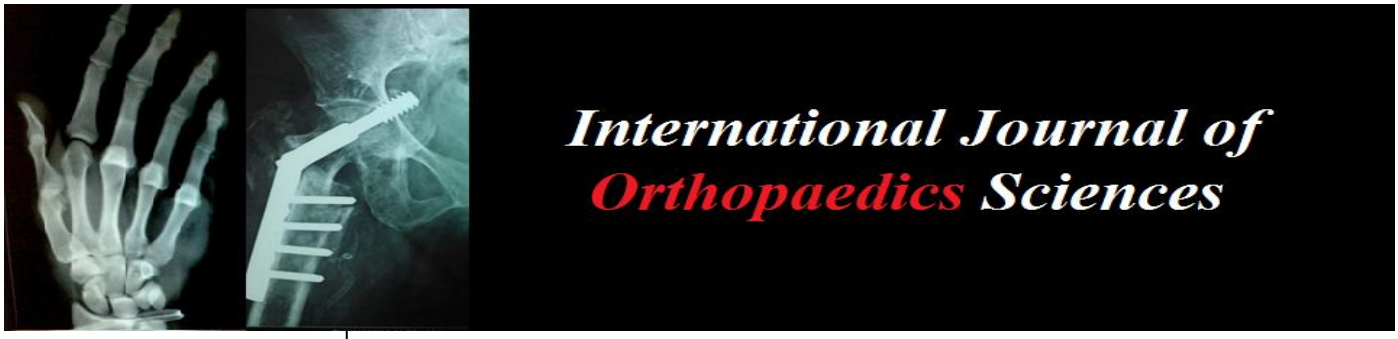

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Functional outcome of transforaminal steroid injection in patients suffering from prolapsed intervertebral disc

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Abstract
Background: Low back ache is one of the most common complaints with which a patient goes to a hospital. Steroid injections are valuable treatment alternative when patients fail to respond to other conservative treatments within 4 to 6 weeks. This study was undertaken to evaluate the functional outcome in patients with prolapsed intervertebral discs (PIVD) after the patients were given transforaminal steroid injection in our institution.
Methodology: This prospective observational study included 66 patients with low back ache diagnosed PIVD on MRI conducted at Choithram Hospital, Indore who were given transforaminal steroid injection. After 48 hours, 1 month, 3 months and 6 months following the steroid injection visual analogue score (VAS) and Oswestry Disability Index (ODI) was evaluated at each follow-up.
Results: The mean age in our study patients was 39.79 ± 12.14 years. Male are higher 57.6% as compare to female who are little lower 42.4%. At presentation the mean VAS score for L3-L4 was 7.500 ± 0.548, for L4-L5 was 7.458 ± 0.743 and for L5-S1 was 7.500 ± 0.798. At 6 months the mean VAS score for L3-L4 was 2.167 ± 0.408, for L4-L5 was 2.068 ± 0.695 and for L5-S1 was 2.083 ± 0.900. The overall mean VAS at presentation was 7.470 ± 0.728, at 48 hours it was 3.985 ± 1.116, at 1 month it was 2.619 ± 0.941, at 3 months it was 2.177 ± 0.666 and at 6 months it was 2.081 ± 0.708. There is a decreasing trend in the VAS score from presentation till 6 months. At presentation the mean ODI score for L3-L4 was 65.000 ± 2.098, for L4-L5 was 61.500 ± 5.589 and for L5-S1 was 62.000 ± 3.908. At 6 months the mean ODI score for L3-L4 was 36.667 ± 4.320, for L4-L5 was 27.000 ± 6.198 and for L5-S1 was 29.667 ± 6.706. The overall mean ODI at presentation was 61.909 ± 5.149, at 48 hours it was 50.788 ± 7.613, at 1 month it was 35.111 ± 9.107, at 3 months it was 30.806 ± 6.770 and at 6 months it was 28.452 ± 6.721. There is a decreasing trend in the ODI score from presentation till 6 months.
Conclusion: We conclude that there is a significant functional improvement both statistically, clinically and functionally in patients with prolapsed intervertebral disc after giving transforaminal steroid injections.

