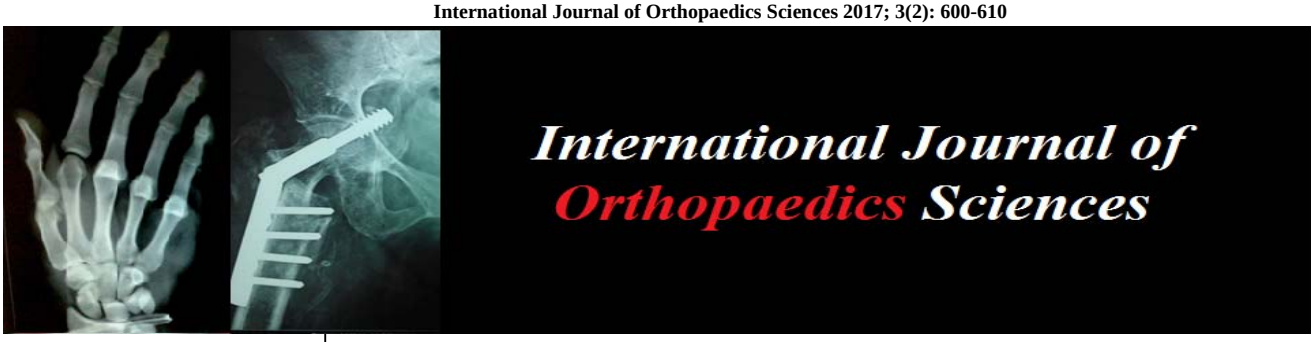

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Observational study of various spinal disorders regarding correlation of radiological and clinical parameters

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Abstract
Background: Today various spinal diseases are diagnosed by means of clinicoradiological methods such as X-ray, MR Imaging and CT scan. Need of such investigations is essential to have idea about the pathology one is going to treat intraoperatively. Many times clinical & radiological diagnosis is not consistent with operative findings. Therefore, surgeon is at a loss to choose proper operative procedure planned preoperatively. An attempt has been done to correlate clinicoradiological findings with operative findings of 40 cases selected prospectively at this Orthopaedic and trauma hospital.
Materials and methods: This is a prospective study of 40 cases of various spinal disorders performed at Orthopaedic and Trauma Hospital, Miraj, Maharashtra during the period from February 2009 to January 2011. In the present study of 40 patients, there were 31 males and 9 females above the age of 20 years. Most of the patients were initially seen on outpatient basis. Detailed history was taken and thorough local as well as neurological examination was carried out.
Results and discussion: The commonest age group affected was 41-50. 75% of cases were above 40 years of age. Males are affected more than females. 77.5% of patients were males. In present study, PID was most common spinal disorder. Manual workers and farmers are more affected. Most affected level is L4/L5 disc. Sagittal diameter was measured at MRI sections and its relation with difficulty during operation was noted. It was seen with narrower the diameter more the difficulty during operation.
Conclusion: MRI may underestimate nerve root tension, hence special efforts needed intraoperatively to estimate nerve root tension. If found appropriate procedure should be followed. MRI is oversensitive to disc pathology. Good clinical correlation is required to deal with pathological disc lesions at the time of surgery.

Keywords: Spinal disorders, radiological, clinical parameters, clinicoradiological methods

Introduction
Today spinal diseases are common cause of pain and affect all age groups. With the increase our knowledge & advancement in spine surgery and anesthesia, one is able to reach specific diagnosis. Today various spinal diseases are diagnosed by means of clinicoradiological methods such as X-ray, MR Imaging and CT scan. Need of such investigations is essential to have idea about the pathology one is going to treat intraoperatively.
Many times clinical & radiological diagnosis is not consistent with operative findings. Therefore, surgeon is at a loss to choose proper operative procedure planned preoperatively.
Orthopaedic and trauma hospital, Miraj drains a large number of rural, agro -based population engaged in agriculture practices, so there are many patients with cases of degenerative and infective spinal diseases. Miraj is well known for its medical facilities. Orthopaedic and trauma hospital is situated in Miraj for last 25 years and is tertiary referral center for management of spinal diseases. Miraj is connected with highway and big cities like Mumbai, Pune & Bengaluru and so gets lot of road traffic accident cases (e.g. spinal fractures).
In the present study, all types of spine cases are included such as degenerative, traumatic and infective spinal disorders. An attempt has been done to correlate clinicoradiological findings with operative findings of 40 cases selected prospectively at this Orthopaedic and trauma hospital.
Therefore, it is hoped that this work would find some guidelines that would indicate actual spine pathology & it would help clinician to be on guard during treatment of spinal disorders. It may help to reduce number of failed back surgery syndrome cases.

Aims and objectives

- To study all spinal cases who presented to this hospital & were operated subsequently.
- To evaluate clinicoradiological findings with operative findings in spinal cases under study.
- To find possible guidelines (indicators) to help clinicians to understand the actual pathology.

Materials and methods

This is a prospective study of 40 cases of various spinal disorders performed at Orthopaedic and Trauma Hospital, Miraj, Maharashtra during the period from February 2009 to January 2011.

In the present study of 40 patients, there were 31 males and 9 females above the age of 20 years. Most of the patients were initially seen on outpatient basis. Detailed history was taken and thorough local as well as neurological examination was carried out.

