

# Epidural Corticosteroid Infiltrations for Lumbar Stenosis: A Prospective Study

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## Abstract

**Introduction:** Lumbar stenosis is a major cause of lower back pain and functional disability especially in elderly. Major symptoms are low back pain and radicular claudication. Medical therapeutic options include painkillers, NSAIDs, Steroids, antiepileptic drugs and epidural infiltrations. Surgery is indicated when medical treatment fails. The objective of our study is to evaluate the efficacy of lumbar epidural infiltrations of corticosteroids in LSS.

**Materials and methods:** This prospective study was conducted on 60 patients presenting to our institution from January 2013 to January 2014. Isolated LSS was suspected after physical examination and was confirmed by a lumbar MRI. All our patients were treated by NSAIDs and antiepileptic drugs (Gabapentin 800 mg daily) for 6 weeks. 7 patients had laminectomy during the year of follow-up and were excluded from the statistical analysis; 53 patients were followed-up for 1 year (88.3%).

The treatment protocol by infiltrations consisted of three interlaminar epidural infiltrations under fluoroscopic guidance of 80 mg Methylprednisolone and 100 mg of Lidocaine administered at 2 weeks interval at the level of the stenosis. Gabapentin 800 mg per day (400 mg BID) was added for 1 month.

Evaluation of clinical results was done using 4 scales: the Visual Numerical Scale (VNS), Roland5 Point Scale (R5PS), Walking distance (WD) and the patient satisfaction scale (PSS).

**Results:** The Mean VNS was significantly ameliorated from (7.27 (4-10) at D0 to, 3, 13 at 2 weeks follow-up and, 3.45 (1 to 6) at 1 year ( $p < 0.0001$ ). The Mean R5PS was also significantly ameliorated. At D0 the score was 4.08 (3 to 5), at D15 1.85 (0 to 3), at 1 y 1.83 (1 to 4) ( $p < 0.0001$ ). Mean WD was significantly increased from 1.85 at D0 to 3.34 at D15 and 3.34 at 1 ( $p < 0.0001$ ). The study of 50% amelioration of VNS, of R5PS and of WD were all significant with a p value  $< 0.0001$ . The PSS showed very good and good results in 65% of the patients and average and bad results in 35%.

**Discussion:** Based on our results, epidural corticosteroid infiltrations are efficient in the treatment of LSS. Our study correlates with many results in the literature although few studies were conducted exclusively on LSS. We attributed the efficacy of steroids in LSS to their probable ability to block the nociceptive pathways and to their effect on prostaglandins.

**Conclusion:** As an alternative for medical treatment, epidural infiltrations of corticosteroids could be a promising option before indicating surgery in LSS, or if surgery is contraindicated.

**Keywords:** Corticosteroid infiltrations; Lumbar stenosis

## Introduction

First described by VERBIEST in 1949 [1], lumbar spinal stenosis (LSS) is a major cause of lower back pain and functional disability especially in elderly. It affects daily activities and decreases the quality of life.

The National Ambulatory Medical Care Survey (NAMCS) in 1995 [2], concluded that 3.9% of the patients consulting for low back pain have lumbar stenosis. 20% of patients above 60 years old have radiologic lumbar stenosis, symptomatic or not [3]. Both sexes are equally affected, and peak age is between 60 and 65 years [4].

Major symptoms are low back pain and radicular claudication. These symptoms are not caused by mechanical compression alone. In fact, as recent studies [5] clearly demonstrated, hyperemia and venous congestion of nerve roots are important components responsible for the symptoms in LSS.

Surgical decompression proved its efficacy and is considered today as the gold standard in treating spinal stenosis. It is indicated only after an attempt of a proper medical treatment.

Medical Therapeutic armamentarium includes painkillers, NSAIDs, Steroids, antiepileptic drugs and Epidural infiltrations.

Steroids were first used in epidural infiltrations by Robecchi in 1952 [6] for the treatment of radicular pain. Its use became more popular and it was widely studied especially for disco-radicular pathologies. We found few recent studies in the literature describing its efficacy for lumbar stenosis. The results were very variable with an efficacy that ranged from 5% to 75%.

We conducted our study in order to evaluate short and long term efficacy of epidural steroid infiltrations in lumbar stenosis, and to determine predictive factors affecting the final outcome. Therefore we hypothesis that lumbar epidural corticosteroid infiltrations are beneficial in the treatment of LSS

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## Materials and Methods

This prospective study was conducted on 60 patients presenting to our institution from January 2013 to January 2014. Isolated lumbar spinal stenosis was suspected after physical examination and was confirmed by a lumbar MRI. All our patients were treated by NSAIDS and antiepileptic drugs (Gabapentin 800 mg daily) for 6 weeks. Seven patients had laminectomy during the year of follow-up and were excluded from the statistical analysis; 53 patients were followed-up for 1 year (88.3%).