Keywords: Prolapsed intervertebral disc, transforaminal, steroid injection, methylprednisolone

Introduction
Low back ache is one of the most common complaints with which a patient goes to a hospital. Around 80% of the population gets low back ache at some point in their lives whereas lumbar radiculopathy which is commonly called as sciatica i.e. radiating leg pain with or without low back ache is a symptom which is seen in 40-60% of the total population and which is clinically significant in only 4%-6% of the cases [4-8].
PIVD is a common manifestation of degenerative disc disease, which is contributory to the pathogenesis of secondary spinal disorders such as spinal stenosis and degenerative spondylolisthesis [9].
With advancement in technology, the understanding about sciatica has upgraded leading to understanding that the pathogenesis of sciatica is mediated by inflammation, immunological and mechanical lesions [10]. Mechanical lesions include various stages of disc prolapse, ligamentum flavum hypertrophy, facet hypertrophy and degenerative osteophytes causing nerve root irritation [10]. Inflammation has also been implicated for pain due to nerve root

Irritation [11-17]. Phospholipase A2 is a natural component of intervertebral discs that triggers the release of Arachidonic acid causing inflammation of the nerve roots. High levels of PLA2have been found in the epidural space and the prolapsed disc substance [18]. Steroids are supposed to reduce the inflammation by inhibiting leukocyte aggregation, preventing degranulation of inflammatory mediators, stabilizing lysosomal and other membranes, and reducing the synthesis and release of proinflammatory factors [19].

Steroid injections are valuable treatment alternative when patients fail to respond to other conservative treatments within 4 to 6 weeks [1]. Various modes of administration of epidural steroid injections are available such as interlaminar, caudal, transforaminal injections, out of which transforaminal epidural steroid injections have been found to have a superior efficacy in decreasing the radicular pain as they have a higher incidence of steroid placement in the ventral epidural space at suspected pathological site [20-22].

This study was undertaken to evaluate the functional outcome in patients with PIVD after the patients were given transforaminal steroid injection in our institution.

Methodology

After approval of the Institutional Research Committee and valid, written, informed consent of the patients, the study was conducted on patients visiting Choithram Hospital and Research Centre, Indore.

Inclusion criteria

1. Patient with age between 18 to 65 years.
2. Patient with low back pain and leg pain and/or with tingling.
3. Patient with single intervertebral disc involvement (confirmed on MRI).
4. Patient with unilateral symptoms.
5. Patient with failed conservative management for more than 6 weeks.
6. Patient and/or his/her legally acceptable representative willing to provide their voluntary written informed consent for participation in study.

Exclusion criteria

1. Patient with multiple intervertebral discs involvement.
2. Patient with bilateral involvement.
3. Patient with recurrent herniations.
4. Patient with cauda equina syndrome, vertebral fractures, spondylolisthesis and arachnoiditis.
5. Patient having repeated steroid injections or previous spinal surgeries.
6. Patient with significant coagulopathies and use of anticoagulants.
7. Patient diagnosed to have diabetes mellitus, active cancer, history of substance abuse, current psychiatric co-morbidity, pregnancy and congestive cardiac failure.
8. Patient with history of allergy to contrast media, steroids and local anesthetic agents.
9. Patient with severe motor deficit.
10. Patient and/or his/her legally acceptable representative not willing to provide their voluntary written informed consent for participation in study.

Patients with inclusion criteria were then investigated further. Routine blood investigations were done, the VAS and ODI score were assessed pre-injection. Under sterile precautions 3 separate and labelled 2–5mL syringes were used. First non-ionic iohexol contrast medium, second 2% lignocaine for local anaesthesia and the last syringe was with 2 ml of methylprednisolone (40 mg/ml) along with 1 ml 2% lignocaine. The patient was positioned prone on a radiolucent procedure table, the desired level was identified using fluoroscopy guidance by C-arm. [Figure 3].

The X-ray projection was focused on the epiphyseal plate of the upper and lower vertebral body by controlling the cranial-caudal angle of the C-arm and the right and left angle of the C-arm was rotated by 20-35 degrees toward the region, so that the superior articular process could be seen at the middle of the intervertebral disc.

After local anaesthesia with a 22G quincke spinal needle was inserted just above the superior articulating process and directed toward the base of the pedicle, and advanced slowly until the bone was contacted just below the pedicle. The needle was then slightly withdrawn and redirected inferiorly into the targeted spinal nerve canal. [Figure 4].

