Original Research Article

Assessment of capability of CT myelography in finding out the aetiopathology of lumbar canal stenosis and prolapsed intervertebral disc

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Abstract

Background: Degenerative lumbar spinal stenosis (DLSS) is the most common type of spinal stenosis, with a reported incidence of 2–8% in the general population. It is a common spinal disorder in the older population, and a clinical syndrome consisting of pain in the buttock or lower extremity, with or without low back pain and corresponding imaging findings of narrowing of spaces around neural and vascular elements in the lumbar spine. **Amis and objectives:** Assessment of capability of CT Myelography in finding out the aetiopathology of lumbar canal stenosis and prolapsed intervertebral disc. **Methodology:** 100 cases from rural population with clinical history of low backache and lower limb neurodeficit with probable lumbar canal stenosis or prolapsed inter-vertebral disc were taken up for CT scanning. Informed consents were obtained from all the participants All patients underwent complete physical and neurological examinations including straight leg raising test, femoral stretch test, ankle/knee reflexes, motor and sensory examinations of both lower limbs. The spine was examined for tenderness and deformity. **Results:** It was seen that majority of the patients in the present study were male (65%) with age between 31-50years if age. Lumbar canal stenosis was diagnosed in 28 cases, Prolapsed inter-vertebral disc was diagnosed in 56 cases and both Lumbar canal stenosis and Prolapsed inter-vertebral disc was diagnosed in 16 cases. Congenital cause of spinal cord stenosis was observed in 22.8% cases. In acquired causes Bulging annulus fibrosus was the most common cause observed in 25% cases followed by the Ligamentum flavum hypertrophy in 13.6% cases, Spondylolisthesis and Spondylolysis in 11.4% cases and traumatic in 9% cases. **Conclusion:** CT Myelography is very sensitive in detecting the degenerative changes like osteophytes, vacuum phenomenon, Schmorl's nodes and facetal arthropathic changes. In the surgical follow-up available in 64 cases, CT Myelography correctly diagnosed 81.8% cases of lumbar canal stenosis, 93.1% cases of prolapsed intervertebral disc and 88.8% cases of lumbar canal stenosis and prolapsed intervertebral disc. Thus, CT Myelography may be used as modality of choice in evaluating the patients who are clinically suspected of lumbar canal stenosis and prolapsed intervertebral disc.

Key words: CT Myelography, etiopathology, lumbar canal stenosis, prolapsed intervertebral disc.

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INTRODUCTION

Degenerative lumbar spinal stenosis (DLSS) is the most common type of spinal stenosis, with a reported incidence of 2–8% in the general population[1].It is a common spinal disorder in the older population, and a clinical syndrome consisting of pain in the buttock or lower extremity, with or without low back pain and corresponding imaging findings of narrowing of spaces around neural and vascular elements in the lumbar spine.[2-4] Nodal point of pathogenesis of spinal "degeneration" is instability of the spinal segment/s related to abuse, misuse, or injury to the

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muscles of the spine. Standing human position and lifelong stress on the muscles and related wear and tear lead to instability that is manifested at the facets that are the fulcrum of all spinal movements. Vertical reduction in the distance between adjacent vertebrae results incircumferential buckling of all the inter-vertebral ligaments that include the ligamentum flavum and posterior longitudinal ligament. Ligamentum flavum "hypertrophy," osteophyte formation, and disc space reduction are not the primary pathological events but the secondary effects of spinal instability. The net effect is reduction in the spinal canal and root canal dimensions.[5] Present study was conducted to assess the capability of CT myelography in finding out the aetiopathology of lumbar canal stenosis and prolapsed intervertebral disc.

AMIS AND OBJECTIVES

Assessment of capability of CT Myelography in finding out the aetiopathology of lumbar canal stenosis and prolapsed intervertebral disc.

METHODOLOGY

The present cross-sectional study was conducted for assessing the capability of CT Myelography in finding out the aetiopathology of lumbar canal stenosis and prolapsed intervertebral disc. For the purpose of study patients with clinical history of low backache and lower limb neurodeficit with probable lumbar canal stenosis or prolapsed inter-vertebral disc were selected for the study. Patients suffering from polyartharalgia, spinal tuberculosis, past history of lumbar disc surgery, and spinal/peripheral nerve injuries were not included. Cases with history of drug/food allergies, bleeding disorders, local skin infections, and patients on anticoagulant, antihyperglycemics, or antiepileptic drugs were also excluded A pilot study was conducted and 40% Prevalence of backache was observed. Considering the prevalence of backache 40% and allowable error 10% sample size was calculated by using Sample size calculation formula (n= 4pq/l2). Thus the calculated sample size was 96 and it was round up 100. Thus total 100 participants were selected in the present study. Total 100 cases from rural population with clinical history of low backache and lower limb neurodeficit with probable lumbar canal stenosis or prolapsed inter-vertebral disc were taken up for CT scanning. Informed consents were obtained from all the participants All patients underwent complete physical and neurological examinations including straight leg raising test, femoral stretch test, ankle/knee reflexes, motor and sensory examinations of both lower limbs. The spine was examined for tenderness and deformity.

