showed no improvement, had the features of cervical myelopathy for more than a year.

Laminectomy for the treatment of CSM has been accepted as a standard procedure for years [7].

Many surgical approaches have been proposed for patients with cervical spondylotic myelopathy (CSM); however, there are no standard methods for determining which is preferable. These approaches include: (1) laminectomy, with or without fusion; (2) laminoplasty; (3) medial (central) corpectomy with grafting, with or without fusion; and (4) ventral discectomy.

Double-door laminoplasty with hydroxyapatite spacer appears to restore the motion of the decompressed segment back to normal in all loading modes. In contrast; laminectomy seems to have potential postoperative deformity or instability [17].

The involvement of multiple cervical levels in the compression of the spinal cord (at least three levels) rendered laminectomy the preferable approach in these patients. The surgeon's personal preference and experience remains the dominant factor [18].

It is not always possible to compare the results of ventral and dorsal approaches, because the indications for ventral and dorsal surgery may differ depending on the presence of "effective kyphosis or lordosis" and the location of the compressive lesion (predominantly ventral or dorsal) [5].

A variety of factors may affect surgical outcome in patients with CSM.

Anterior cervical approaches when indicated are generally preferred, although there are still indications for laminectomy [2]. The presence of an effective lordosis may dictate the use of a dorsal approach [19, 20].

In this study, immediate loss of lordosis was seen in all patients postoperatively, as appeared in Plain X-rays. While Herkowitz noticed loss of lordosis in six patients out of 12 patients undergoing laminectomy in a 2 -year follow-up period [15]. This difference in this result is due to the time of follow-up.

Both an anterior and posterior approach may be indicated in unique circumstances of spondylostenosis complicated by subluxation and instability [18].

The outcome of surgery for CSM is often disappointing [1]. In this study 26 patients (86.7%) had some degree of improvement in their muscle power.

This result recommends that surgery is indicated even if only mild improvement in the neurological status is expected, as this will arrest the progression of the myelopathy.

Some series show good results, with 65-75% of patients having improvement post-operatively [15]. MacCormack. Et.al suggested good initial results expected in about 70% of patients [2].

The surgical decompression for cervical myelopathy appears to be beneficial, even in patients more than 75 years of age, in improving neurologic function and ability to engage in activities of daily living [21]. Hasegawa, et.al. Concluded that there is an increase in postoperative neurologic complications noted for the older individuals with greater morbidities [22].

Although patients without preoperative high signal intensity on MRI of the spinal cord showed better improvement rate than did patients with preoperative high

signal intensity, the difference was statistically insignificant [23].

The surgical outcome was evaluated after one month from surgery. Only one patient (3.3%) had deterioration from his pre-operative condition, which may be due to further pressure and ischemia to the spinal cord and the roots. This is comparable with the result of Wiberg [24] who noticed no immediate postoperative deterioration after laminectomy.

In this study, three patients were at the same clinical condition and there was no mortality.

The results are comparable with the results of Huang, et.al. who noticed improvement in Nurick grade in 71% of patients and nine showed no improvement [25].

In this study, both prone and sitting positions were implicated. The use of prone position with abdominal compression may compromise spinal cord perfusion and lead to spinal cord ischemia [26]. The sitting position is on the other hand is not free of complications. In this study, there were no complications related to the position.

Misalignment and instability after cervical laminectomy, performed to treat spondylotic myelopathy, has been described as possible adverse effects [27].

Late complications of cervical laminectomy often report scar formation, between the dura and overlying paraspinal muscles: and malalignment of the cervical spine with secondary kyphosis may follow an expansive laminectomy [6].

These complications were not seen in this study due to short follow-up period, a longer follow-up period is suggested to study those complications.

Conclusions

Although decompressive laminectomy is an indirect procedure in patients with anteriorly located lesions, like osteophytes and herniated discs, it is indicated in multiple level compressions, especially in elderly. Decompression of the cervical spinal cord should be performed in spite of long duration of the features of CSM. The improvement in muscle power in those patients who had features of CSM less than a year, suggest that the shorter duration of symptoms prior to surgery and a good general medical condition of the patient were associated with better outcome. Magnetic resonance imaging provides better information of the size and the character of the spinal cord as well as better identification of extrinsic lesions causing myelopathy, than myelography.

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دەرئە نجامی نەشتەگەری پەتکە دەمار لە برپرەکانی مل دا.