Advancement was made under anteroposterior (AP) and lateral views to provide a 3-dimensional spatial representation. The AP view was taken to verify that the needle was not medial to the 6-o clock position of the pedicle; on the lateral view, the needle was positioned just below the pedicle in the ventral aspect of the intervertebral foramen. Non-ionic iohexol contrast dye 1-2 ml was injected and the dye pattern was assessed. If leg paraesthesia was noted as the needle approached the neural foramen, the needle was withdrawn slightly and the dye was injected. A positive image of the nerve root on fluoroscopy indicated that the needle had penetrated the epiradicular membrane. Once the correct placement of the needle was confirmed, an infiltration of 2 ml of methylprednisolone (40 mg/ml) with 1 ml 2% lignocaine was injected. Following the procedure, the needle entry site was sealed with a sterile dressing or Band-Aid. [Figure 5].

Results

Out of 66 patients, 3 patients opted for surgery within one month of transforaminal steroid injection and 1 patient opted for surgery between 1 and 3 month of transforaminal steroid injection.

The mean age in our study patients was 39.79 ± 12.14 years. [Table 1].

Out of 66 people 38(58%) are male while 28(42%) are female. Male are higher 57.6% as compare to female who are little lower 42.4%. [Table 1].

VAS score

At presentation the mean VAS score for L3-L4 was 7.500 ± 0.548, for L4-L5 was 7.458 ± 0.743 and for L5-S1 was 7.500 ± 0.798. At 48 hours the mean VAS score for L3-L4 was 4.333 ± 0.516, for L4-L5 was 4.042 ± 1.220 and for L5-S1 was 3.583 ± 0.669. At 1 month the mean VAS score for L3-L4 was 2.833 ± 0.408, for L4-L5 was 2.600 ± 1.031 and for L5-S1 was 2.583 ± 0.793. At 3 months the mean VAS score for L3-L4 was 2.333 ± 0.516, for L4-L5 was 2.136 ± 0.668 and for L5-S1 was 2.250 ± 0.754. At 6 months the mean VAS score for L3-L4 was 2.167 ± 0.408, for L4-L5 was 2.068 ± 0.695 and for L5-S1 was 2.083 ± 0.900. [Table 3].

The overall mean VAS at presentation was 7.470 ± 0.728, at 48 hours it was 3.985 ± 1.116, at 1 month it was 2.619 ± 0.941, at 3 months it was 2.177 ± 0.666 and at 6 months it was 2.081 ± 0.708. There is a decreasing trend in the VAS score from presentation till 6 months. [Table 3].

ODI

At presentation the mean ODI score for L3-L4 was 65.000 ±

2.098, for L4-L5 was 61.500 ± 5.589 and for L5-S1 was 62.000 ± 3.908. At 48 hours the mean ODI score for L3-L4 was 54.667 ± 4.676, for L4-L5 was 50.250 ± 8.451 and for L5-S1 was 51.000 ± 4.221. At 1 month the mean ODI score for L3-L4 was 42.333 ± 4.633, for L4-L5 was 34.222 ± 9.883 and for L5-S1 was 34.833 ± 5.937. At 3 months the mean ODI score for L3-L4 was 38.667 ± 4.320, for L4-L5 was 29.500 ± 6.642 and for L5-S1 was 31.667 ± 5.646. At 6 months the mean ODI score for L3-L4 was 36.667 ± 4.320, for L4-L5 was 27.000 ± 6.198 and for L5-S1 was 29.667 ± 6.706. [Table 4].

The overall mean ODI at presentation was 61.909 ± 5.149, at 48 hours it was 50.788 ± 7.613, at 1 month it was 35.111 ± 9.107, at 3 months it was 30.806 ± 6.770 and at 6 months it was 28.452 ± 6.721. There is a decreasing trend in the ODI score from presentation till 6 months. [Table 4].

