



Original Article

Evaluation of epidural blockade as therapy for patients with sciatica secondary to lumbar disc herniation[☆]



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ABSTRACT

Objective: Sciatic pain secondary to lumbar disc herniation is a complex condition that is often highly limiting. The causes of pain in disc herniation are multifactorial. Two pathophysiological mechanisms are involved in discogenic pain: mechanical deformation of nerve roots and a biochemical inflammatory component resulting from contact between the intervertebral disc and neural tissue, by way of the nucleus pulposus. The aim of this study was to evaluate the efficacy and safety of epidural blockade as therapy for bulging lumbar disc herniation.

Methods: A clinical study was conducted based on a retrospective and prospective survey. The blockade consisted of interlaminar puncture and bolus drug delivery. The number of procedures varied according to the clinical response, as determined through weekly evaluations and then 30, 90, and 180 days after the final session. A total of 124 patients who received one to five blockades were evaluated.

Results: The success rate (defining success as a reduction in sciatic pain of at least 80%) was 75.8%.

Conclusion: The results demonstrated the therapeutic action of epidural blockade over the short term, i.e. in cases of acute pain, thus showing that intense and excruciating sciatic pain can be relieved through this technique. Because of the multifactorial genesis of sciatica and the difficulties encountered by healthcare professionals in treating this condition, epidural

[☆] Study conducted at Clínica de Dor, Campo Grande, MS, Brazil.

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blockade can become part of therapeutic arsenal available. This procedure is situated between conservative treatment with an eminently clinical focus and surgical approaches.

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Avaliação do bloqueio epidural como terapêutica em pacientes com cialgia secundária a herniação discal lombar

R E S U M O

Palavras-chave:

Deslocamento do disco intervertebral
Dor lombar
Bloqueio nervoso

Objetivo: A dor ciática secundária a hérnia discal lombar é condição complexa e, muitas vezes, intensamente limitante. As causas de dor na herniação discal são multifatoriais. Na dor discogênica há envolvimento de dois mecanismos fisiopatológicos: a deformação mecânica das raízes nervosas e o componente bioquímico inflamatório, que resulta do contato do disco intervertebral, através do núcleo pulposo, com o tecido neural. O objetivo desta investigação foi verificar a eficácia e a segurança do bloqueio epidural como terapêutica em hérnias discas lombares protrusas.

Métodos: Empreendeu-se um ensaio clínico com base em levantamento retrospectivo e prospectivo. O bloqueio foi feito por punção interlaminar com administração de fármacos em bolo. O número de procedimentos variou conforme a evolução clínica, com avaliações semanais e, finalmente, aos 30, 90 e 180 dias da última sessão. Foram avaliados 124 pacientes, que receberam de um a cinco bloqueios.

Resultados: A taxa de sucesso (considerado como redução de no mínimo 80% na dor ciática) foi de 75,8%.

Conclusão: Os resultados revelaram a ação terapêutica do bloqueio epidural em curto prazo – ou seja, na dor aguda – e demonstraram que a dor ciática intensa e excruciante pode ser aliviada com essa técnica. A gênese multifatorial da cialgia e as dificuldades encontradas pelos profissionais em seu tratamento permitem que o bloqueio epidural integre o arsenal terapêutico disponível. O procedimento insere-se entre o tratamento conservador, eminentemente clínico, e o cirúrgico.

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Introduction

The 1st Brazilian Consensus on low back pain and sciatica¹ classifies low back pain according to mechanic-degenerative causes and non-mechanical causes (inflammatory, infectious, metabolic, and psychosomatic; fibromyalgia, myofascial syndrome). Mechanic-degenerative causes involve structural, biomechanical, or vascular changes, or an interaction of these.²⁻⁴

The great variability of clinical presentations reflects the location of pain at various levels.¹ Lumbar pain that radiates to the distal end of the lower limb and worsens after a Valsalva maneuver indicate a neurological origin; pain that radiates to the buttocks or posterior thigh and change with movement of the lumbar spine are likely to have a mechanical origin. Although vascular causes should also be investigated (claudication, temperature abnormalities, color, etc.),⁵ properly characterized sciatica tends to be the main indicator of disc herniation.⁶

Disc herniation results from biomechanical factors, degenerative changes, and situations that increase the pressure on the disc – developments that may or may not prove to be symptomatic.

The relationship between disc degenerative process, displacement of nuclear material, and low back pain remains controversial, although disc herniation tends to resolve spontaneously within the first month.^{7,8} Through magnetic resonance imaging, disc degenerations have been evidenced in 34% of individuals aged 20–39 years, in 59% of those aged 40–50 years, and in 93% of those aged 60–80 years. Nonetheless, it is difficult to attribute low back pain to these findings.⁹

In mechanic-degenerative low back pain, epidural blocks are gaining ground in the non-surgical arsenal. Given the multifactorial genesis of sciatica, partly related to inflammatory processes due to the presence of degenerative disc material in the epidural space, the injection of an anti-inflammatory medication near the site of origin of pain is an indicated procedure.

