DORSAL COMPRESSIVE MYELOPATHY DUE TO OSSIFIED YELLOW LIGAMENT - A COMPARATIVE STUDY

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ABSTRACT

INTRODUCTION

The well-known causes of Dorsal myelopathy are Koch's Spine and Metastasis. Ossified Yellow Ligament is a rare cause, endemic in some parts of the world. With advances in imaging techniques, preoperative evaluation and diagnosis has become easier.

MATERIALS AND METHODS

Twenty-one cases of Dorsal ligamentum flavum thickening causing compressive myelopathy have been studied and evaluated with Nurick grading preoperative and post-operatively. The age distribution, presenting complaints, duration of symptoms, pre-operative Nurick grade, level of spinal involvement, surgical procedures and post-operative Nurick grade were compared among male and female patients and also among different age groups

RESULTS AND CONCLUSION

Males are twice commonly affected than females. Parasthesias are present in all most all cases. Lower dorsal segment is solely involved in females whereas multiple level involvement is common among male patients. Male patients usually develop sudden onset of symptoms with trivial fall.

KEYWORDS

Dorsal myelopathy, Ossified yellow ligament, Spastic weakness, Nurick grade, Thoracic spine, Laminectomy, Age group, Males, Females.

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INTRODUCTION: The two most common aetiologies of Dorsal myeloradiculopathy are Tuberculosis and Metastasis in India. Among Asian countries Ossified Yellow Ligament is being increasingly recognised as a cause of Dorsal compressive myelopathy.[1] The condition is found most frequently in elderly men, with a possible association with obesity and type 2 diabetes.[2] It commonly involves lower thoracic spine (T9–T12) with upper thoracic spine (T1–T4) being the next common site.[3,4] Decompressive laminectomy is the procedure of choice, although laminoplasty can also be done in selected cases.[5]

OBJECTIVES: The following are the objectives to study the dorsal compressive myelopathy due to thickened ligamentum flavum among males and females in Visakhapatnam region of Andhra Pradesh.

1. To examine the impact of the ligamentum flavum thickening among males and females with reference to age distribution, presenting complaints, duration of symptoms, pre-operative Nurick grade, level of spinal involvement, surgical procedures and post-operative Nurick grade and
2. To compare the severity of ligamentum flavum thickening between males and females with reference to age distribution, presenting complaints, duration of symptoms, pre-operative Nurick grade, level of spinal involvement, surgical procedures and post-operative Nurick grade.

MATERIALS AND METHODS (METHODOLOGY): Twenty-one cases of Dorsal compressive myelopathy among males and females with thickened ligamentum flavum are studied from the period of October 2013 to June 2015 in Neurosurgery Department of Andhra Medical College, Visakhapatnam. The follow up period is 6 months. The study was conducted in the age group of 21-70 years of Patients age, sex, symptoms and their duration, pre-operative Nurick grade are noted. On MRI (Figure 2) and CT (Figure 1) the level of the lesion corresponding to the symptoms are identified and that lesion is being attributed to surgical decompression or excision. Post-operative Nurick grading is taken on follow up and noted. The data obtained such is evaluated.

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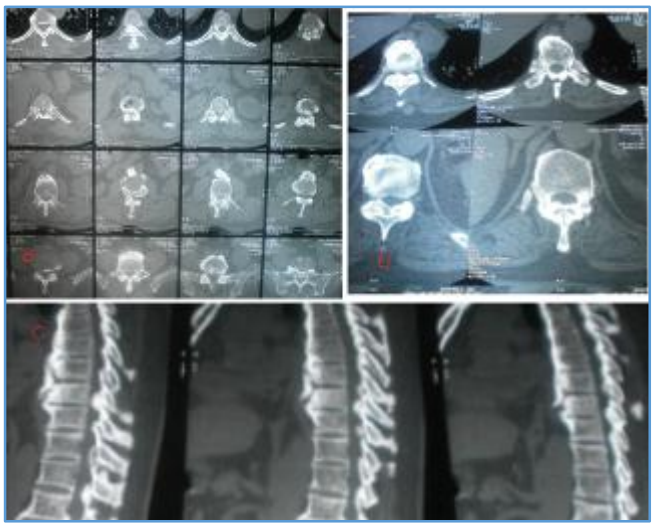

Fig. 1: CT scan (a) axial (b) magnified axial and (c) sagittal images of dorsal spine of a DISH (diffuse idiopathic skeletal hyperostosis) patient associated with ossified ligamentum flavour and ossified anterior longitudinal ligament.

Fig. 2: MRI (a) sagittal and (b) axial images of a patient with ossified ligamentum flavum involving both the upper and lower dorsal spine.