ئاری سامی حسین، کۆلیجی پزیشکی ، بەشی نەشتەرگەری میشك و دەمارەکان ، زانکۆی سلێمانی،
هەرێمی کوردستان / عێراق

پوختە

شێواویەکانی پەتکە دەمار، یەکێکە لە نەخۆشیە باوەکانی پەتکە دەمار کەدێتە لای نەشتەگەری میشك و پەتکە دەمار و دەمارەکان، ئەم شێ، اویە لە ئە نجامی پەستاندن و جواڕندنەوە، زۆر جۆر سکالاو نیشانە دروست نەکات،جۆری نەشتەرگەریەکە لەسەر چەند پنتیك بەندە وەك (تەمەنی نەخۆش، ناسەقامگیری برپرەکان، وەهۆی پەستاوتنەکە، ئەم لێکۆلینەوەیەدا، زوو لابردنی پەستاوتنەکە لەرووی پشتەوە هەڵسەنگێنرا).سێ نەخۆش کەبرپرەی سۆی ملیان هەبوو، کۆتا پێکی هەڵسانگێنران، کەنەشتەگەری بەرفراوانیان لە برپرە جیاوازەکانی مددا بۆ کرابوو، تەمەنیان ٢٧-٧٠ سالّ بوو.ناوندی تەمەن (٤٧,٨) سالّ بوو، زۆربەی نێرینە (٨٣,٣٪) بوون، ئەم شێ، ازیە لە تەمەنی پە نجاو شەستەکان باوتر بوو، ماوەی نیشانەکان لە مانگێك بۆ ٢,٥ سالّ بوو، وەناوەندەکەی (٦) مانگ بوو. بەکشتی ، (٢٦) نەخۆشیان (٨٦,٧٪) یان بەرەو باشی چوون، (١١) نەخۆش کەشێواویەکەیان تووں بوون تووشی برینە سۆ، یەك نەخۆش تووشی کردبوونەوەی شلەی میشك و پەتکە دەمار بوو. کەس لەنەخۆشەکان نەمردن.لابردنی پەستاوتنی سەر پەتکە دەمار، بەنەشتگەریەکی ناڕاستەوخۆ، دائەنرێت بۆ ئەو نەخۆشانەی کەپەستاوتیان لە پێشەوەی پەتکە دەمار هەیە بەخزانی پەکەی برپرەکان و هەڵتۆقیوی نێسکی برپرەکان. نەوانیە نیشانەکانیان و باری تەندرەستی یان باش بوو، دەرئە نجامی چارەسەریان باشتر بوو.

النتيجة الجراحية لاستئصال الصفيحة الفقرية في اعتلال النخاع التنكسي العنقي.

ئاري سامي حسين، كلية الطب، قسم جراحة الاعصاب، جامعة السليمانية ، اقليم كوردستان / العراق

الخلاصة

ان مرض اعتلال النخاع التنكسي هو احد الاضطربات الشائعة التي تصيب النخاع الشوكي الذي يصادف جراحي الجراحة العصبية كثيرا. و تنتج عن هذا الاعتلال عدة علامات و اعراض سريرية نتجية للضغط على الاعصاب و تحديد حركة الفقرات. و تعتمد النظرة الجراحية على عمر المريض ووجود عدم الاستقرار للفقرات العنقية و نوعية المرض الذي سبب الانضغاط. و قد تم في هذا البحث تقييم النتيجة الجراحية المبكرة لاستئصال الصفيحة الفقرية في المرضى الذين يعانون من اعتلال النخاع الشوكي التنكسي العنقي.تم دراسة ثلاثين مريضا يعانون من اعتلال النخاع الشوكي التنكسي العنقي بشكل دو اثر رجعي، و تم اجراء استئصال الصفيحة الفقرية للمستويات المؤثرة في الفقرات العنقية. و تباين اعمار المرضى ما بين ٢٧/٧٠ سنة.كان معدل عمر المريض ٤٧,٨ سنة. و كانت نسبة الذكور ٨٣,٣٪ من المرضى. و كانت النسبة الاكثر حدوثا للمرض في العقدين الخامس و السادس من العمر.و قد تباين مدة التدهور في الحالة العصبية للمرضى من شهر الى ٢,٥ سنة و متوسط المدة هو ٦ اشهر. و على العموم تحسنت الحالة الصحية ل (٢٦) مريضا (٨٦,٧٪) بعد اجرا الجراحة. و من التعقيدات و مضاعفات العملية الجراحية ، ان اصيب (١١ مريضا) باعتلال العصب العنقي و التهاب الجرح (٢ مريضا) و نضح السائل الشوكي في مريض واحد. و لم تكن هناك حالات وفاة.استئصال الصفيحة الفقرية هو احد الطرق الغير مباشرة لعلاج المرضى الذين يعانون من انضغاط النخاع الشوكي يسبب افة تقع في الجهة الامامية للنخاع، مثل انزلاق الاقراص الفقرية.و استنتج من هذا البحث انه كلما كانت مدة ظهور الاعراض و العلامات لهذا المرض قصيرة و كانت الحالة الصحية للمريض جيدة، تكون النتائج بعد العملية الجراحية بهذه الطريقة جيدة ايضا.

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