Inclusion criteria were lower back pain associated to radicular pattern claudication, lumbar stenosis on MRI and resistance to a 6 weeks course of NSAIDS and antiepileptic drugs. Exclusion criteria were: history of lumbar trauma, history of lumbar surgery, history of epidural infiltrations in the last 3 months, documented peripheral artery disease, associated coxo-femoral disease (documented on pelvis X-ray) or lumbar disc herniation.

The level and the severity of the stenosis were classified on MRI (Table 1) and duration of symptoms was also noted and divided into two groups (<3 months and > 3 months)

The treatment protocol by infiltrations consisted of three interlaminar epidural infiltrations under fluoroscopic guidance of 80 mg Methylprednisolone and 100 mg of Lidocaine administered at 2 weeks interval at the level of the stenosis. Gabapentin 800 mg per day (400 mg BID) was added for 1 month.

A questionnaire included the pain visual numeric scale (VNS) [7], another pain scale: the Roland 5 points scale (R5PS), a walking distance scale (WD) and the patient satisfaction scale (PS) (Table 1). Our patients filled the questionnaire before the first infiltration, 2 weeks after the last infiltration, 1 year after the last infiltration. Patients who underwent laminectomy during the year of follow-up were excluded. Statistical analysis was made on SPSS V.17

## Results

Sixty patients were included. Mean age was 61 y (27-83 y), 32 females and 28 males. Thirty-two patients had one or two levels disease whereas 28 patients had multi-level stenosis. We found 48 patients with mild to moderate stenosis (between 8 and 12 mm) and 12 patients with severe stenosis (<8 mm). Eighteen patients were feeling pain less than 3 months prior to infiltrations. Forty-two patients were having pain for more than 3 months. Seven patients underwent laminectomy during the follow-up year for worsening of symptoms despite epidural infiltrations (Table 2).

Initial mean scores (including patient who later underwent laminectomy) were: 7.38 (4-10) for the VNS, 4.1 for the R5PS, 1.76 m WD.

As for the 53 patients who were followed up for 1 year, initial mean scores were: 7.27, 4.08 and 1.85 for VNS, R5PS, WD respectively. At 2 weeks follow-up: 3.13 for the VNS, 1.85 for the R5PS, 3.34 m WD. At 1 year follow-up scores for VNS, R5PS, WD were 3.453, 1.83, 3.34 respectively.

| Level       | Severity  |
|-------------|---|
| L1-L2       | Severe lumbar stenosis (<8 mm)                        |
| L2-L3       |   |
| L3-L4       |   |
| L4-L5       | Mild to moderate lumbar stenosis (between 8 et 12 mm) |
| Multi-level |   |

Table 1: Classification of the level and severity of stenosis.

| No. of patients: 60; 53 at 1 year.<br>Mean age: 61 y; interval: 27-83 y.<br>Gender: 32 females (53.3%), 28 males (46.7%).<br>N. of infiltrations per patient: 3 (80 mg de methylprednisolone + 100 mg de lidocaine). |             |    |            |
|--|-------------|----|------------|
|  |             | Nb | Percentage |
| Pain duration prior to infiltration  | <3 months   | 18 | 30%        |
|  | >3 months   | 42 | 70%        |
| Stenosis severity  | <8 mm       | 13 | 21.6%      |
|  | 8 to 12 mm  | 47 | 78.3%      |
| Stenosis level   | L3-L4       | 10 | 16.7%      |
|  | L4-L5       | 22 | 36.7%      |
|  | Multi-level | 28 | 46.7%      |

Table 2: Population demography.

|      | Initial VNS | Mean VNS at 2w | p Value (t test) |
|------|-------------|----------------|------------------|
| VNS  | 7.27        | 3.132          | <0.0001          |
| R5PS | 4.08        | 1.85           | <0.0001          |
| PM   | 1.85        | 3.34           | <0.0001          |

Table 3: Differences between initial scores and those at 2 weeks of follow-up.

|      | Initial VNS | Mean VNS at 1 y | p Value (t test) |
|------|-------------|-----------------|------------------|
| VNS  | 7.27        | 3.453           | <0.0001          |
| R5PS | 4.08        | 1.83            | <0.0001          |
| PM   | 1.85        | 3.34            | <0.0001          |

Table 4: Differences between initial scores and those at 1 year of follow-up.