Although some aspects regarding the efficacy of this treatment are yet to be elucidated, and despite the fact that non-uniform procedures were identified in the use of this method in patients with lumbar disc pathologies, particularly in cases of surgical treatment (which is indicated for approximately 1–2% of the patients),¹⁰ epidural blocks are one of the treatments that aim to prevent surgery.

This study aimed to verify the effectiveness and safety of epidural blocks as therapy in protruding lumbar disc herniations; estimate the success rate of the epidural block in protruding herniations; verify the association between the result of epidural block and the variables gender, age, number of blocks, and use of adjuvant medication; and compare the percentage of pain reduction after 30, 90, and 180 days of monitoring, for the following variables: result of epidural blocks, number of blocks, and the use of adjuvant medication.

Materials and methods

This was a clinical trial based on a retrospective (patient records and initial interviews) and prospective survey (interviews after the start of treatment).

Inclusion criteria comprised patients aged ≥ 18 years; with back pain that radiated to the posterior thigh, extending to the corresponding lower limb; pain whose pathway was compatible with the affected root and associated with sensory-subjective changes; and imaging exam diagnosing lumbar degenerative disc disease like protruding herniation. The exclusion criteria comprised previous surgery, chronic/inflammatory degenerative diseases, extruded or migrated disc herniation, local or systemic infectious diseases, neoplasms, and chronic pain secondary to epidural fibrosis (post-laminectomy syndrome).

The study included all patients who were attended to in 2012 at a pain clinic located in Campo Grande, MS, Brazil and met the inclusion criteria. Patients were retrospectively and prospectively evaluated at 30, 90, and 180 days after receiving an epidural block. They were clinically evaluated by the same examiner, both before and after the start of treatment using the visual analogue scale (VAS),¹¹ and underwent simple radiography and magnetic resonance imaging or computed tomography.

All blocks, made by the same anesthesiologist, followed a protocol. An interlaminar puncture performed at the site indicated by the imaging tests; needle bevel faced the side of the lesion. The following were administered in bolus: 0.5% bupivacaine (2 mL), methylprednisolone (80 mg), clonidine (30–75 μ g, according to age and clinical conditions), morphine (1 mg), and saline solution qs (10 mL). Patient was sitting, and, when possible, placed in lateral decubitus. In case of pain manifestation, the most convenient analgic position was adopted. Then, a 15-minute rest followed. In case of complete abolition of pain, the procedure was not repeated. In case of partial improvement, the procedure was repeated seven to ten days after the initial procedure. In case of partial clinical improvement, new blocks were performed (up to five).

Weekly serial clinical assessments were performed during the procedures and at 30, 90, and 180 days of the last (or only) block, following the same guidelines. At such times, general and specific physical examinations were performed, and the VAS was used by the patient and by the physician.

To compare the proportions of patients with or without pain reduction after block (outcome) and the independent variables (gender, age, number of blocks, and adjuvant medication), the chi-squared test and the chi-squared test for trend

were used. The relative risks were calculated with their 95% confidence intervals.

Friedman's test for paired samples was used to compare the percentages of reduction of sciatica between the monitoring periods (30, 90, and 180 days). For the variables epidural block outcome, number of blocks, and adjuvant medication, the Kruskal–Wallis (three independent groups) and Mann–Whitney (two groups) tests were used.

A 5% significance level was adopted. Epi-Info, version 7,¹² and Bio-Stat, version 5.3¹³ were used for statistical analysis.

The study was approved by the Ethics Committee on Human Research of the Universidade Federal do Mato Grosso do Sul (Protocol No. 2234, CAAE No. 0359.0.049.000-11, November 9, 2011). Informed consents were signed by the participants, and all other ethical requirements were met.

Results

Of the 129 selected patients with lumbar disc herniation, five left the study, resulting in 124 patients (62 men and 62 women), most of them were above 30 years old (Table 1; range: 18–79 years; mean: 50 ± 14 years). Of this total, 66.2% received one or two blocks (range: 1–5; mean: 2 ± 1).

Adjuvant medication was administered to 37.1% of patients, predominantly gabapentin and pregabalin. Corticosteroid therapy, alone or in combination with another

Table 1 – Patients with lumbar disc herniation, according to the assessed variables.