All the patients were investigated for X-rays of spine; Anteroposterior/Lateral views were taken. In special situation, Flexion & Extension views were taken. Patients and X-rays were evaluated under consultants' opinion and further line of management was decided.

Most of patients were given a trial of conservative treatment in the form of rest, analgesics, diathermy, spinal belts, and spinal exercises. In cases like fracture, tuberculous paraplegia, acute PID with confirmed severe neurological deficit operative procedure was adopted without conservative management.

In present study MRI was carried out in 39 patients with 1.5 Tesla scanning machine and CT scan was carried out in 1 patient.

Inclusion criteria were as follows

1. Operated cases of spinal disorders like prolapsed intervertebral disc (PID), Spinal canal stenosis, spondylolisthesis, spinal instability, tuberculosis and traumatic fractures.
2. Age >20 years.

Exclusion criteria as follows

1. Patients who have responded to a trial of conservative treatment.
2. Age <20 years.
3. Patients not willing for surgery.
4. Medically unfit patients.

From the radiological (X-ray, MRI and CT scan), expected findings which could be correlated positively or negatively intraoperative were noted.

All patients were assessed for fitness for anesthesia. Necessary investigations in the form of Chest X-ray, ECG, Complete Hemogram, Blood sugar, Blood urea, and Urine examination were carried out. Consent for surgery was taken.

Following surgeries were carried out:

Laminectomy, laminotomy, Hemilaminectomy, discectomy, Corpectomy and spinal fusion using pedicle screw and rod fixation, Hartshill rectangle fixation and Harrington fixation.

Patients were divided into following groups according to surgery undertaken:

Group 1: Laminectomy/ Hemilaminectomy/ Laminotomy/ Corpectomy

Group 2: Laminectomy/ Hemilaminectomy/ Laminotomy +Discectomy

Group 3: Laminectomy/ Hemilaminectomy/ Laminotomy+ Discectomy + Mesial facetectomy/Foraminotomy

Group 4: Anterior/ Posterior Stabilization with Any of above Surgery

Group 5: Anterior + Posterior Stabilization with Any of above Surgery

Anesthesia: All patients were operated under general anesthesia.

Procedure

Majority of our patients were given lateral position. Side was decided according to symptoms of radiculopathy. In unilateral radiculopathy, the affected side was kept up. In bilateral cases, dominant side was kept up. In bilateral equally symptomatic cases, left lateral position was given, as it was easier to do laminectomy from below upwards by a right-handed surgeon. Posterior midline incision was taken over affected spinal region. Paraspinal muscles were retracted & according to the need surgical procedure carried out. The proximal and distal extent of decompression was decided by passing dura retractor proximaly and distally Necessity of foraminotomy/ mesial facetectomy was decided by nerve root guide. Disc was removed in selected cases by disc forceps. Fixation was confirmed under C-arm.

Intraoperative assessment in various spinal pathologies: Thickness of lamina: It was measured at pathological level in midline with the help of depth measure used for 2.5 mm screws (In spinal canal stenosis-degenerative & due to direct factors). Thickness of ligamentum flavum: The ligamentum flavum was detached form proximal lamina and thickness was measured by the same instrument. (In SCS-degenerative & due to direct factors). Inter-pedicular distance: It was measured after laminectomy with the help of caliper. (In SCS-degenerative & due to direct factors). Sagittal diameter was measured in Imaging and amount of constriction was correlated at the pathology site. Absolute stenosis was defined as Anteroposterior diameter < 10mm on plain radiographs. Disc changes: According to classification of disc pathology, disc changes were identified & expected disc space reduction was correlated with the operative finding. Grade of spondylolisthesis was correlated and degree of stenosis was measured. Change in vertebral height: In case of the fracture, change in vertebral height was checked. According to expected site of stenosis cases of central and lateral canal was checked. Clinicoradiologically detected neuroforaminal encroachments were correlated with the nerve root changes. Expected changes were correlated with intraoperative findings. Vacuum phenomenon was confirmed by presence of cavity at the level of intervertebral disc in cases of instability. Facetal Hypertrophy was as identified & correlated with Clinicoradiological diagnosis. Psoas Abscess/Granulation Tissue/Epidural Extension: It was correlated in cases of tuberculosis.

Wound closed in layers. Perioperative antibiotics were administered. Post-operative management was done according to protocol.

The clinical, radiological and intraoperative findings were correlated as follows:

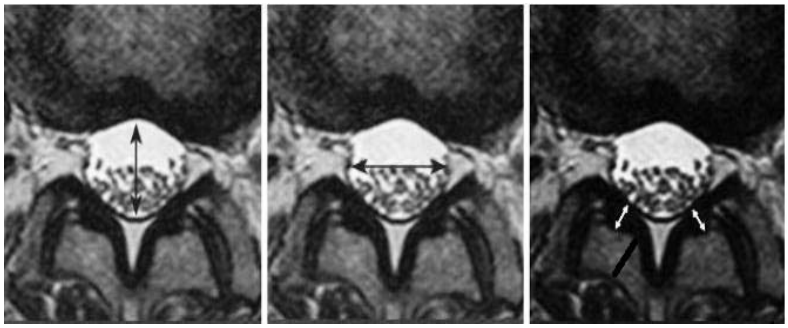
1. **Positive correlation:** In which patient's Operative findings were well correlated with the clinicoradiological expected findings. It was divided into positive bony correlation and positive soft tissue correlation.

