Original Research Article

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A Comparison of Pre Operative and Post Operative Clinical Signs with Electrophysiological Parameters in Degenerative Lumbar Disc Disease

Saranyan R.[1], Raghavendran R.[2]

Abstract

In this present world, Low Back Ache is a common debilitating problem. It is mostly because of degenerative disc disease. There is no definitive management available to evaluate the patient before surgery and predict the probable outcome. *Objective:* There is a discrepancy between the MRI findings and Clinical findings which creates false positive and false negative results. These shows there are no definitive investigation criteria and patient selection for degenerative disc disease and the surgical success rate is moderately high. So it is important that we identify the group of patients who will benefit from surgical procedure and we can give them a reliable prognosis. *Methods:* Nerve conduction study is done pre- op and repeated twice after surgery on second and tenth post op day. Amplitude, latency and velocity results of all three Nerve conduction studies were analysed and compared. *Results:* Electrophysiological studies augments selection criteria of patients undergoing surgery for Low back pain. It is also helpful in Prognosticating Outcome. *Conclusion:* Combining Electrophysiological studies with Clinical and Imaging modalities gives better outcome.

Keywords: Lumbar Spine; Degenerative Disease; Neural Compression.

Introduction

Low back pain and leg pain radiating from back affects a substantial proportion of population and is one of the leading causes of disability in our society and the cost of treatment is increasing progressively every year. The outcome of the operative treatment of degenerative disc disease [1] is often unpredictable, despite variety of surgical procedures.

Several scientific publications have documented Good to excellent surgical results in high percentage of patients. The correlation between Clinical Signs, MRI and surgical findings [2] is frequently reliable as is the evaluation of false positive and false negative findings which can be influenced by the experience of both the radiologist and the surgeon.

It becomes important that we should identify the subgroup most likely to benefit from surgery in order to select whom to operate upon, and also to give a reasonable estimate of prognosis to the patients. This study investigates whether nerve conduction study [4] with clinical correlation can be used to identify the subgroup with better postoperative outcome [1].

Materials and Methods

The study was conducted at the Institute of neurosurgery, Madras Medical College and the associated Rajiv Gandhi Government General hospital, Chennai – 600003 from Jan to March 2015 after obtaining clearance from the institutional ethics committee. The aim of the study was to compare the pre op and post op clinical signs with electrophysiological parameters in patients with Neural Compression due to Degenerative Lumbar Disc Diseases.

Author's Affiliation: [1]Assistant Professor [2]Professor, Department of Neurosurgery, Institute Of Neurosurgery , Rajiv Gandhi Government General Hospital and Madras Medical College, Chennai, Tamil Nadu 600003, India .

Corresponding Author: Raghavendran R., Professor, Department of Neurosurgery, Institute of Neurosurgery, Rajiv Gandhi Government General Hospital and Madras Medical College, Chennai, Tamil Nadu 600003, India .
E-mail: drrrojaa@gmail.com
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Participants and Procedure

This was a prospective analytical study conducted from January 2015 to March 2015 at Institute of Neurosurgery, Madras Medical College, Chennai.

Inclusion Criteria

1. Age 25 - 65 years
2. Patients with pain more than 3 month's duration.
3. Patients with weakness or numbness of lower limb

Exclusion Criteria

1. Patients with non compressive lumbar medical diseases
2. Patients who underwent previous surgery or trauma to the spine
3. Age > 65 years
4. Patients with Diabetes mellitus

All patients were subjected to a detailed neurological examination and neurological deficit was documented. They were subjected to Electrophysiological study. Then patients underwent surgery.

Post op

Electrophysiological study was done on post op day 2 and 10 and findings documented. Statistical analysis was done using Epi Info, SPSS, MS Excel to assess the multifactorial causes of complications and outcomes.

Results

Patient Characteristics

A total of 20 patients were included in the study 60% of patient's male and 40% female. The mean age of the males was 54.2±6.4 years and of the females were 51.9±6.7 years. This was not statistically significant ($p>0.05$). The total subjects mean age was 53.3±6.5 with range of 43-65 years.

The mean symptom duration of the males was 6.7 ±1.3 months and the same of the females was 6.4±1.4months. This was not statistically significant ($p>0.05$). The total mean duration was 6.6±1.3 with a range of 4-9 months.

Clinical Findings

After examination, a 'Clinical Level 'was assigned to each patient to signify the offending spinal level. 11 patients had symptoms localizing to the L4-L5 level, the remaining 9 localized to L5-S1. MRI confirmed a L4-l5 level in 11 patients and L5-S1 in 9 patients.

