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Original Research Paper

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CERVICAL SPONDYLOTIC MYELOPATHY- DIFFERENT TYPES OF SURGICAL TECHNIQUES AND THEIR SURGICAL OUTCOME IN TERMS OF PATIENT RECOVERY

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ABSTRACT Cervical spondylotic myelopathy is a neurological condition that develops due to degenerative changes in the spine resulting in compression of the spinal cord and compressive myelopathic features. In this paper, we have performed different sur- gical procedures for cervical decompression(Total 50 cases) and followed up for functional outcome and recovery of the patients in our institute over the last 6 months. We have concluded that age, duration of symptoms and neurological con- ditions at admission are the most important determinants of outcome of different surgical techniques. Patients who are clinically and radiologically diagnosed should be treated with surgery as soon as possible.

KEYWORDS : cervical spondylotic myelopathy, cervical decompression and fu- sion, stenosis, myelomalacia

INTRODUCTION :

Cervical spondylotic myelopathy is a neurological condition that develops due to degenerative changes of spine resulting in compression of the spinal cord. The most common cause of spinal cord dysfunction in adults is CSM [1,2]. The symp- toms of cervical myelopathy are due to impaired motor and sensory functionality. (They include clumsiness of the hand, difficulty walking, impaired balance and coordination, and sensory complaints of numbness or tingling in the hands and feet [3]. It evolves from desiccation of the disc that leads to reduced disc height and bulging of the disc posteriorly into the spinal canal. The bulging disc may then calcify and, along with marginal osteophyte formation and uncovertebral spurring, narrow the spinal canal. The resultant foraminal and spinal canal stenosis produces radiculopathy and myelopathy, respectively [4,5]. Surgery is usually required to de- compress the neural elements, restore lordosis and stabilise the spine to prevent additional degeneration at the affected level. Surgery for cervical myelopathy has been performed for both posterior (laminectomy) and anterior (corpectomy) ap- proaches, each with unique advantages and disadvantages. Although it is generally safe and effective, 11-38% of CSM patients treated surgically develop complica- tions[6,7]. These include dysphagia, C5 radiculopathy, wound infection, axial pain and postoperative (post-op) kyphosis[8]. In case of multiple levels cervical stenosis, it remains unclear which procedure is best for treatment and whether each of these surgical approaches is superior in terms of patient recovery.

MATERIAL AND METHODS :

Our study included only patients who were operated for cervical stenosis in our institute for last 6 months. We have excluded all patients of spinal stenosis whowere operated for trauma, tutor and other aetiologies. The patients' age, sex, admission complaints, duration of complaints, systemic diseases and neurological examinations were evaluated. Gait performances were evaluated by Nurick scale. Stenosis level and presence of myelomalacia were examined with preoperative MRI. Operative times, surgical approaches, number of decompression, per-opera- tive and post-operative complications, post discharge follow up for functional outcomes were analysed. The patients were divided into 4 groups : group 1 (laminec- tomy without fusion), group 2 (laminectomy and fusion), group 3 (anterior corpec- tomy and fusion) and group 4 (combined surgery). Total of 50 patients were operated of which 34 were male and 16 female.

Selection of surgical technique: The surgical treatment of CSM is performed by anterior, posterior or combined approach, depending on the specific pathology.

The patients with 1 to 2 vertebral level kyphosis or ossification of the posterior longitudinal ligament were generally operated with an anterior approach. The pa- tients with >3 levels of cervical stenosis, posterior compression or congenital stenosis, laminectomy and posterior fusion were generally performed.

RESULTS:

50 patients were operated in our hospital for last 6 months of which 34 were male and 16 were female (M:F=2.12:1), age groups 40-50, 51-60, 61-70 years. The most common admission complaints were simultaneous weakness in the arms and legs, difficulty in walking, arm pain, weakness only in the legs, weakness only in the arms, weakness on one side of the body and spasticity. The mean time of pre- sentation of symptoms was 7.9 months (2 days to 60 months). The patients' per- sonal history evaluated and revealed that the most common systemic disease washypertension (26%, n=13), followed by DM (24%, n=12), coronary artery disease (14%, n=7) and combined (20%, n=10).

