ORIGINAL RESEARCH PAPER

Volume-8 | Issue-3 | March-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

SURGICAL OUTCOME IN PATIENTS WITH CERVICAL OSSIFIED POSTERIOR LONGITUDINAL LIGAMENT: OUR INSTITUTIONAL EXPERIENCE.

Neurosurgery

K.Satyavaraprasad Professor and Head of Department, Department of Neurosurgery, Andhra Medical College, Andhra Pradesh, India.

D.Ravi Assistant Professor, Department of Neurosurgery, Andhra Medical College, Andhra Pradesh, India.

P.Kishore* Senior Resident , Department of Neurosurgery, Andhra Medical College, Andhra Pradesh, India. *Corresponding Author

ABSTRACT

Objective: Posterior longitudinal ligament ossification has multiple factors for its disease occurrence. The metabolic and biomechanical factors are the main factors causing the disease process. The role of surgical intervention as well as ambiguity of whether anterior or posterior approach is a matter of debate. Postoperative functional improvement and assessment of surgical outcome are the objectives of the study.

Materials and Methods: This is a prospective study which included 44 patients of cervical OPLL who underwent either anterior or posterior surgery in Department of Neurosurgery, Andhra Medical College, Visakhapatnam between August 2016 to July 2018 over a period of two years. Patient's data including age, sex, pre and post operative functional status, radiographic findings and OPLL subtypes were analyzed.

Results: The disease process was common in age group of 41-50 years involving 12 women and 32 men. Out of 44 patients, 13 patients underwent surgery by anterior approach (corpectomy and fusion) of which 9 improved, 3 were of same neurological status and 1 deteriorated. 31 patients underwent surgery by posterior approach where decompressive laminectomy with instrumentation was done. Of those who underwent posterior surgery, 17 patients improved, 11 remained the same as their preoperative status and 3 patients deteriorated. The mean pre-operative Nurick grade was 2.8 which later on improved to 2.15 post surgery.

Conclusion: Anterior cervical median corpectomy, fusion with plate is a better modality of treatment for cervical spondylotic myelopathy in single or two levels OPLL. Posterior decompressive laminectomy and lateral mass fixation is better in a setting of more than three levels of OPLL.

KEYWORDS

OPLL: Ossified posterior longitudinal ligament

INTRODUCTION:

Ossification of the posterior longitudinal ligament (OPLL) is a disorder of progressive ectopic calcification and ossification of the cervical and thoracic segments of the posterior longitudinal ligament (PLL) that results in a compressive myelopathy and/or radiculopathy. The prevalence of OPLL in western countries is 0.01% to 1.7% where as it ranges from 1.9% to 11.3% in East Asian countries. (1,2) The clinical features of cervical OPLL are somewhat similar to spondylotic myelopathy or cervical disc herniation but it also has few unique features. The management of OPLL can be either surgical or conservative. The choice of whether anterior or posterior approach is debatable. The objective of the study is to asses surgical outcome and postoperative functional improvement in patients of cervical OPLL.

MATERIALS AND METHODS:

This is a prospective study which included 44 patients with cervical OPLL over a period of two years between August 2016 to July 2018 admitted and operated in Department of Neurosurgery, Andhra Medical College, Visakhapatnam.

Inclusion criteria:

1. Patients with radiological proven cervical OPLL along with clinical signs of myelopathy were included in the study.

Exclusion criteria:

1. Patients with spondylotic myelopathy not due to OPLL.
2. Moribund patients were excluded from the study.

Cervical OPLL is identified as abnormal radioopacity along the posterior margins of the vertebral bodies on lateral radiographic views / Computed tomography (CT)/ Magnetic resonance imaging (MRI) scans. Age, gender, occupation, socio-economic status, duration of sensory and motor symptoms and the presence or absence of autonomic dysfunction was noted. Neurological assessment included examination of tone and spasticity in upper and lower limbs (as per Modified Ashworth Scale). Functional disability was assessed as per the Nurick grade.