Surgical Details

The patients with L4-L5 pathology (11) underwent L4 Decompressive Laminectomy, Foraminotomy and Disc Excision.

The patients with L5-S1 pathology (9) underwent L5 Decompressive Laminectomy,Foraminotomy and Disc Excision

Pre and Post Operative Nerve Conduction Studies

The following parameters were studied pre and post operatively: Anterior Tibial Latency , Anterior Tibial Amplitude.

Analysis and Discussion

All Patients who had improvement in Clinical Status had improvement in their Electrophysiological parameters [4,9]. Patients who did not improve

Table 1: Pre and Post operative anterior tibial latency

	No of Patients	Minimum	Maximum	Mean	Std. Deviation
Pre Op	20	5.6	7.7	6.825	.5486
2nd Day Post Op	20	5.3	7.0	6.095	.4883
10th Day Post Op	20	4.0	7.0	5.635	.8499

Table 2: Pre and Post operative Anterior Tibial Amplititude

	No of Patients	Minimum	Maximum	Mean	Std. Deviation
Pre Op-Anterior Tibial Amplitude	20	2	4	3.43	.782
2nd Day Post Op-Anterior Tibial Amplitude	20	2	4	3.45	.862
10th Day Post Op-Anterior Tibial Amplitude	20	2	6	4.06	1.233

Table 3: Post operative Tibial F wave

	No of Patients	Minimum	Maximum	Mean	Std. Deviation
2nd Day Post Op-Anterior Tibial F wave	20	39	63	56.30	7.498
10th Day Post Op-Anterior Tibial F wave	20	39	75	62.15	10.874

Table 4: Pre and Post operative Posterior Tibial Amplitude

	No of Patients	Minimum	Maximum	Mean	Std. Deviation
Pre Op-Posterior Tibial Amplitude	20	1	2	1.60	.410
2nd Day Post Op-Posterior Tibial Amplitude	20	1	2	1.78	.332
10th Day Post Op-Posterior Tibial Amplitude	20	1.4	3.8	2.370	.7399

Table 5: Posterior Tibial F Wave

	No of Patients	Minimum	Maximum	Mean	Std. Deviation
Pre Op-Posterior Tibial Velocity	20	31	62	41.55	8.593
2nd Day Post Op-Posterior Tibial Velocity	20	39	65	47.60	8.363
10th Day Post Op-Posterior Tibial Velocity	20	51	69	56.50	4.020

clinically (Table 6) also had improvement in their Electrophysiological Status [11].

Anterior Tibial Characteristics

The mean Velocity before surgery was 42.2±7.9 and increased to 47.8±6.5 in second day of operation. The mean improvement 5.5±3.9 was statistically significant (p<0.001) [6].

Table 6:

Clinical status	Electrophysiological Status Improved	Not Improved	Total
Improved	12	0	12
Not Improved	0	8	8
Total	12	8	20

The mean Latency of second and 10th day was 6.1±0.5 and 5.6± 0.8 respectively (Tables 1 and 2). The difference 0.5±0.6 was statistically significant (p<0.001) . The means of Amplitude on second day was 3.5±0.9 and increased on tenth day of surgery [4] as 4.1±1.2. The mean increase 0.6±0.7 was statistically significant (p<0.001). The mean Velocity at second day was 47.8±6.5 and increased to 56.9±3.8 on tenth day of operation. The mean improvement 9.2±5.7 was statistically significant (p<0.001). The mean F wave on second day was 56.3±7.5 and the same increased to 62.2±10.9 on tenth day. The mean increase to 5.9±5.9 was statistically significant (p<0.001).

Posterior Tibial Characteristics

The mean Latency of pre and post op second day was 7.2±1.1 and 6.5±0.8 respectively. The difference 0.8±0.8 was statistically significant (p<0.001) as seen in Tables 3, 4 and 5. The means of Amplitude before surgery was 1.6±0.4 and the increased on second day of surgery as 1.8±0.3. The increase was statistically significant (p<0.001) [5].

The mean Velocity before surgery was 41.6±8.6 and increased to 47.6±8.4 on second day of operation. The mean improvement 6.0±4.8 was statistically significant (p<0.001).

The mean Latency of second and 10th day was 6.5±0.8 and 6.2± 0.8 respectively. The difference 0.3±0.9 was statistically not significant (p>0.05). The means of Amplitude on second day was 1.8±0.3 and increased on tenth day of surgery [11] to 2.4±0.7. The mean increase 0.6±0.5 was statistically significant (p<0.001).