Table 1: Age and Sex Distribution

Age Group	Frequency	Percent
<=30	16	24.2
31-40	23	34.8
41-50	15	22.7
>=51	12	18.2
Total	66	100.0
Sex	**Frequency**	**Percent**
Female	28	42.4
Male	38	57.6
Total	66	100.0

Table 2: Distribution of patients according to level of PIVD

Level of PIVD	Frequency	Percent
L3-L4 PIVD	6	9.1
L4-L5 PIVD	48	72.7
L5-S1 PIVD	12	18.2
Total	66	100.0

Table 3: Comparison of mean VAS in relation to level of PIVD

Time Interval	Diagnosis	N	Mean VAS	Standard Deviation
Presentation	L3-L4	6	7.500	0.548
	L4-L5	48	7.458	0.743
	L5-S1	12	7.500	0.798
	Total	66	7.470	0.728
48 Hours	L3-L4	6	4.333	0.816
	L4-L5	48	4.042	1.220
	L5-S1	12	3.583	0.669
	Total	66	3.985	1.116
1 Month	L3-L4	6	2.833	0.408
	L4-L5	45	2.600	1.031
	L5-S1	12	2.583	0.793
	Total	63	2.619	0.941
3 Months	L3-L4	6	2.333	0.516
	L4-L5	44	2.136	0.668
	L5-S1	12	2.250	0.754
	Total	62	2.177	0.666
6 Months	L3-L4	6	2.167	0.408
	L4-L5	44	2.068	0.695
	L5-S1	12	2.083	0.900
	Total	62	2.081	0.708

Table 4: Comparison of mean ODI in relation to level of PIVD

Time Interqval	Diagnosis	N	Mean ODI	Standard Deviation
Presentation	L3-L4	6	65.000	2.098
	L4-L5	48	61.500	5.589
	L5-S1	12	62.000	3.908
	Total	66	61.909	5.149
48 Hours	L3-L4	6	54.667	4.676
	L4-L5	48	50.250	8.451
	L5-S1	12	51.000	4.221
	Total	66	50.788	7.613
1 Month	L3-L4	6	42.333	4.633
	L4-L5	45	34.222	9.883
	L5-S1	12	34.833	5.937
	Total	63	35.111	9.107
3 Months	L3-L4	6	38.667	4.320

	L4-L5	44	29.500	6.642
	L5-S1	12	31.667	5.646
	Total	62	30.806	6.770
6 Months	L3-L4	6	36.667	4.320
	L4-L5	44	27.000	6.198
	L5-S1	12	29.667	6.706
	Total	62	28.452	6.721

Table 5: Comparison of mean VAS between different time intervals

Time Interval	N	Mean VAS	Standard Deviation
Presentation	66	7.470	0.728
48 Hours	66	3.985	1.116
Presentation	63	7.444	0.713
1 Month	63	2.619	0.941
Presentation	62	7.419	0.691
3 Months	62	2.177	0.666
Presentation	62	7.419	0.691
6 Months	62	2.081	0.708
48 Hours	63	3.825	0.853
1 Month	63	2.619	0.941
1 Month	62	2.532	0.646
3 Months	62	2.177	0.666
3 Months	62	2.177	0.666
6 Months	62	2.081	0.708

Table 6: Comparison of mean ODI between different time intervals

Time Interval	N	Mean ODI	Standard Deviation
Presentation	66	61.909	5.149
48 Hours	66	50.788	7.613
Presentation	63	61.524	4.775
1 Month	63	35.111	9.107
Presentation	62	61.355	4.620
3 Month	62	30.806	6.770
Presentation	62	61.355	4.620
6 Month	62	28.452	6.721
48 Hours	63	50.000	6.749
1 Month	63	35.111	9.107
1 Month	62	34.419	7.325
3 Month	62	30.806	6.770
3 Month	62	30.806	6.770
6 Month	62	28.452	6.721

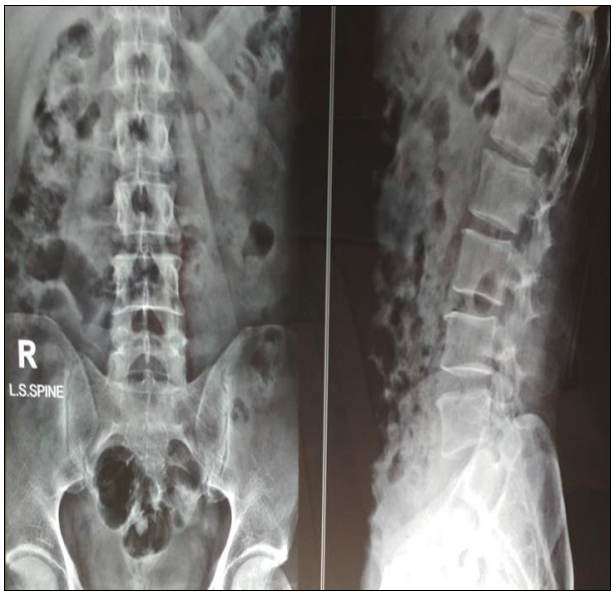


Fig 1: X-ray LS spine antero-posterior and lateral views with decreased L5-S1 disc space