2. **Negative correlation**: There was discrepancy between preoperative assessment and operative findings. It was divided into major discrepancy and minor discrepancy.

A. Major discrepancy: There was much difficulty during surgery as the problem was not estimated in preoperative radiological investigations. It was divided into major bony discrepancy and major soft tissue discrepancy.

B. Minor discrepancy: The operator faced some difficulty during surgery but it was overcome without much hastle. It was divided into minor bony discrepancy and minor soft tissue discrepancy.

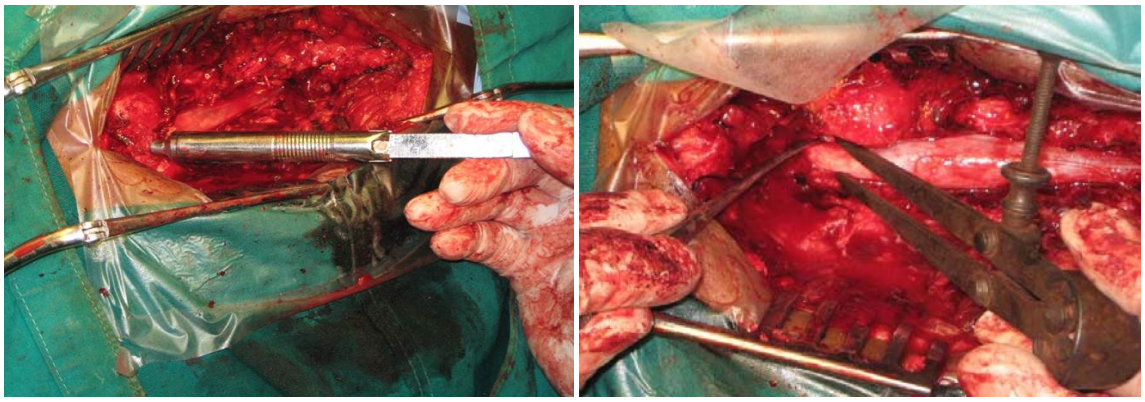
All patients were subjected to above procedure and analyzed.



A) B) C)

A) Measurement of Anteroposterior Diameter (Black Arrow)
B) Measurement of Transverse Diameter (Black Arrow)
C) Measurement of Ligamentum Flavum Thickness (White Arrow) and Laminar Thickness (Black Arrow)

Fig 1: Measurement of Diameter and Thickness from Radiology



A) B)

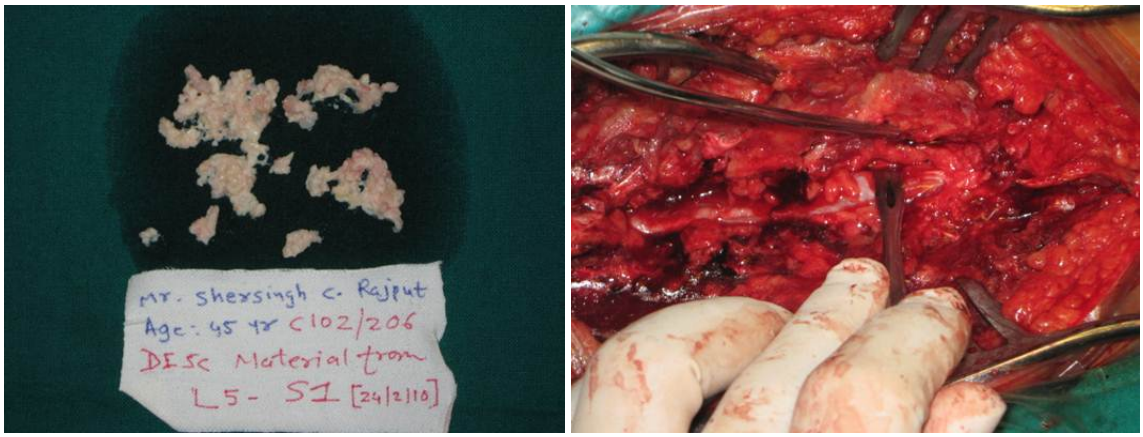
C) D)

A) Intraoperative measurement of interpedicular distance
B) Intraoperative measurement of ligamentum flavum thickness (similar can be used for lamina)
C) Inter-pedicular distance measurement
D) Measurement of laminar thickness

Fig 2: Intraoperative Measurement

A) B)