The mean Velocity at second day was 47.6±8.4 and increased to 56.5±4.0 on tenth day of operation [10]. The mean improvement 8.9±6.9 was statistically significant (p<0.001). The mean F on second day was 56.7±7.7 and increased to 63.8±11.8 on tenth day. The mean increase of 7.1±5.8 was statistically significant (p<0.001).

The mean Latency of pre and 10th day was 7.2±1.1 and 6.2±0.8 respectively. The difference 1.0±1.4 was statistically significant (p<0.001). The means of A on pre op was 1.6±0.4 and increased on tenth day of surgery to 2.4±0.7. The mean increase 0.8±0.5 was statistically significant (p<0.001).

The mean Velocity at pre op was 41.6±8.6 and increased to 56.5±4.0 on tenth day of operation. The mean improvement 15.0±7.6 was statistically significant (p<0.001).

Clinical Findings

The clinical findings of subjects were compared before surgery with second day of surgery and second day with tenth day of surgery. The number of patients improved compared to pre-operative to tenth day of surgery in respect of their clinical findings such as Radicular pain, Straight leg raising test, Extensor Hallucis Longus, Sensory loss and Ankle jerk [14] was documented.

Before surgery 18 (90%) and post-operatively 2 (10%) persons had radicular pain. Out of 18 (90%) persons on second day of surgery, 7 (35%) patients became normal and 11 (55%) it persisted. On tenth day, except 2 (10%) patients all 18 (90%) patients had complete relief from radicular pain [11]. This was statistically significant (p<0.01) and tenth day finding was also statistically significant (p<0.001).

Post-operatively 18 (90%) SLR became negative and in 2 (10%) it was positive. Out of 18 (90%) persons, on second day of surgery 9 (45%) it became negative and 9 (45%) were positive. On tenth day, except 1 (5%) patient all 19 (95%) patients were negative for SLR [9]. The improvements in second day was statistically significant (p<0.01) and tenth day was also statistically significant (p<0.001).

Before surgery 11 (55%) and 9 (45%) had EHL weakness and normal EHL power respectively. Out of 11 (55%) persons, on second day of surgery 4 (20%) patients recovered and in 7 (35%) persisted. On tenth day, except 6 (30%) patients, all 13 (95%) persons had normal EHL power [10]. The improvements in second day (p>0.05) and tenth day was not statistically significant (p=1.00).

Before surgery 12 (60%) had sensory deficit and 8 (40%) it was normal. Out of 12 (60%) patients, on second day of surgery 3 (15%) patients had normal and 2 (10%) still abnormal. On tenth day, except 2 (30%) persons all 18 (90%) persons had normal sensation [12]. This improvements was not statistically significant (p>0.05), but tenth day the attainment of normal from second day to tenth day was statistically significant (p<0.05).

Before surgery 2 (10%) and 18 (90%) patients had abnormal and normal ankle jerk respectively. Out of 2 (10%) patients, on second day of surgery 1 (5%) person had normal jerk and 1 (5%) still abnormal. On tenth day all 20 (100%) persons had normal Ankle jerk [12]. This improvement from before surgery to second day was not statistically significant (p>0.05) and second day to tenth day was not statistically significant (p=1.00).

The radiating pain was present among 18 (90%) and absent among 2 (10%) respectively. After 10 days 18 (90%) patients became normal and 2 (10%) continued to be positive. Regarding the SLR 18 (90%) were positive before surgery and after surgery on tenth day, 19 (95%) patients became normal and only 2(10%) were positive. In respect of EHL 11(55%) had weakness and 9 (45%) were normal. On tenth day only 14 (70%) had normal EHL [15]. The remaining 6 (30%) had weakness. Before surgery 12(60%) patients had weakness and after surgery on tenth the prevalence of weakness was only 2(10%) persons. In respect of ankle jerk only 2 (10%) patients had absent jerk. On tenth day all 20(100%) persons normal jerk. In all the above findings except EHL all were statistically significant (P<0.01).

Conclusion

All Patients who had improvement in Clinical Status had improvement in their Electrophysiological parameters also. None of the patients who did not improve in Clinical Status had significant improvement in their Electrophysiological Status. The mean Latency and velocity levels significantly improved after surgery at 2nd day.The amplitude level did not significantly change after surgery on 2nd day. Latency, amplitude, velocity and F wave significantly improved from 2nd day of surgery to 10th day of surgery (p<0.001).

Hence electrophysiological markers can be used for assessment of surgical efficacy, Prognostic effect and Realistic assessment of Failed Back Syndrome.

Limitations

1. Number of patients in this study group is low.
2. No long term follow up as the investigator plans to take it up as another study with more number of patients.

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