65% of patients were satisfied with the outcome of the infiltrations and attributed a satisfaction level of good and very good results, 35% noted average or bad results.

No major complications were noted due to epidural infiltrations.

All the operated patients were men with a mean age of 70 years. MRI of these patients showed severe stenosis in 3 patients and mild to moderate stenosis in 4 patients. 4 among these patients had multi-level stenosis.

Differences between initial scores, scores at 2 weeks follow-up and those between initial scores and scores at 1 year of follow up were all statistically significant (p<0.0001) (Tables 3 and 4, Chart 1).

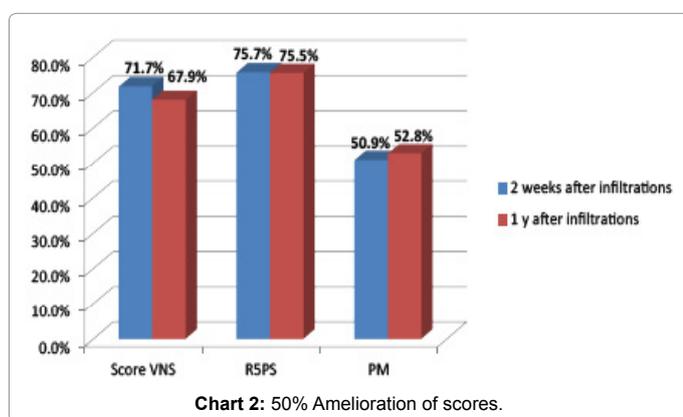
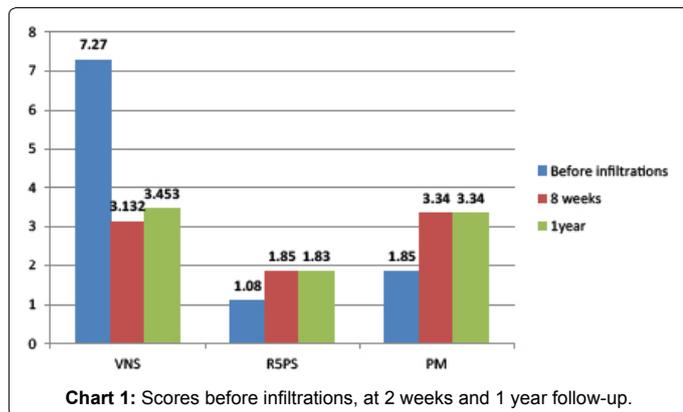
Further analysis was made to evaluate a 50% amelioration of the initial scores. A 50% amelioration of the VNS score was noted in 71.1% of the patients at 2 weeks follow-up (p < 0.0001) and in 67.9% of the patients at 1 year (p<0.0001). For the R5PS, 50% amelioration was noted in 75.5% at 2 weeks and at 1 year of follow-up. WD was ameliorated by 50% in 50.9% of patients at 2 weeks and 52.8% at 1 year (Table 5 and Chart 2).

In our study, age, gender, duration of symptoms prior to infiltrations, stenosis level and its severity on MRI were not predictive factors of bad or good results for epidural infiltrations of corticosteroids in lumbar stenosis syndrome. None of these factors had a statistically significant influence on the outcome of the study. Threshold of efficacy was defined as 50% amelioration of the scores used in the study.

## Discussion

Lumbar epidural steroid infiltrations were widely studied in radicular syndromes particularly in discal hernias. Few studied its efficacy in LSS.

A retrospective study conducted by Rosen et al. [8] on 40 patients having LSS, using non guided transforminal epidural infiltrations of steroids showed a temporary efficacy of 2 months in 60% of the patients but only in 25% after 8 months. Another study, by Hoogmartens



|      | At 2 weeks |      | At 1 year |      |
|------|------------|------|-----------|------|
|      | Nb.        | %    | Nb.       | %    |
| VNS  | 38         | 71.7 | 36        | 67.9 |
| R5PS | 40         | 75.7 | 40        | 75.5 |
| WD   | 27         | 50.9 | 28        | 52.8 |

Table 5: 50% Amelioration of the scores.

and Morelle [9] on 49 patients, using caudal epidural infiltrations of steroids, showed satisfactory results in only 48% of the patients. Cuckler et al. [10], in 1985, conducted a randomized double blinded prospective study on the efficacy of transforaminal epidural infiltrations of steroids in LSS and showed only satisfactory results in 2 patients among 41 (threshold of efficacy was defined as 75% amelioration of the symptoms, 1 year after the infiltration).