RESULTS AND DISCUSSION: The ligamentum flavum (LF) is a yellow elastic ligament extending from second cervical vertebra to the first piece of sacrum. The ligament is in the dorsal portion of the spinal canal, attaching the laminae and extending to the capsules of the facet joints and the posterior aspects of the neural foramina.[6] It is composed of longitudinal network of elastic connective tissue and is routinely demonstrated on CT scans as an isodense structure, 2 to 4 mm thick, on the postero-medial aspect of the laminae, contrasted by the adjacent fat.[7]

This pathology is found most commonly in the thoracic region. It is thought that the hyperkyphosis of this region of the spine is associated with mechanical stress, which makes ligaments in this region more prone to ossification.[8]

About twenty-one cases are studied. The men who are suffering from Dorsal Compressive Myelopathy due to Ossified Yellow Ligament are generally in the age group of 31-70 years. But majority of patients are in the age group of 41-50 years. No case is reported in the age group of 21-30 years. Generally, the male persons are vulnerable to this disease are twice the number (i.e., 14) when compared to women (i.e., 7) (Figure 3). The women who are suffering from this disease are generally in the age group of 21-60 years. But majority of patients are in the age group of 21-30 and 41-60 years. No case is reported in the age group of 61-70 years (Figure 4).

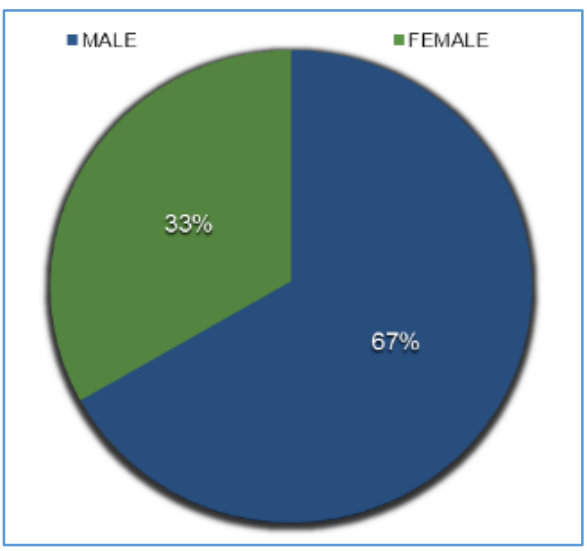

Fig. 3: Pie diagram showing the sex incidence among the patients with ligamentum flavum thickening with dorsal compressive myelopathy

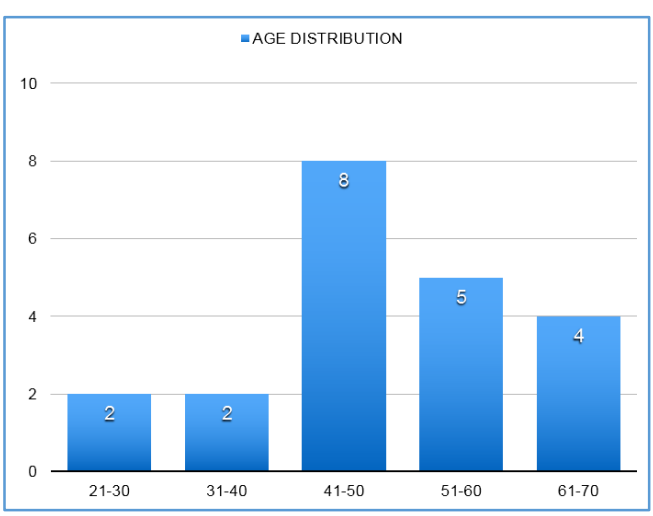

Fig. 4: A bar diagram showing the age distribution among the patients with ligamentum flavum thickening

OLF of the thoracic spine is predominantly seen in the middle-aged subjects with the mean age at the time of surgery ranging from 50 to 60 years according to different series. Males outnumber females with a male to female ratio ranging from 2:1 to 4:2.[9]

Among females back pain and parasthesias are presenting complaints common in all age groups (21-60yrs). Along with those complaints numbness (21-30, 41-50 yrs.), spastic weakness (21-30, 41-60) and urinary incontinence (41-60 yrs.) are also present (Table 1). In males, spastic weakness and parasthesias are presenting complaints seen in all age groups (31-70 yrs.). Back pain and urinary incontinence are seen in the age group of 51-70 yrs. Trivial fall leading to symptoms are seen in age group 61-70 yrs. One case presented with bowel disturbance in age group of 41-50 yrs. and another recurrent case presented with low back pain and radiculopathy. Radiculopathy is present in 2 cases among age group 41-50 yrs. (Table 2).