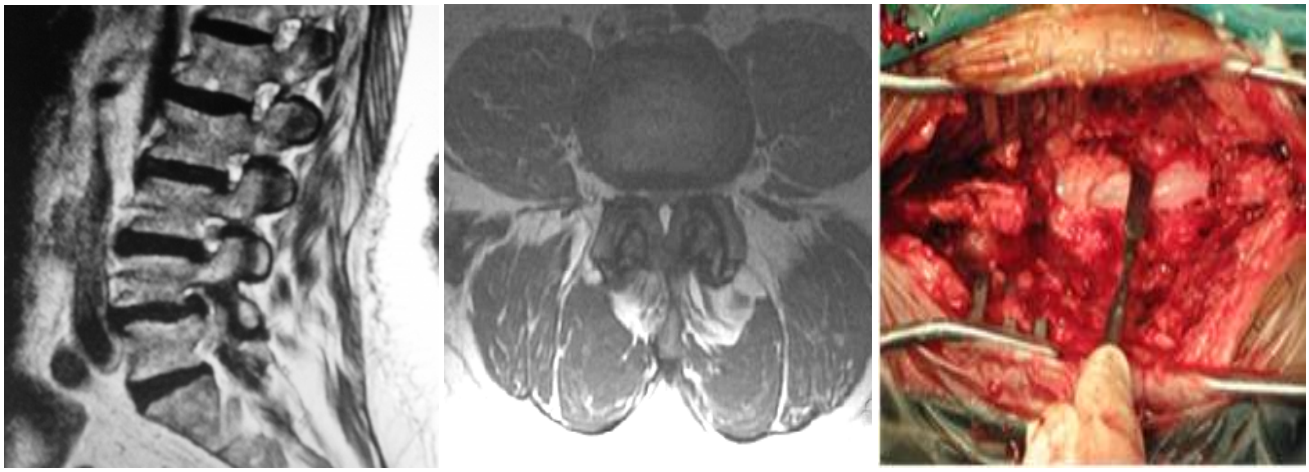
C) D)



D) E)

A, B) Plain radiographs showing degenerative changes in lower lumbar spine (decrease disc space reduction between L5/S1.
C, D) Disc at L5/S1-sagittal and axial section
E) Intraoperative photograph showing large disc bulging posteriorly
F) Excised disc material

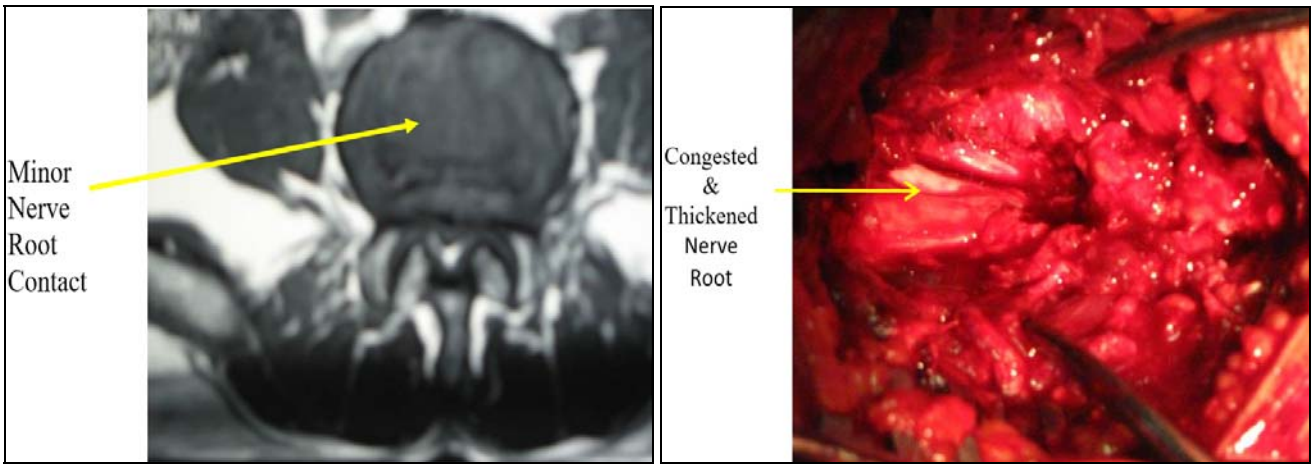
Fig 3: Positive correlation of Case of PID



A) B) C)

A) MRI showing L4/5 disc prolapse
B) Axial section showing narrow canal and facetal hypertrophy
C) Intraoperative photograph showing nerve root compression (Major Bony Discrepancy)

Fig 4: Case No.3 (P.S.J.) Showing Major Bony Discrepancy



A) B)

Fig 5: Case No.10 (S.C.R.) Showing Minor Soft Tissue Discrepancy

A) MRI axial image showing Minor Nerve Root Contact. (Right Side)
B) Intraoperative photograph showing congested and thickened nerve root. (Undetected by MRI.)

A) B) C)

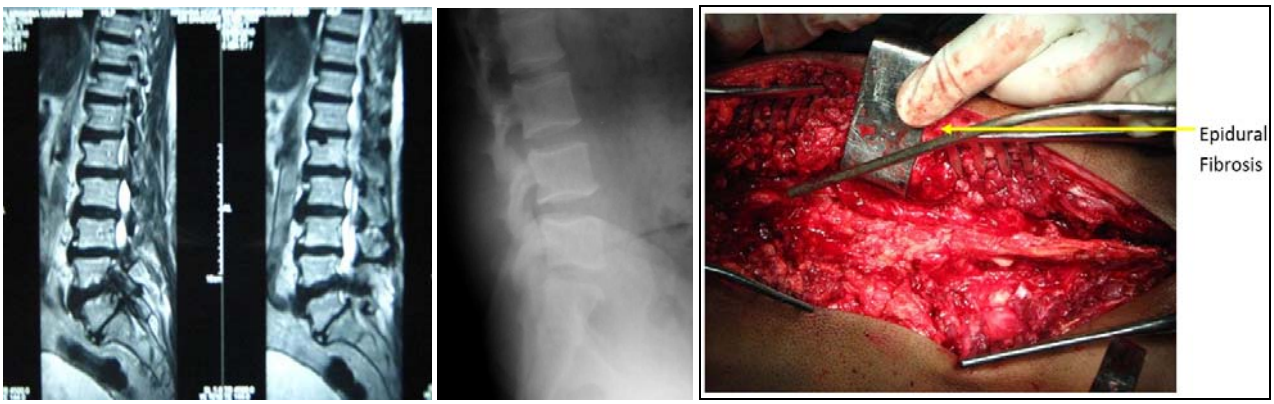
A) MRI showing L5/S1 disc
B) Axial image showing narrow canal, facetal hypertrophy on left side and possible existing nerve root compression
C) Intraoperative photograph showing calcified disc with bony spur. (Minor Soft Tissue Discrepancy)