A study by Lee et al. [11] on the efficacy of lumbar infiltrations of steroids in radicular syndromes (discal hernias and LSS) showed satisfactory results in 76.8% of the patients who received transforaminal injections. The study also showed a superior efficacy in discal hernias compared to LSS.

Our results were comparable to those of the Botwin et al. [12] study done in 2002. Botwin studied the efficacy of fluoroscopically guided lumbar transforaminal epidural steroid infiltrations in LSS and showed a 50% amelioration of the VNS score in 75% of the patients. Six of the 34 patients included in the study underwent laminectomy. Mean age of the operated patients was less than the non-operative group. Five patients had mild to moderate stenosis, one had a severe stenosis. They noted that the 6 patients had lateral stenosis in addition to the central stenosis. In our study, 7 patients underwent laminectomy during follow-up. Mean age was the same as the study population. 3 patients had severe stenosis and 4 patients had mild to moderate stenosis.

Our results fared similarly also to the herniated disc group of Lutz et al. [13], which had a 50% amelioration of pain in 75.4% of the patients. 60 patients were included in the study. Eleven underwent laminectomy during follow-up, 9 of which had superimposed lateral stenosis. In both studies, Botwin et al. and Lutz et al. [12,13], patients who underwent laminectomy had superimposed lateral stenosis. This could explain the lack of efficacy of infiltrations in these patients. In our study Presence or absence of lateral stenosis was not indicated.

In a study in 2006, Cyeteval et al. [14] studied predictive factors of efficacy of lumbar steroids infiltrations in radicular syndromes. They found that a mean duration of symptoms of 7 months prior to infiltrations was a negative factor on efficacy of infiltrations. In our study, none of the factors studied showed any significant influence on the outcomes of infiltrations. Factors were age, gender, level and severity of stenosis on MRI, and duration of symptoms prior to infiltrations.

Botwin et al. [12] attributed the efficacy of steroids in LSS to their ability to block the nociceptive pathways and to their effect on prostaglandins. Many primordial pain mediators were isolated in discal hernias: metalloproteinase, c-fos, PLA2 and cytokines that are related to the degree of disc degeneration [15]. LSS involves venous congestion, intra-neuronal edema and a disturbed axonal conduction due to chronic compression of the nerve root. These factors can lead to an increased release of inflammatory and neurotoxic mediators, particularly TxA2, PLA2, leukotriene B4 that proved their role in radicular lumbar pain [16]. Thus, the use of Steroid infiltrations in LSS could have a beneficial effect on radicular symptoms in LSS. For us, this explanation is the most logic and the most concordant with the outcomes of our study. Since there is no radio-clinical correlation, further studies should be conducted to identify particular mediators that could be responsible for the lack of efficacy of infiltrations in some patients.

No minor or major complications were faced in our study. Many complications are associated with lumbar infiltrations that could be related to the technique, to steroids, to analgesics used, and/or to fluoroscopy. An interdisciplinary consensus considers interlaminar lumbar epidural infiltrations as a non-invasive procedure with no major risk if done by an experienced interventionist in the optimal conditions [17].

Our study was not double blinded. Both clinicians and patients knew the injected medications and their probable beneficial effect on pain. Tfazal et al. [18] published a randomized double blind prospective study in 2009 and showed that the addition of steroids to bupivacaine has significant effect on symptoms of radiculopathies. However, that study suffered from the few number of patients included (25 patients on bupivacaine vs. 23 patients on bupivacaine with steroids). A recent study by Atlas [19] concluded that epidural steroid injections are not effective in patients with LSS. The study showed no difference in pain at 6 week follow-up in a group who received lidocaine + glucocorticoids compared to another group receiving lidocaine alone. Thus, further randomized double blinded prospective studies over a large population of LSS should be made to accurately evaluate the efficacy of steroids infiltrations in this disease.

## Conclusion

We concluded that lumbar epidural steroid infiltrations are simple, mini-invasive procedures with minimal risks, and efficient in treatment of LSS symptoms. These procedures should be used only after failure of medical treatment and before surgical decision. Laminectomy should be considered after failure of steroid infiltrations.

Based on our study, further studies with a control group should

be done to determine the capability of steroid infiltrations to avoid surgeries in LSS and to determine their potential use as definitive treatment in very elderly patients and patients with multiple comorbidities and surgical contraindications.

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