RESULT

Table 1: Age wise distribution of study participants

Age group (Years)	No. Of patients	Percentage
<20	01	1
21-30	15	15
31-40	38	38
41-50	30	30
51-60	11	11
>60	05	5
Total	**100**	**100**

It was observed that majority of the patients i.e. 68 (68%) were in 31-50 years of age group. One patient below 20 years of age was enrolled in the study with traumatic lumbar canal stenosis.

Table 2: Gender wise distribution of study participants

Gender	No. of patients	Percentage
Male	65	65
Female	35	35
Total	**100**	**100**

It was seen that majority of the patients in the present study were male 65 (65%) with male to female ratio of 1.85:1.

Table 3: Distribution of study participants as per diagnosis

Diagnosis	No. of patients	Percentage
Lumbar canal stenosis	28	28
Prolapsed intervertebral disc	56	56
Lumbar canal stenosis and Prolapsed intervertebral disc	16	16
Total	**100**	**100**

It was seen that out of total 100 cases in the present study Lumbar canal stenosis was diagnosed in 28 cases, Prolapsed inter-vertebral disc was diagnosed in 56 cases and both Lumbar canal stenosis and Prolapsed inter-vertebral disc was diagnosed in 16 cases.

Table 4: No. of cases of Lumbar Canal Stenosis according to aetiology

Type of stenosis			No. of cases	Percentage
Acquired		Congenital	10	22.8%
	Degenerative	Bulging annulus fibrosus	11	25.0%
		Ligamentum flavum hypertrophy	6	13.6%
		Spondylolisthesis and Spondylolysis	5	11.4%
	Traumatic		4	09.0%
	Combined (Congenital + Acquired)		08	18.2%
Total			**44**	**100%**

It was observed that congenital cause of spinal cord stenosis was observed in 10 (22.8%) cases. In acquired causes Bulging annulus fibrosus was the most common cause observed in 11 (25%) cases followed by the Ligamentum flavum hypertrophy in 6 (13.6%) cases, Spondylolisthesis and Spondylolysis in 5 (11.4%) cases and traumatic in 4(9%) cases.

Table 5: No. of Cases of Lumbar Canal Stenosis as per degenerative changes

Degenerative Changes	No. Of cases	Percentage
Degenerative changes over the body of lumbar vertebra	32	94.12
Degenerative changes over the apophyseal joints	19	55.88
Vacuum phenomenon		
Gas in the disc	14	41.18
Gas in the spinal canal	03	8.82
Schmorl's nodes	06	17.65

It was observed that out of total 34 cases with acquired stenosis degenerative changes changes over the body of lumbar vertebra was seen in 32 (94.12%) cases followed by degenerative changes over the apophyseal joints was seen 19 (55.88%) cases. Gas in the disc and gas in the spinal canal was seen in 14 (41.18%) and 3 (8.82%) cases respectively. Schmorl's nodes was seen in 6 (17.65%) cases with acquired stenosis.

Table 6: Distribution of cases as per CT diagnosis and positive surgical correlation

Hvbbbc	No. Of Cases	No. Of Cases with +ve surgical correlation	Percentage
Lumbar canal stenosis	11	09	81.8%
Prolapsed intervertebral disc	44	41	93.1%
Lumbar canal stenosis and prolapsed intervertebral disc	09	08	88.8%

Above table shows CT diagnosis and number of cases with positive surgical correlation. It was observed that out of 11 cases with lumbar canal stenosis positive surgical correlation was observed in 9 (81.8%) cases, out of 44 cases with prolapsed inter-vertebral disc positive surgical correlation was observed in 41 (93.1%) cases and out of 9 cases diagnosed with lumbar canal stenosis and prolapsed intervertebral disc positive surgical correlation was observed in 8 (88.8%) cases.