Fig 6: Case No.21 (R.M.P.) Showing Minor Soft Tissue Discrepancy

A) B) C)

A) MRI showing L4/5 disc
B) Axial image showing narrow spinal canal
C) Intraoperative photograph showing epidural fibrosis. (Major Soft Tissue Discrepancy)

Fig 7: Case of no.6 (M.A.M.) Showing Major Soft Tissue Discrepancy

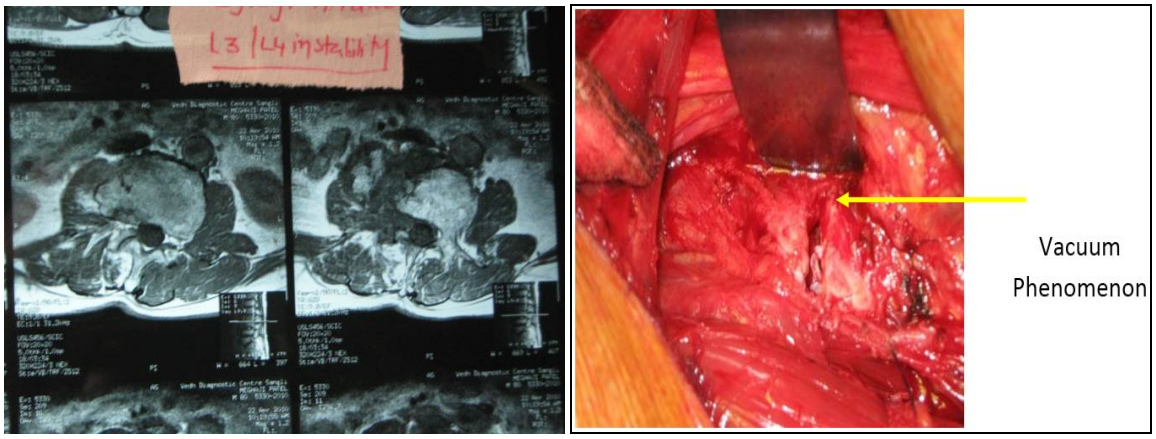


A) B) C)

A) X-ray showing L4/L5 disc space reduction
B) MRI sagittal section showing L4/5 disc
C) Intraoperative photograph showing epidural fibrosis. (Major Soft Tissue Discrepancy)

Fig 8: Case No.8 (R.B.O.) Showing Major Soft Tissue Discrepancy

A) B)



C) D)

A) Plain x-ray showing vacuum phenomenon ans lumbar spinal degenetative changes
B) Sagittal section showing vacuum phenomenon and degenerative changes
C) Axially- narrow spinal canal, facetal hypertrophy. (T_1W)
D) Intraoperative photograph showing vacuum phenomenon. (Positive Correlation)

Fig 9: Case No.39 (M.M.P.) showing positive correlation in lumbar instability

Observations

Table 1: Age (in year) distribution

No. of cases of each diagnosis	20-30	31-40	41-50	51-60	61-70	>70	Total
PID	0	5	6	4	4	1	20
Spinal canal stenosis	0	1	3	1	3	0	8
Spondylolisthesis	0	0	1	1	1	1	4
Lumbar instability	0	0	1	0	0	1	2
Tuberculosis	1	0	1	1	0	0	3
Fracture vertebra	2	0	1	0	0	0	3
	3	6	13	7	8	3	40

It was found in present series that commonest age group affected was 41-50. 75% of cases were above 40 years of age.

Table 2: Sex distribution

Cases	Male	Female	Total
PID	16	4	20
Spinal canal stenosis	7	1	8
Spondylolisthesis	1	3	4
Lumbar instability	2	0	2
Tuberculosis	2	1	3
Fracture vertebra	3	0	3
	31	9	40

Males are affected more than females. 77.5% of patients were males.

Table 3: Different types of spinal disorders

Clinicoradiological diagnosis	No. of cases	Percentage
PID	20	50%
Spinal canal stenosis	8	20%
Spondylolisthesis	4	10%
Lumbar instability	2	5%
Tuberculosis	3	7.5%
Fracture vertebra	3	7.5%
	40	100%

In present study, PID was most common spinal disorder.