IMAGEIOLOGY:

All patients underwent x-ray of cervical spine in anterio posterior and lateral views. Flexion and extension x-rays were obtained when necessary. OPLL was identified on plain x-ray as abnormal radio-opacity along the posterior margins of vertebral bodies. All patients underwent CT and MRI of cervical spine.

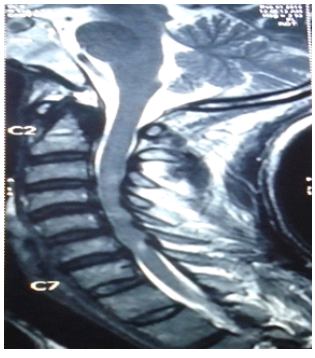


FIG 1

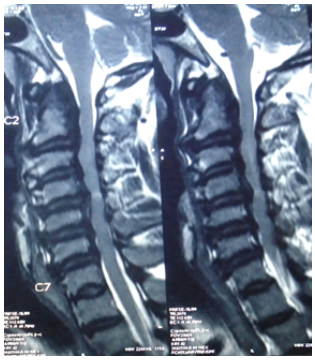
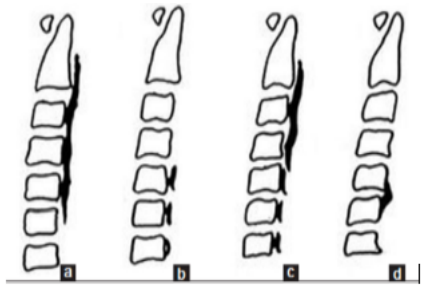


FIG 2

FIG 1 and 2 showing T2 MR images showing cord compression by OPLL

CLASSIFICATION OF OPLL:

Classification of HIRABAYASHI et al (1) was followed.



continous(a) , Segmental (b), Mixed (c), focal (d)

DIAGNOSIS of cervical OPLL was made on three conditions: (1) Clinical symptoms consistent with cervical cord compression. (2) MRI showing evidence of cervical canal stenosis not due to any other degenerative spinal condition. (3) X-ray/CT/MRI scan demonstrated that the cord compression was primarily due to a calcified mass consistent with the morphology of OPLL.

SURGICAL APPROACH:

Decision regarding the type of surgery was based on clinical and radiological findings.(3) Patients with multilevel involvement underwent decompressive laminectomy and lateral mass fixation with rods and screws. While patients with two or less levels of involvement had anterior approach median corpectomy, excision of OPLL, fusion and stabilization with screws and plate.(4,5)

POSTOPERATIVE CARE:

Before discharge, patients functional status was assessed by means of Nurick grade and implant status checked with an x-ray of cervical spine. Patient was followed after 15 days, 3months and 6 months after discharge.

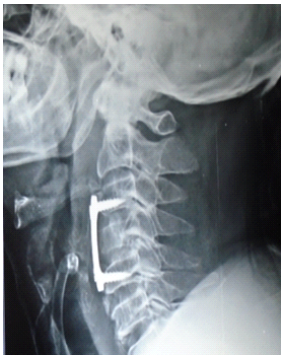


FIG 3

Postoperative x-ray at time of discharge showing screws and plates (anterior approach)

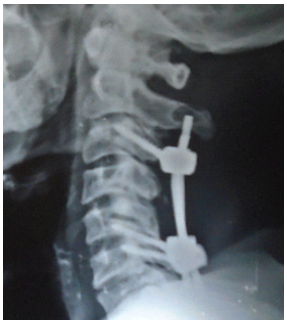


FIG 4

Postoperative x-ray at time of discharge (posterior approach)

RESULTS:

A total of 44 patients were included in the study. 32 were male 12 were female patients. The age of the patients ranged from 35 to 70 years. The mean age was 56 years although maximum number of patients were between 41-50 years of age (n=19). All patients presented with sensory disturbance (mean duration – 9.6 months). 40 patients of the total 44 in the study presented with varying grades of motor weakness. (Mean duration 7.3 months). 7 patients had spintcher disturbance. 4 patients had myelomalacia changes on MRI.