Table 1 Neurological examination

Feature	No. of cases	% of cases
pathological reflex (Hofmann, clonus, Babinsky	37	74
quadriparesis	20	40
paraparesis	9	18
mono paresis	9	18
hemiparesis	3	6
spastic paraparesis	2	4

Table 2 Preoperative Nurick scale

Grade	Description	% of our cases
0	Signs and symptoms of root involvement without spinal cord disease	12
1	Signs of spinal cord disease without difficulty in walking	15
2	Slight difficulty in walking that does not prevent full-time employment	9
3	Difficulty in walking that prevents full-time employment or daily life without requiring assistance with walking	2
4	Ability to walk only with assistance	64
5	Chair bound or bedbound	0

Table 3 MRI findings

Myelomalacia	No. of cases	% of cases
	30	60

B)

Spinal stenosis	No. of levels	No. of cases	% of cases
	2	28	56
	3	18	36
	1	4	8

C)

Spinal stenosis	Level of stenosis	% of cases
	C4-5	78
	C5-6	67
	C3-4	44
	C6-7	37

Table 4 Surgical procedures

Group	Surgery	No. of cases	% of cases	Operative time
1	laminectomy without fusion	10	20	92.5 mins
2	laminectomy with fusion	12	24	134.5 mins
3	corpectomy+anterior fusion	24	48	150.5 mins
4	anterior+posterior decompression+fusion	4	8	200 mins

Decompression was performed at 2 levels in 22 patients, 1 level in 16 patients and 3 levels in 12 patients. There was a statistically significant difference ($p<0.005$) in the mean operative time of the surgical groups.

Table 5 Postoperative

Group	Length of stay	Complications	Outcome
1	3.64 days	spinal cord edema-1 haematoma-1	complete recovery-42 partial recovery-22 no change-21.58 worsening-14.41
2	4.84 days	dural tear-1	complete recovery-81.44 partial recovery-0 no change-0 worsening-18.55
3	4.58 days	cage shift-1 haematoma-1	complete recovery-72.56 partial recovery-15.67 no change-5.88 worsening-5.88
4	6.34 days	dural tear-1	complete recovery-64.66 partial recovery-35.33 no change-0 worsening-0

The mean follow-up period was 1-12 months.

There was no significant difference recovery rates between surgical groups. One patient died of pulmonary embolism 3days after discharge.we determined that 10(20%) patients developed neu- ropathic pain complaints more than half of whom 6 patients were in the group of laminectomy.

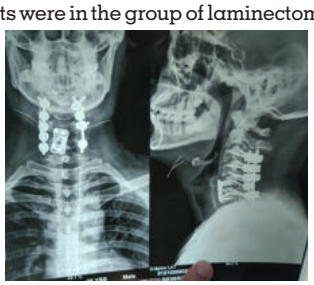

Fig 1. Combined approach

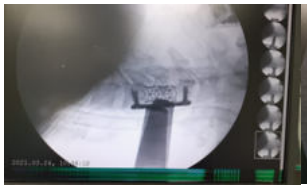

Fig 2. Corpectomy and cage plate fixation

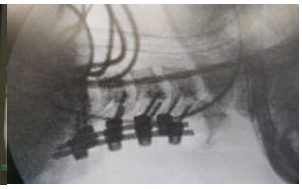

Fig 3. Laminectomy and fusion

DISCUSSION:

Cervical spondylosis is a progressive disease characterised by degenerative changes affecting the vertebrae, intervertebral discs, facets and associated ligaments. These changes accelerate CSM by causing narrowing of the canal diameter and direct compression of the spinal cord and/or sur-rounding blood vessels[9]. Disruption in blood supply to the spinal cord tissue, further increasing neuronal injury is caused by the vascular involvement. The disease can result in long-term disability and severe neurological disorders. Early and effective treatment before irreversible spinal cord injury develops is important to maintain the quality of life of these patients. The progression of cervical myelopathy is often insidious although it is seen only in a small portion of patients with spondylosis. The natural course of CSM is variable. Some patients show a gradual worsen- ing, while others have a long silent period. Minor and major traumas that may occur in the pres- ence of cervical spondylosis can cause acute clinical deterioration and central cord syndrome.