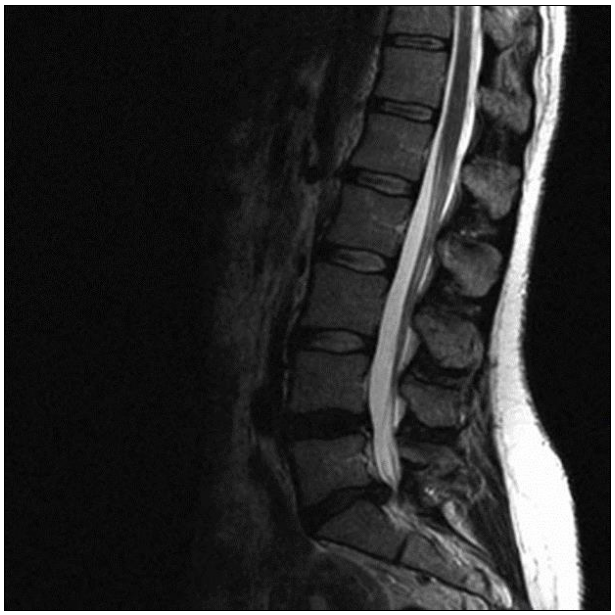


Fig 2: MRI showing prolapsed intervertebral disc at L5-S1 level

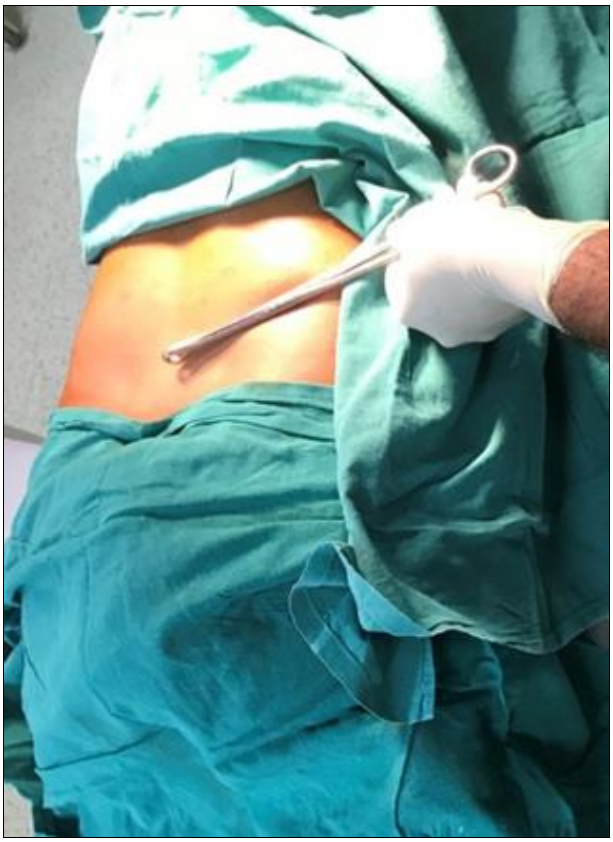


Fig 3a: Gross level marking of Disc space