Sl. No.	Age group	No. of cases	Presenting Complaint	Duration of symptoms	Nurick grade level	Spinal level	Level Operated	Post-Operative Nurick grade	others
1.	21-30	2	*Back pain, spastic weakness and numbness **Spastic weakness and parasthesias	*3 months, 2 months,1 month **18 months, 1 year	*3 **4	*D10 PIVD with LF **D8, D9	* D10 Laminectomy and Discectomy ADN LT Facetectomy **D8,D9 Laminectomy	*2 **3	-- ** Lumbar LIG Flavum 1,2,3,4
2.	31-40	1	*Back pain and parasthesias	* 6 months and 4 months	*2	*D9, D10	*D9,10 Laminectomy	*2	--
3.	41-50 (6, 11)	2	* Spastic weakness and numbness and urinary incontinence ** Back pain and parasthesias	*1year, 6 months, 1 month **1year and 1 month	*2 **2	* D10, D11, D12 **D10, D11, D7,D8	* D10,11,12 Laminectomy **failed back redo D7,8 Laminectomy	*2 ** 2	-- ** Failed back
4.	51-60 (1, 3)	2	*Back pain and incontinence **Back pain and Spastic Weakness and Parasthesias	*2years and 3 months ** 1 year, 6months and 4 months	*4 **3	* D9, D10, D11 ** D10, D11, D12	* D9, D10, D11 Laminectomy ** D10, D11, D12 Laminectomy	* 3 ** 3	*Cervical Spondylotic ** Cervical Spondylotic
5.	61-70	0	--	--	--		--	--	--
	Total	7							

Table 1: The age distribution, symptomatology, duration of symptoms, preoperative Nurick grading, spinal segment involved, level of spine operated, post-operative Nurick grading and other associated features among Female patients with ossified ligamentum flavum.

Sl. No.	Age group	No. of cases	Presenting Complaint	Duration of symptoms	Nurick grade level	Spinal level	Level Operated	Post-Op Nurick grade	Others
1	31-40	1	*Spastic Weakness post-operative case	*1yr post-surgery	*3	* D6, 7,8,9,10	* D6, D10 Laminectomy	*3	* Previously D7,8,9 Levels
2.	41-50	6	*Spastic Weakness and Radiating pain and parasthesias	*1 yr 6 months	*5	* D7,8,9	* D7,8,9 Laminectomy	*4	--
			**Sudden onset weakness with Bowel disturbance	**Trivial Fall	**. 5	** D2,3	** D2, 3 Laminectomy	**3	** D11,12 LIG Flavum
			***Spastic Weakness and numbness	*** 6 months and 1 month	***4	***D6,7,8,9	***D6,7,8,9 Laminectomy	***.4	***Degenerative Cervical and Lumbar changes
			****Low Backache and Radiculopathy	**** Failed back 1yr	****2	****L4/5 LIG Flavum	****L4/5 LIG A Flavum Excision	****1	****Failed back previous D11,12
			*****Spastic Quadriparesis	***** 3 yrs.	***** 5	***** Cervical OPLL C2,6	*****Cervical Corpectomy	***** 4	***** with D2-12LF and at L4-5 level
			****** Spastic Quadriparesis	******2 yrs.	******3	****** C2-4 OPLL	****** Cervical Corpectomy	******2	******D7,8,9,10,11

3.	51-60	3	*Spastic weakness and parasthesias ** Spastic weakness and Numbness ***back pain, Spastic weakness and Incontinence	*1yr and 6 months **1yr and 5months *** 1 yr., 1yr, 1 month	*5 **3 *** 5	*D1,2,3,4 and D11,12 ** D5,6,7 *** D1,D2	* not operated ** D5,6,7 Laminectomy *** D1,D2 Laminectomy	* --- **3 ***4	* --- ** --- ***Dish with D6-D11 Ossified all
4.	61-70	4	* Spastic weakness and Incontinence **Post Trivial fall Paresthesia *** back pain, Spastic weakness and Parasthesias and Urinary Incontinence **** Spastic weakness and Numbness	*6months and 1 month ** sudden onset ***2yrs, 1month, 2wks, 1wk **** 1yr and 6 months	*5 **2 ***2 ****5	* D7,8,9 **D2-L1 LIF with Cervical OPLL ***D10, D11 **** D7,8,9	* D7,8,9 Laminectomy ** Cervical Corpectomy ***D10, D11 Laminectomy **** D7,8,9 Laminectomy	*3 **2 ***2 ****3	* --- ** -- ***DISH C3-D1 OPLL ****Cervical Spondylotic
	Total	14							

Table 2: The age distribution, symptomatology, duration of symptoms, preoperative Nurick grading, spinal segment involved, level of spine operated, post-operative Nurick grading and other associated features among Male patients with ossified ligamentum flavum.