Table 4: Occupation related to each spinal disorder

No. of cases of each diagnosis	Occupation				Total
	Housewife	Manual worker	Farmer	Sedentary	
PID	4	2	13	1	20
Spinal canal stenosis	1	4	2	1	8
Spondylolisthesis	3	0	1	0	4
Lumbar instability	0	0	1	1	2
Tuberculosis	2	1	0	0	3
Fracture vertebra	0	3	0	0	3
	10	10	17	3	40

Manual workers and farmers are more affected.

Table 5: Disc level in cases of PID

Level of disc	Unilateral Presentation	Bilateral Presentation
L1-L2	0	0
L2-L3	1	0
L3-L4	2	1
L4-L5	12	2
L5-S1	5	0

Most affected level is L4/L5 disc.

Table 6: Correlation of MRI noted Canal Diameters with intraoperative finding in Degenerative SCS:

	No. of cases	Interpedicular distance in mm at narrowest canal site					Sagittal diameter at narrowest canal site			
		<20	20-23	24-26	27-30	>30	<5	5-7	8-10	>10
MRI findings	12	3	6	3	0	0	2	9	1	0
Operative findings	12	3	6	3	0	0	2	9	1	0

Four cases of degenerative spondylolisthesis associated canal stenosis have been included. Sagittal diameter was measured at MRI sections and its relation with difficulty during operation was noted. It was seen with narrower the diameter more the difficulty during operation.

Table 7: Operative procedures undertaken in all spinal disorders

Clinicoradiological diagnosis	Group1	Group2	Group3	Group4	Group5	Total
PID	2	14	3	1	0	20
Degenerative spinal canal stenosis	5	2	1	0	0	8
Degenerative Spondylolisthesis	1	0	0	3	0	4
Lumbar instability	0	0	0	2	0	2
Tuberculosis	1	0	0	1	1	3
Fracture vertebra	0	0	0	2	1	3
	9	16	4	9	2	40

Group 1: Laminectomy/Hemilaminectomy/Laminotomy

Group 2: Laminectomy/Hemilaminectomy/Laminotomy +Discectomy

Group 3: Laminectomy / Hemilaminectomy / Laminotomy + Discectomy + Facetectomy / Foraminotomy

Group 4: Anterior/Posterior Stabilization With or Without Above Surgery

Group 5: Anterior + Posterior Stabilization With or Without Above Surgery

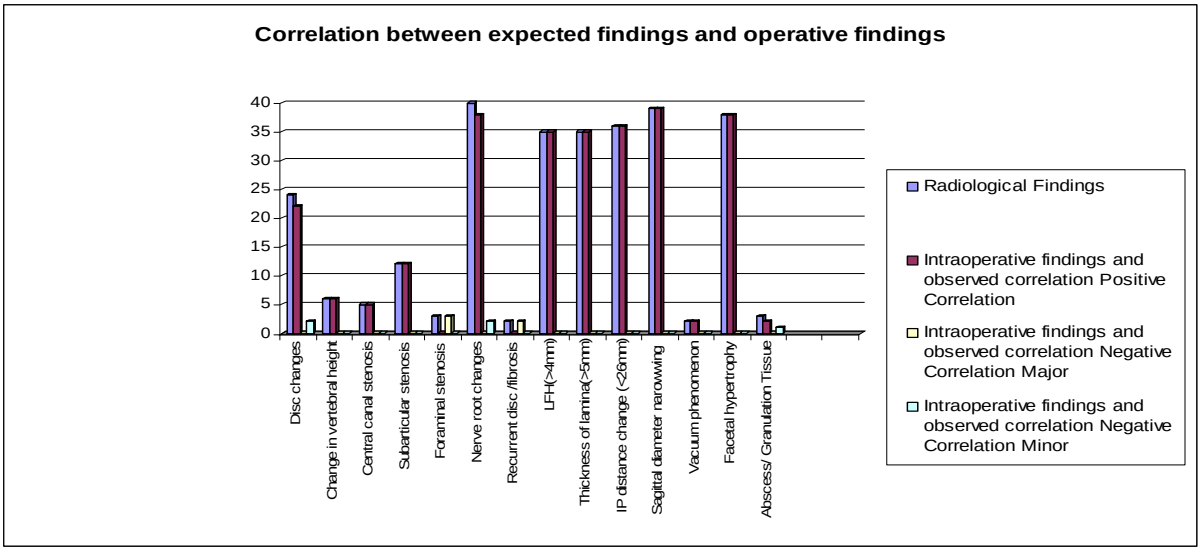


Chart 1: Correlation between radiological findings and operative findings

Table 9: Interpretation of Data

Clinicoradiological diagnosis	Total Cases		Positive correlation		Negative correlation			
					Major discrepancy		Minor discrepancy	
	Bony	Soft tissue	Bony	Soft tissue	Bony	Soft tissue	Bony	Soft tissue
PID	20	20	17	14	3	2	0	4
Spinal canal stenosis	8	8	8	8	0	0	0	0
Spondylolisthesis	4	4	4	4	0	0	0	0
Lumbar instability	2	2	2	2	0	0	0	0
Tuberculosis	3	3	3	2	0	0	0	1
Facture vertebra	3	3	3	3	0	0	0	0
Total cases	40	40	37	33	3	2	0	5

Discussion

40 cases of spinal disorders were studied. All these cases were studied at Orthopaedic and Trauma Hospital, Miraj during February 2009 to January 2011.