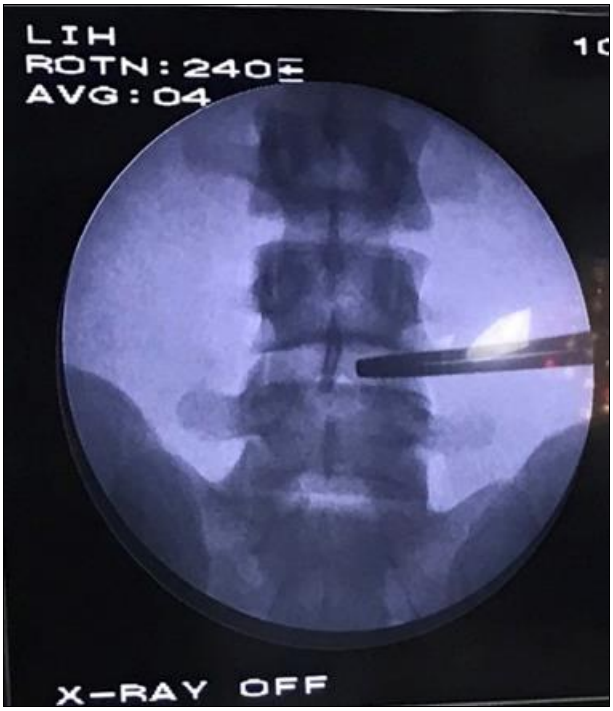


Fig 3b: C- arm picture of marking

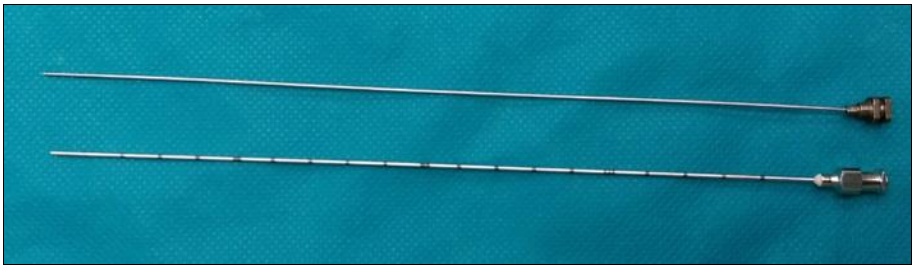


Fig 4a: Quincke spinal needle

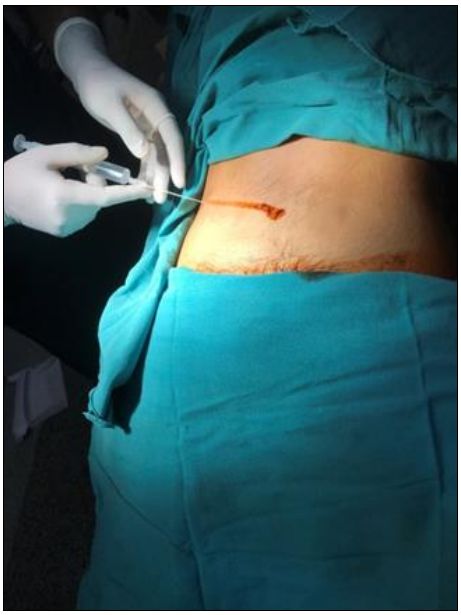
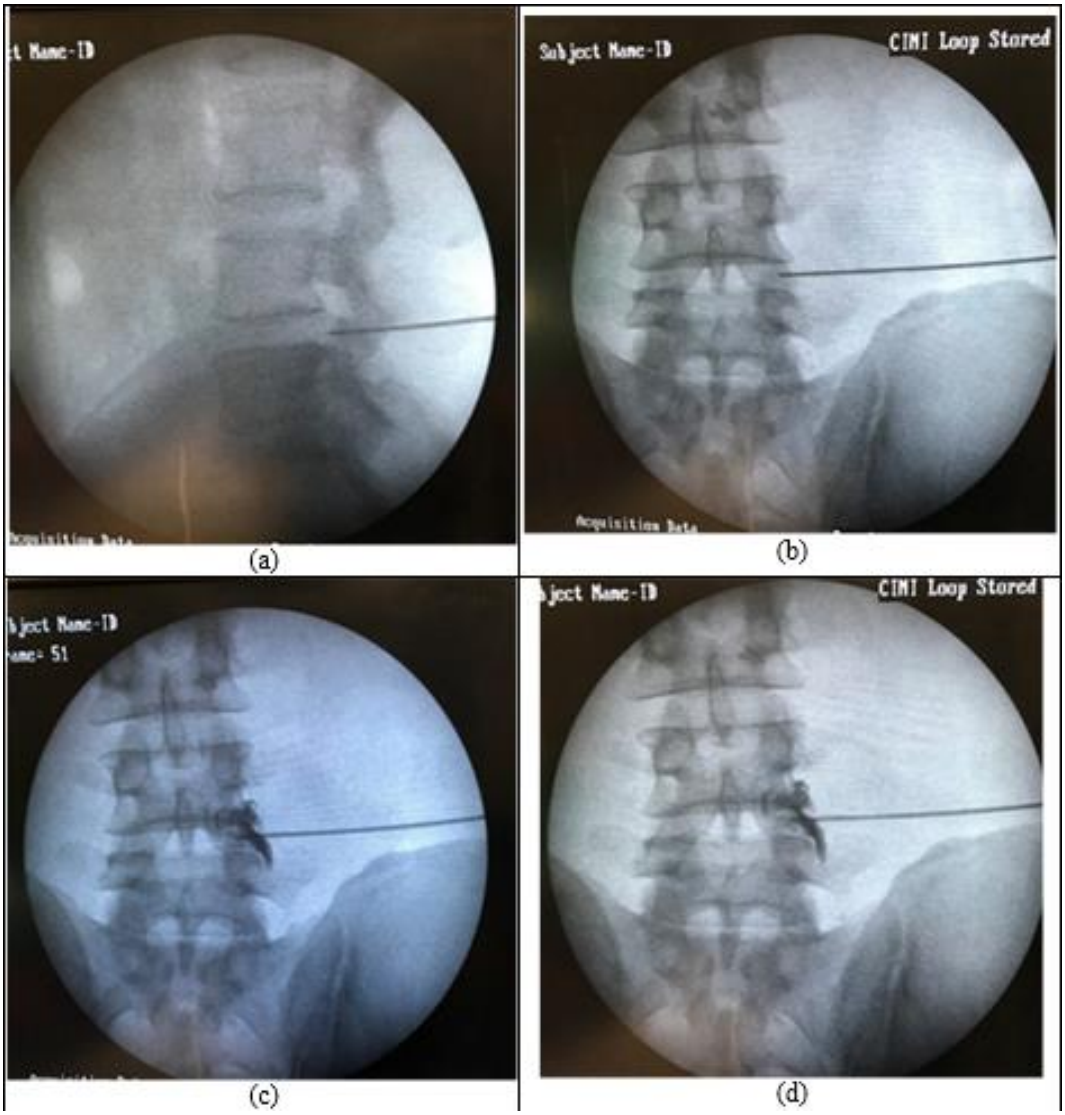