Ossified ligamentum flavum may present as two distinct syndromes. The first involves chronic spinal cord compression over a long period of time and presents with unsteady gait, difficulty with balance and climbing stairs, with or without unilateral/ bilateral neurogenic claudication. This is followed by progressively increasing spastic paraparesis during walking on level ground and requiring walking aid or support. In the second syndrome, OLF may present with acute myelopathy after minor trauma. There is a sudden compromise in an asymptomatic, but narrowed, spinal canal by haematoma and oedema, with or without bony/soft tissue impingement secondary to the trauma.[10]

With regard to the duration of symptoms in females with increasing age there is a delay in presentation of the patient. When there is urinary incontinence or numbness patients are seeking medical advice earlier (Table 1). In all age groups of males duration of symptoms was around 1 year and above 2 years duration is observed in age group of 41-50 yrs (may be due to work pressure and physical stress). Sudden onset weakness with trivial fall seen in age group 41-50 and 61-70. Urinary incontinence lead to presentation of the patient to doctor at the earliest (Table 2).

The preoperative female patients among 31-50 yrs. age presented with good Nurick Grade with lesser intensity of the disease. Among 21-30 and 51-60 age group presented with poor Nurick grade with greater intensity of the disease (Table 1). While among the males, presentation with Nurick grade 5 seen among all age groups and are usually associated with disease at a higher level in the spinal cord. In the age group of 41-50 cases are seen with all grades of Nurick (2, 3, 4, 5). Grade 3 is seen in 31-60 yrs age group (Table 2).

The level of spinal involvement in females of all age groups is lower dorsal (D9, D10, D11). One case was associated with PIVD at D10 level in age group of 21-30 yrs. Among 51-60 years age group cervical spondylotic changes are also present along with thickened ligamentum flavum (Table 1). Among males in all age groups lower thoracic is involved along with involvement of the other spinal segments. Associated cervical OPLL is present in age groups 41-50 and 61-70. Trivial fall leading to symptoms is associated with higher level in upper thoracic or lower cervical region (Table 2). DISH is seen in 2 cases among 51-70 yrs. age group with Ossified Anterior Longitudinal Ligament in one case (D6-D11).

In female patients for all cases decompressive laminectomy was done. One case with PIVD (i.e. 21-30 yrs.), discectomy and facetectomy was done along with laminectomy. Another patient redo surgery was done at a higher level than that of previous level (Table 1). Among male patients, cases associated with cervical OPLL cervical corpectomy was done and the remaining cases decompressive laminectomy was done. 2 cases redo surgeries were done with one at a higher level (31-50) and one at a lower level (41-50) (Table 2).

On comparison with preoperative Nurick grade among female patients, case in the age groups 31-60 yrs. are seen without any improvement in Nurick's grade post operatively. While improvement with 1 grade seen in age group 21-30 and 51-60 (Table 1). Male patients among all age groups are seen without any improvement in Nurick grade. However there is an improvement of 1 grade in age groups 41-60 yrs. It is also observed that 2 points improvement in Nurick grade seen in cases presenting with Grade 5 and those with urinary or bowel incontinence (Table 2).

CONCLUSION: Males are twice more commonly involved than females. Parasthesias are present among all age groups of both males and females. Spastic weakness is also present in almost all age groups of both males and females except in female population of 31-40 years. Urinary incontinence is

observed in higher age groups of males (51-70 years) and females (41-60 years).

In all age groups of females and males except for females of 31-40 years the duration of symptoms was observed for 1 year. Trivial fall leading to sudden onset of symptoms were seen only in male patients and that to at a higher spinal level (2 cases) while one case in female (21-30) was observed with 3 months' duration of symptoms. After the onset of urinary incontinence, patients are seeking medical attention within 1 week to 1 month duration.

Except for age group of 31-50 years in females, patients presented with poor Nurick grade (grade 4, 5) in all age groups of males and females. It is also observed that no female patients presented with Nurick grade 5.

In all age groups of both males and females lower dorsal segment is most commonly involved. In females predominantly lower dorsal segments are involved whereas multiple level involvement is common in male patients. In males associated cervical OPLL is observed in age groups of 41-50 and 61-70 years. DISH is observed in 2 male patients predominantly of older population (51-70).

All cases decompressive laminectomy was done except in two cases of male where cervical corpectomy was done for OPLL. Recurrent cases were operated in both male and female patients.

In male patients, cases are seen among all age groups with no improvement in post-operative Nurick grade while the same is observed in females of age group 31-60 years. While improvement in 2 points in Nurick grade is observed in male patients, no females showed two points improvement.

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