Age distribution

In present study, all patients were more than 20 years of age. The maximum age incidence was found above 40 years, which included patients of disc prolapse, degenerative spinal canal stenosis, spondylolisthesis, lumbar instability & tuberculosis. However most of cases of acute disc prolapse and traumatic spinal disorders were under 40 years of age.

Atlas [1] *et al* reported peak incidence of PID was between 30 to 55 years of age. C.J.M. Getty [2] reported that maximum age incidence of Spinal canal stenosis was between 51 to 60 years with mean age 52 years. Jacobson [3] *et al* reported that mean age for spondylolisthesis was 62 years. Michael Heinzelmann [4] *et al* reported thoracolumbar fractures were more between the ages of 20 and 40 years. Dharmalingam [5] reported mean age was 36.5 year in cases of tuberculous spine.

Our findings are well consistent with previous authors.

Sex distribution:

There was male preponderance in all spinal disorders under study (except spondylolisthesis). Kelsey [6] reported male predominance in cases of PID. Mervine Tile [7] *et al* reported male predominance in his study (77.14%) for the spinal canal stenosis. Michael Heinzelmann *et al* reported 2/3rd male preponderance in thoracolumbar fractures. Dharmalingum also observed males were more affected in cases of spinal tuberculosis. Our findings are matching with the above studies (See observation table no.2).

In this study, out of 4 spondylolisthesis, there were 3 females and 1 male. Jacobsen *et al* reported spondylolisthesis more common in females (Female: Male ratio was 6.4:1). This was probably related to body mass index and postmenopausal age. Our findings are matching with the Jacobson study.

Incidence of each spinal disorder:

In this present study, there were 20 patients (50%) suffering from disc problems. Thus making a large proportion in present series suffering from disc problems (observation table no.3).

Macnab [8] stated that disc degeneration and related spinal disorders were common to all ages. Similar presentation has not been done.

Occupation:

In present study, incidence of spinal disorders were found maximum in farmers (42.5%) followed by manual workers (25%) and housewives (25%). Luoma [9] stated disc degeneration was common due to occupational loads. Mariconda [10] *et al* found a heavier job workload was the only occupational factor positively related to the degree of spinal disability at the multivariate analysis (see observation table no.4).

Level of disc in the cases of PID:

In the present study, out of total cases of PID, 85% suffered from disc prolapse at lower lumbar level (see observation table no.5).

Spangfort [11] had reviewed 49 publications related to lumbar disc lesions, found that most of the lumbar disc herniations were seen at L4/5 (49.8%) and L5/S1 (46.9%). Ken Hsu [12] also reported 64.4% incidence of disc pathology in lower lumbar spine.

Our incidence is matching with the finding of above workers.

Comparison of Clinicoradiological and Operative findings
In cases of PID
Total cases of PID-20(50%)
Major bony discrepancy-3, Minor bony discrepancy-0
Major soft tissue discrepancy-2, Minor soft tissue discrepancy-4
Out of 3 major bony discrepancies, one patient (No.3) required redo surgery. The reason was that present practice of MRI is sections are taken at the distance of 5 mm.1 section is taken at disc level and next section is taken at mid body level, with resultant miss of foraminal stenosis. In above patient there was nerve root compression which was missed. After this case radiologist was requested by us to take closer sections at the level of the intervertebral foramen to give proper information of stenosis and subrhizal disc prolapse. - Repeat closer sections were taken in Case No. 7 & 17 and foraminal stenosis was diagnosed. Accordingly special efforts were taken to decompress the foramina. Thus avoiding Redo – surgery in Case No. 7 & 17. These are examples of major bony discrepancy. Richard Herzog [13] *et al* also stressed that closer sections should be taken on MR Imaging at the level of pathology.
In patients (No.2 & No.10), MRI showed nerve root contact with disc material (pfirrmann [14] classification) preoperatively nerve root tension could not be assessed. However we found nerve root was under tension because of sub rhizal bulging disc material so there were cases of minor soft tissue discrepancy. Walter S. Bartynski [15] *et al* had described considerable difficulty in predicting root compression in the lateral recess when using MR imaging.
In patient (No.21), MRI reported L5/S1 disc herniation. During operation, hypertrophy of ligamentum flavum was found to be a main cause of nerve root compression. The symptoms in this case were relieved by doing laminectomy at L5 level and excision of ligamentum flavum without discectomy. Therefore, this case was of minor soft tissue discrepancy.
In patient (No.4), MRI showed L3/4 disc central protrusion & L4/5 disc peripheral protrusion. During operation, it was seen that L3/4 disc was not causing significant pressure on nerve root while L4/5 disc was causing pressure on nerve root. The L3/4 disc was calcified with posterior osteophytes and hence left alone. Therefore, this was a case of minor soft tissue discrepancy. Though MRI reported showed disc prolapse at L3/4, it was not causing significant pressure on the dural sac to intervene. Thus it appears that MRI is oversensitive to disc. This findings correspond with the study done by Boden [16] who showed disc herniations in asymptomatic patients and thereby concluded that MRI was oversensitive in diagnosing the disc herniations.
In patient (No.6), because of previous surgery, dura was seen tightly adherant to the lamina, which was not revealed on MRI study. During surgery there was a lot of difficulty in separating the dura from lamina. This situation could be rectified if contrast MRI is done. This formed a major soft tissue discrepancy. Similar situation was faced in case no.8 who had previous spinal surgery. Hueftle [17] *et al* had described the use of gadolinium-enhanced MRI in the evaluation of patients for redo-surgery. The gadolinium enhances scar tissue but not disc tissue, making it easier to differentiate between postoperative scar and recurrent disc herniation. Ross [18] *et al* had reported a 96% accuracy rate in distinguishing scar from recurrent disc herniation in patients requiring second surgery with the use of gadolinium-enhanced MRI. As a solution to above problem, recently Ozer [19] has advised preservation of ligamentum flavum and placing it on dura at the end of surgery to prevent postoperative adhesions.