Demographics:

mean age in years	52.0 year
Men / women	32/12
Mean pre operative Nuricks grade	2.8
Mean duration of motor symptoms	7.3 months
Mean duration of sensory symptoms	9.6 months

Duration of motor symptoms:

Age	<6 months	7-12 months	12-18 months	18-24 months	total
31-40	5	3	-	1	9
41-50	11	7	-	2	20
51-60	6	-	-	2	8
61-70	3	-	-	-	3

Duration of sensory symptoms:

Age	<6 months	7-12 months	12-18 months	18-24 months	Total
31-40	4	1	-	1	6
41-50	10	5	2	2	19
51-60	6	3	-	1	10
61-70	6	2	-	1	9

Characteristic of OPLL:

Type of OPLL	Total number of patients	Neurological Improvement	Neurological same status	deteriorated
Continuous	25	18	5	2
Segmental	9	3	6	-
Focal	4	3	-	1
Mixed	6	2	3	1

Surgical approach :

Median corpectomy, fusion, stabilization with plate and screws (anterior approach)	13
Decompressive Laminectomy and lateral mass fixation (posterior approach)	31

Of the 13 patients who underwent anterior approach 9 patients improved neurologically, 3 were of same status and 1 deteriorated. 31 patients were operated by posterior approach, 17 of them improved neurologically, 11 are of same status and 3 deteriorated. Of the 13 patients who underwent corpectomy and fusion OPLL was removed completely in 10. 3 patients with adherent dura underwent floating technique and all 3 of them remained in same neurological status postoperatively. Dural tear occurred in 2 patients which subsided with muscle patch repair. Surgical site infection was noted in 2 patients among those who were operated by posterior approach and were treated with antibiotics.

DISCUSSION:

It has been estimated that 70% of OPLL cases involve the cervical spine, 15% involve the thoracic spine and the remaining 15% involve the upper cervical spine.(1,2,6) OPLL patients may show increased signal intensity of spinal cord on T2 weighed MR image.(7,8,9) Takahashi et al first reported the MR findings of the intramedullary high signal intensity in patients with cervical spondylotic myelopathy.(10,11) In the present study there were 4 patients with myelomalacia changes who remained in the same neurological status even after surgery. Ischemia of the cord secondary to chronic compression is the cause of deterioration not amenable to surgical decompression.(12) The sex ratio in the present study is 2.6:1 (male: female), which is in accordance with the study of Matsunaga et al with 2.4:1.(12) Tsugama et al reported sex ratio of 2:1.(13) In Trojan et al's review of 73 cases of OPLL in non Asians there was predominance of males and also predominant involvement of cervical spine.(14) In the series of Jayakumar et al, 47 symptomatic Asian Indian patients of Caucasoid origin were studied (15) continuous type of OPLL was reported in 65% of them. The morphology of OPLL was predominantly continuous and segmental type in the present study

which is consistent with the literature.

The ideal surgical treatment option for multilevel ossified posterior longitudinal ligament remains controversial.(16, 17, 18, 19) The advantage of anterior approach is complete excision of the ossified posterior longitudinal ligament producing adequate decompression of spinal cord. Vaccaro et al. noted 9% failure rate for two level corpectomy and plating and 50% failure rate for three level anterior cervical fusion with plating.(20,21) Wang et al concluded that a longer length grafts was directly related to an increased incidence of graft displacement.(22) Autograft or allograft of longer length increases the duration required for osteogenesis. Hee et al reported plate related problems in multilevel corpectomies.(23) Sarso reported 6% failure rate after two level anterior corpectomy decompression and fusion reconstruction and 71% failure rate after three level.(24,25) Posterior decompression is the choice for multilevel ossification of the posterior longitudinal ligament.(26)