Fig 4b: Injection of local anaesthetic



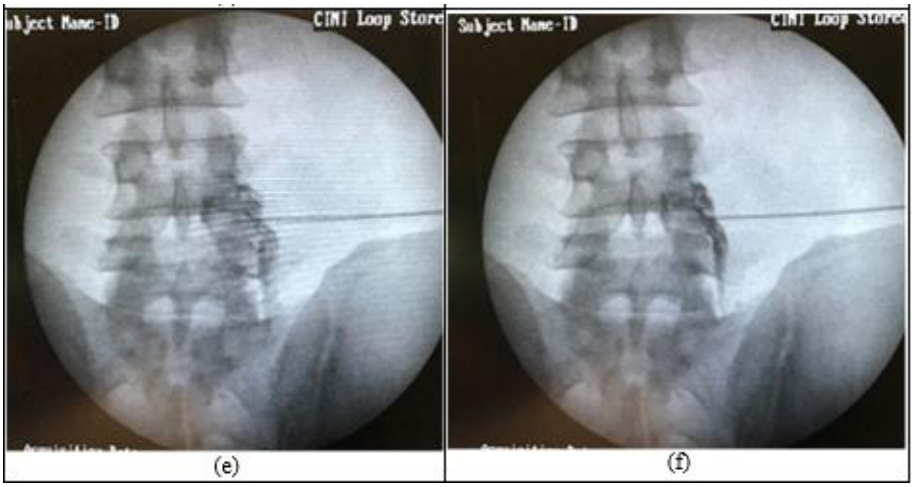


Fig 5: a to f showing sequential C -arm images (a), (b) level confirmation, (c), (d) dye insertion (transforaminal) after level confirmation, (e), (f) final steroid instillation after level confirmation and dye instillation

Conclusion

We conclude that there is a significant functional improvement both statistically, clinically and functionally in patients with prolapsed intervertebral disc after giving transforaminal steroid injections.

Conflict of Interest

Not available

Financial Support

Not available

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