In cases of Degenerative spinal canal stenosis
Total cases of Degenerative spinal canal stenosis-8(20%)
Major bony discrepancy-0, Minor bony discrepancy-0
Major soft tissue discrepancy-0, Minor soft tissue discrepancy-0 8 patients of degenerative spinal canal stenosis included 2 cervical & 6 lumbar canal stenosis. In spinal canal stenosis findings such as, ligamentum flavum hypertrophy [20] (>4mm), thickness of lamina (>5mm), inter-pedicular distance (<26mm) & sagittal diameter (<10mm) were well correlated with radiological findings at the time of surgery. There was no discrepancy. Ogura [21] compared canal with the use of MRI and CT myelography for lumbar canal stenosis, and found well correlation between these two investigative modalities. So far, there is no study in literature corroborating MRI and operative findings.

In case of Spondylolisthesis
Total cases of Spondylolisthesis-4(10%)
Major bony discrepancy-0, Minor bony discrepancy-0
Major soft tissue discrepancy-0, Minor soft tissue discrepancy-0 In the study of spondylolisthesis cases, Radiological findings were well correlated with the operative findings in all bony & soft tissue components. In all 4 patients radiological findings such as, thecal sac indentation, neuroforaminal encroachment, ligamentum hypertrophy, thickness of lamina, interpedicular distance reduction and facetal hypertrophy, were well correlated at surgery. Chaput [22] *et al* reported large (> 1.5 mm) facet effusions were highly predictive of degenerative spondylolisthesis in the absence of measurable anterolisthesis on supine MRI.

In cases of Lumbar instability
Total cases of Lumbar instabiliy-2(5%) Major bony discrepancy-0, Minor bony discrepancy-0 Major soft tissue discrepancy-0, Minor soft tissue discrepancy-0 In the case of lumbar instability, MRI findings of facetal hypertrophy and vacuum phenomenon were well correlated during operation. There was no discrepancy.

In cases of Tuberculosis
Total cases of Tuberculosis-3(7.5%) Major bony discrepancy-0, Minor bony discrepancy-0 Major soft tissue discrepancy-0, Minor soft tissue discrepancy-1(2.5%) In patient (No.34), Cord compression due to epidural abscess at the L4/L5 level was reported by radiologist on MRI. At operation, no pus was found but only granulation tissue. So this was a case of minor soft tissue discrepancy. In such situation contrast study might be useful to distinguish between abscess from granulation tissue.
There was good correlation between MRI findings of bony pathology and operative findings. Moore [23] *et al* and Desai [24] *et al* had demonstrated efficacy of MRI in early detection of tuberculous infection. All patients were positively correlated findings for disc space narrowing, paravertebral abscess, psoas abscess with thin smooth abscess wall and epidural extension. Moorthy [25] *et al* described the spectrum of imaging findings in spinal tuberculosis. They concluded that in spinal tuberculosis, MR imaging is useful for showing contiguous vertebral involvement, skip lesions, and paraspinal collections with high sensitivity and specificity.

In cases of Spinal fractures

Total cases of Spinal fractures-3(7.5%) Major bony discrepancy-0, Minor bony discrepancy-0 Major soft tissue discrepancy-0, Minor soft tissue discrepancy-0 All fractures were classified according to Frankel classification of neurodeficit [8]. There were 3 fractures of spinal column. 2 of them (no.33 and no.37) had compression fractures with neurodeficit. MRI showed cord compression due to retropulsed bony fragment and soft tissue disruption of posterior ligament complex. 3rd patient (no.36) had burst fracture of L1 vertebra without neurodeficit and this was investigated by CT scan rather than MRI, as there was no neurodefitit. CT scan identified retropulsion of bony segment into the thecal sac. This finding was sufficient to give adequate and proper information for surgery hence subsequent MRI was not done.

In his study on spinal fractures, Lee [26] concluded that MRI was a highly sensitive, specific and accurate method of evaluating posterior ligament complex injury. We feel that MRI has upper edge over CT scan in defining posterior longitudinal ligament complex rupture, disc lesions, and interspinous soft tissue.

Conclusion

More sections are required at the level of intervertebral disc and nerve root foramen to detect foraminal stenosis, subrhizal disc prolapse and nerve root compression. Gadolinium enhanced MRI should be done preoperatively in repeat surgery to assess the element of fibrosis. MRI may underestimate nerve root tension, hence special efforts needed intraoperatively to estimate nerve root tension. If found appropriate procedure should be followed. MRI is oversensitive to disc pathology. Good clinical correlation is required to deal with pathological disc lesions at the time of surgery.

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