In the present study patients who underwent posterior approach had better outcome than patients who underwent anterior approach. Surgery at younger age had better outcome than older patients. The present study showed better improvement in patients with less preoperative Neurick's grade. The mean preoperative Neurick's grade by anterior approach is 2.7 and mean postoperative Neurick's grade was 2.0. The mean preoperative Neurick's grade by posterior approach is 2.9 and postoperative Neurick's grade was 2.3. Duration of sensory and motor symptoms had no statistical significance. The overall improvement in the present study is 59.09% (26/44), 31.81% (14/44) remained static, 9.09% (4/44) deteriorated. The outcome in the present study was low, could be due to the fact that most of the patients were illiterates and presented with poor (grade IV and grade V) Neurick's grade preoperatively. Abe et al reported 100% improvement in patients with anterior approach.(27) Mizuno and Nakagawa reported improvement of 87%.(28)

CONCLUSION:

Anterior cervical median corpectomy, fusion and stabilization with screws and plate is a better modality of treatment for cervical spondylotic myelopathy in single or two level OPLL. Posterior decompressive laminectomy and lateral mass fixation is better in a setting of more than three levels of OPLL involvement as more than two level corpectomy is associated with high level of instrumentation failure.

Younger patients with good preoperative functional status and less than two levels of involvement have better outcome following surgery.

REFERENCES:

1. Kalb S, Martirosya NL, Perez-Orribo L, Kalani MYS, Theodore N. Analysis of demographics, risk factors, clinical presentation, and surgical treatment modalities for the ossified posterior longitudinal ligament. Neurosurg Focus 2011;30:E11:1-9.
2. Wang MY, Thambuswamy M, Ossification of the posterior longitudinal ligament in non-Asians: Demographic, clinical, and radiographic findings in 43 patients. Neurosurg Focus 2011;30:E4:1-5.
3. Sait Naderi, Edward C. Benzel, Nevan G. Baldwin. Cervical spondylotic myelopathy: Surgical decision making. Neurosurgical Focus 1996;1:13-7.
4. Chen Y, Chen D, Wang X, Lu X, Guo Y, He Z, Tian H. Anterior corpectomy and fusion for severe ossification of posterior longitudinal ligament in the cervical spine.International Orthopaedics (SICOT) 2009;33:477-82.
5. Cardoso MJ, Koski TR, Liu AGJC, Approach-related complications after decompression for cervical ossification of the posterior longitudinal ligament. Neurosurg Focus 2011;30:E12:1-5.
6. Saetia K, Cho D, Lee S, Kim DH, Kim SD. Ossification of the posterior longitudinal ligament: A review. Neurosurg Focus 2011;30:E1:1-16.
7. Fernández de Rota JJ, Meschian S, Fernández de Rota A, Urbano V, Baron M. Cervical spondylotic myelopathy due to chronic compression: the role of signal intensity changes in magnetic resonance images. J Neurosurg Spine 2007;6:17-22.
8. Lin-Feng Wang, Ying-Ze Zhang, Yong Shen, Yan-Ling Su, Jia-Xin Xu, Wen-Yuan Ding, Ying-Hua Zhang, Using the T2-weighted magnetic resonance imaging signal intensity ratio and clinical manifestations to assess the prognosis of patients with cervical ossification of the posterior longitudinal ligament. J Neurosurg: Spine. 2010;13: 319-23.0
9. Izumikoyanagi, Iwasaki Y, Kazutoshihida, Iiamura H, Hiroshiabe. Magnetic resonance imaging findings in ossification of the posterior longitudinal ligament of the cervical spine. J Neurosurg 1998;88:247-54.
10. Li H, Jiang LS, Dai LY. A review of prognostic factors for surgical outcome of ossification of the posterior longitudinal ligament of cervical spine. Eur Spine J 2008;17:1277-88.
11. Takahashi M, Yamashita Y, Sakamoto Y, Kojima R. Chronic cervical cord compression: clinical significance of increased signal intensity on MR images. Radiology 1989;173:219-24.
12. Matsunaga S, Kukita M, Hayashi K, Shinkura R, Koriyama C, Sakou T, et al. Pathogenesis of myelopathy in patients with ossification of the posterior longitudinal ligament. J Neurosurg. 2002;96:168-72
13. Tsuyama N. Ossification of the posterior longitudinal ligament of the spine. Clin Orthop Relat Res 1984;184:71-84.
14. Trojan DA, Pouchot J, Pokrupa R, Ford RM, Adamsbaum C, Hill RO, et al. Diagnosis and treatment of ossification of the posterior longitudinal ligament of the spine: report of eight cases and literature review. Am J Med 1992; 92:296–306.
15. Jayakumar PN, Kolluri VR, Vasudev MK, Srikanth SG: Ossification of the posterior longitudinal ligament of the cervical spine in Asian Indians a multiracial comparison. Clin Neurol Neurosurg 1996;98:142–48.
16. Junjiexu, Kaizhang, Xiangyang MA, Qingshuiyin, Zenghuiwu, Hongxia. Systematic Review of Cohort Studies Comparing Surgical Treatment for Multilevel Ossifi cation of Posterior Longitudinal Ligament: Anterior vs Posterior Approach. Spot light on spine 2011;34:e397-e402.
17. Qizhi S, Xuelei W, Lili Y, Lei L, Linwei C, Y Lang, et al. Segmental anterior decompression and fusion for multilevel ossification of the posterior longitudinal ligament. Orthopedics OrthoSuperSite.com 2012;35:e403-07.
18. Chen, Liu X, Chen D, Wang X, Yuan W. Surgical strategy for ossification of the posterior longitudinal ligament in the cervical Spine. Orthopedics/Healio.com/Orthopedics 2012;35:e1231-7.
19. Hai-song Yang, De-yu Chen, Xu-hua Lu, Li-li Yang, Wang-jun Yan, Wen Yuan, Yu Chen. Choice of surgical approach for ossification of the posteriorlongitudinal ligament in combination with cervical disc hernia. Eur Spine Journal 2010;19:494-501.
20. Rick C. Sasso, Robert A. Ruggiero, Jr. Thomas M. Reilly, Peter V. Hall. Early Reconstruction Failures After Multilevel Cervical Corpectomy. SPINE 2003; 28: 140–42.
21. Okawa A, Sakai K, Hirai T, Kato T, Tomizawa S, Enomoto M. Risk factors for early reconstruction failure of multilevel cervical corpectomy with dynamic plate fixation. Spine 2011;36:582-87.
22. Hee HT, Majd ME, Holt RT, Whitecloud TS III, Pienkowski D. Complications of multilevel cervical corpectomies and reconstruction with titanium cages and anterior plating. J Spinal Disord Tech. 2003;16:1-8.
23. Wang JC, Hart RA, Emery SE, Bohlman HH. Graft migration or displacement after multilevel cervical corpectomy and strut grafting. Spine. 2003;28:1016-21.
24. Byung-Wan Choi, Kyung-Jin Song, Han Chang. Ossification of the posterior longitudinal ligament: A review of literature. Asian Spine Journal 2011;5:267-76.
25. Sasso RC, Ruggiero RA Jr, Reilly TM, Hall PV. Early reconstruction failures after multilevel cervical corpectomy. Spine. 2003;28:140-42.
26. Takahashi M, Sakamoto Y, Miyawaki M, Bussaka H: Increased MR signal intensity secondary to chronic cervical cord compression. Neuroradiology 1987;29:550-6.
27. Abe H, Tsuru M, Ito T, Iwasaki Y, Koiwa M, Anterior decompression for ossification of the posterior longitudinal ligament of the cervical spine Journal of Neurosurgery 1981;55:108-16.
28. Mizuno J, Nakagawa H. Outcome analysis of anterior decompressive surgery and fusion for cervical ossification of the posterior longitudinal ligament: Report of 107 cases and review of the literature. Neurosurg Focus 2001;10:1-7.