Positive Hoffman, Clonus and Babinski reflexes and motor weakness are frequently encoun- tered[10]. In recent years, the Nurick scale has been considerably replaced by a more holistic rating system, called the Japanese Orthopaedic Association Myelopathy Evaluation Questionnaire (JOA scale) [11]. We found out using the Nurick scale 64 % of the patient were grade 4 in the pre opera- tive period. In our study 24 % of the patients had DM. 7 patients had neuropathic pain in postop- course and 3 had DM previously.

Due to the non invasive nature high resolution and ability to show soft tissues in details of MRI, it is preferred for precise evaluation. Sometimes, an increased T2 signal is visualised in the spinal cord on MRI. This condition, which we call myelomalacia, suggests spinal cord injury and per- manent damage due to spinal cord compression or recurrent trauma[10]. In our study , pre-op MRI was performed in all patients and myelomalacia was visualised in 60% of the patients. Pre-op CTexamination was also performed to exclude posterior longitudinal ligament ossification. The most important risk factors for disease progression and worsening are age and duration of symptoms.

The goals of surgery for patients with CSM are decompression of the spinal cord, restoration of the cervical alignment and treatment of the instability, if any[12]. The anterior approach is preferred when the number of affected levels is 1 or 2. Discectomy and fusion or corpectomy and fusion can be included in the procedures performed during the anterior surgical approach.

Direct decompression of pathologies located in the anterior cervical spine (osteophyte, PLLO, disc herniations), the ability to resolve radiculopathy, muscle-preserving dissection to minimise post-op pain, low infection rates and correction of cervical kyphosis [9]. In case of 3 or more levels, posterior approach should be considered however, posterior approach should not be used in case of kyphosis. In our study, we found that combination with posterior approach were performed on all the patients with 3 levels of spinal stenosis and the anterior approach alone was not performed on any of them. In the past, laminectomy without fusion was widely used for the treatment

of CSM; however, due to the identification of post-laminectomy kyphotic deformities, the use of this technique has reduced[13]. Therefore, although the idea of adding fusion to the posterior ap- proach has gained importance, restricted cervical mobility, neck stiffness and adjacent segment degeneration are its important handicaps[5]. In our study, we found that 20% of the CSM patients underwent laminectomy without fusion; this surgical approach was preferred more in high-risk patients due to advanced age and systemic diseases, and complaints such as neuropathic pain in the post-op long-term follow-up were most commonly observed in these patients. Although no post- laminectomy kyphotic deformity was observed in the follow-up of any patient, this group had the shortest operative time and post-op length of hospital-stay of 92.5 minutes and 3.64 days, respectively. In our study we found that where only the anterior approach was preferred had oneof the highest satisfaction rate 72.56% and only 1 or 2 levels of corpectomy were performed in this group. However it was noted that 5.88% of the patients in group 3 and 14.41% of the patients in group 1 had post-op worsening. In combined approach group, satisfaction rate of these patients was 64.66%. However these patients had longer hospital stay. The group treated with laminecto- my and fusion was found to be the best in terms of satisfaction and functional recovery (81.44%).

Thus, in the current literature, the anterior and posterior neurological outcome is insufficient for explaining the best surgical approach. We found that laminectomy and fusion was the most suc- cessful surgical method. However, the anterior approach is also a successful treatment option.

CONCLUSION :

CSM is an irreversible degenerative spinal cord disease which should be treated as soon as possi- ble. Laminectomy without fusion has the advantage of shortest hospital stay and operative time but only to be performed in high risk patients without kyphosis since it has more side effects in terms of patient satisfaction score so it will be better to add laminectomy and fusion in eligible cases. When deciding on the surgical technique we should consider patient age, clinical condition and radiological characteristics altogether. For better efficacy there is a need for series with a larger sample size.

Ethics Committee approval was done.

Informed consent was obtained from all the patients. No conflict of interest was declared by the authors.

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