DISCUSSION

With increasing longevity of life due to better medical care and socioeconomic condition the percentage of aging populations had increased so the prevalence of degenerative musculoskeletal diseases and associated clinical disability is also on the rise. Present study was conducted in rural population to assess capability of CT Myelography in finding out the aetiopathology of lumbar canal stenosis and prolapsed intervertebral disc. It was observed that majority of the patients i.e. 68 (68%) were in 31-50 years of age group. One patient below 20 years of age was enrolled in the study with traumatic lumbar canal stenosis. Study conducted by the Chiranjit De *et al.*[6] observed maximum number of patients in fourth decade. It was seen that majority of the patients in the present study were male 65 (65%) and 35 (35%) were female with male to female ratio of 1.85:1. Males affected more most probably due to increased mechanical stress and prone to injuries due to more outdoor activities. Similar findings were observed in the study conducted by the Garjesh Singh Rai *et al.*[7] revealed disc degeneration was quite higher among males (62%) as compared to females (38%). Study conducted by the Eijiro Okada *et al.*[8] observed that males were affected more i.e. (62.7%) compared to the females (33.3%). It was seen that out of total 100 cases in the present study Lumbar canal stenosis was diagnosed in 28 (28%) cases, Prolapsed inter-vertebral disc was diagnosed in 56 (56%) cases and both Lumbar canal stenosis and Prolapsed inter-vertebral disc was diagnosed in 16 cases. Study conducted by the S Boden *et al.*[9] observed that spinal canal stenosis in 24% cases. It was observed that congenital cause of spinal cord stenosis was observed in 10 (22.8%) cases. In acquired causes Bulging annulus fibrosus was the most common cause observed in 11 (25%) cases followed by the Ligamentum flavum hypertrophy in 6 (13.6%) cases, Spondylolisthesis and Spondylolysis in 5 (11.4%) cases and traumatic in 4(9%) cases. (Table 4) study conducted by the Garjesh Singh Rai *et al.*[7] revealed

ligamentum flavum hypertrophy was the commonest among all non- discogenic causes of spinal canal stenosis constitutes almost 90% share, author also mentioned degenerative changes were seen in majority (93%) of patients. Study conducted by the Genevay S *et al.*[10] revealed reduced disc space, disc bulge and herniation was observed in most of spinal canal stenosis cases. Study conducted by the Thomé C *et al.*[11] observed spondylolisthesis more frequently in the patients of lumbar canal stenosis. Williams *et al.*[12] and Gulati *et al.*[13] mentioned bulging annuls as important casuse of spinal cord stenosis. Kurihara *et al.*[14] found ligamentum flavum hypertrophy as one of the main cause for degenerative stenosis. Jayakumar *et al.*[15] found herniated nucleus pulposus as a soft tissue density lesion continuous with the disc and compressing the dural sac and obliterating the epidural fat. It was observed that out of total 34 cases with acquired stenosis degenerative changes over the body of lumbar vertebra was seen in 32 (94.12%) cases followed by degenerative changes over the apophyseal joints was seen 19 (55.88%) cases. Gas in the disc and gas in the spinal canal was seen in 14 (41.18%) and 3 (8.82%) cases respectively. Schmorl's nodes was seen in 6 (17.65%) cases with acquired stenosis. Study conducted by the Janan Abbas *et al.*[16] observed that 80 (44.4%) individuals had at least one Schmorl's nodes along the lumbar spine. and incidence of discal Vaccum phenomenon in approximately 50% of subjects over 40 years of age. It was observed that out of 11 cases with lumbar canal stenosis positive surgical correlation was observed in 9 (81.8%) cases, out of 44 cases with prolapsed inter-vertebral disc positive surgical correlation was observed in 41 (93.1%) cases and out of 9 cases diagnosed with lumbar canal stenosis and prolapsed intervertebral disc positive surgical correlation was observed in 8 (88.8%) cases. The biggest demand for CT of the lumbar spine is for the detection and assessment of disc diseases. High resolution CT scanning is becoming the primary definitive study for diagnosing or excluding from the diagnosis of a lumbar herniated disc. CT Myelography has further improved the diagnostic capability of the early prolapsed diseases. Myelography has been the standard radiologic examination method for suggested disc herniation for more than 30 years. The accuracy of rnyelography compared with surgery is reported to be approximately 85 to 90 per cent at the L4/L5 level and 75 to 80 per cent at the L5Y/S1 level.[17-18]

CONCLUSION

CT Myelography is very sensitive in detecting the degenerative changes like osteophytes, vacuum phenomenon, Schmorl's nodes and facetal arthropathic changes. In the surgical follow-up available in 64 cases, CT Myelography correctly diagnosed 81.8% cases of lumbar canal stenosis, 93.1% cases of prolapsed intervertebral disc and 88.8% cases of lumbar canal stenosis and prolapsed intervertebral disc. Thus, CT Myelography may be used as modality of choice in evaluating the patients who are clinically suspected of lumbar canal stenosis and prolapsed intervertebral disc.

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