Variables	n	%
Sex		
Female	62	50.0
Male	62	50.0
Age (years)		
No information	6	4.8
≤ 30	13	10.5
31–50	51	41.1
≥ 50	54	43.6
Blocks		
No information	4	3.2
1	41	33.1
2	41	33.1
3	32	25.8
4	4	3.2
5	2	1.6
Adjuvant medication		
Yes	46	37.1
No	78	62.9
Medication regimen		
No medication	78	62.9
Gabapentin	20	16.1
Pregabalin	13	10.5
Duloxetine + corticosteroid therapy	4	3.2
Pregabalin + corticosteroid therapy	4	3.2
Gabapentin + corticosteroid therapy	3	2.5
Carbamazepine	1	0.8
Corticosteroid therapy	1	0.8

Source: Hospital files, 2012 (n = 124).

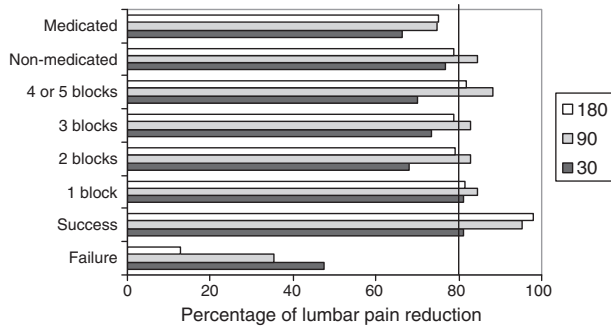


Fig. 1 – Pain reduction in patients with lumbar disc herniation, according to the assessed variables and days elapsed after epidural block. Campo Grande, MS, 2012 (n = 124).

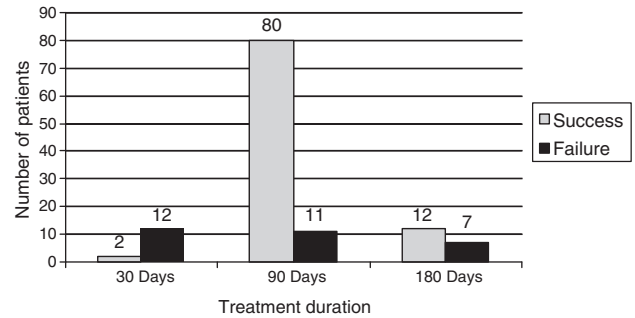


Fig. 2 – Patients with lumbar disc herniation, according to duration of the treatment with epidural block and outcome. Campo Grande, MS, 2012 (n = 124).

medication, was seldom used (criterion: partial improvement associated with interruption of epidural blocks).

Considering the number of blocks and time elapsed since last (or only) block (Table 2), we observed that, at 30-day follow-up, most patients had had one block (35.7%); at 90-day, two blocks (35.2%); and at 180-day, three blocks (36.8%). Clinically, longer treatment periods require more blocks.

Success rate ($\geq 80\%$ reduction in sciatica) was of 75.8% (95% CI: 68.3–83.3%). Failure rate was of 24.2% – in 8.9%, block was ineffective, but without subsequent surgery because patients abandoned the protocol, opted for medical therapy or acupuncture, among other approaches; 12.9% received surgery due to adverse clinical outcomes after blockages; and 2.4% had recurrence after reduction of 95–100% of pain with the block.

There was no significant association between failure or success of the technique and sex, age, number of blocks, and use of adjuvant medication (Table 3).

At 90-day post-block follow-up, the percentage of pain reduction increased when compared with 30-day post-block (Fig. 1). Patients who did not receive adjuvant medication had a higher percentage of sciatica reduction after the procedure.

At 30-day follow-up, a smaller percentage of pain reduction was observed in patients submitted to two blocks (Fig. 1). For the 90- and 180-day follow-ups, this difference was not significant.

Regarding block treatment duration, 14 patients were assessed at 30 days: 14.3% were successful in reducing

sciatica; in the 91 reevaluated at 90 days, an 87.9% success rate was observed; in the 19 reassessed at 180 days, a 63.2% rate of successful outcomes after last block was observed (Fig. 2).

Discussion

Pain due to lumbar disc disease, more specifically lumbar disc herniation, radiates along the lower limb and the injured nerve root pathway, with sensory and/or motor deficits secondary to neural dysfunction of that root.¹⁴ Its pathophysiology involves both mechanical (compression of the lumbar root)^{15,16} and biochemical/inflammatory causes.¹⁷

Although mechanical factors have been investigated since the description of this condition as an intervertebral disc disease by Mixter,¹⁸ inflammatory factors have recently been the subject of rigorous research in many experimental studies.^{14,19–21}

There is evidence of immune system impairment in the reaction between nerve root and exposed nucleus pulposus. The glycosphingolipid (GSL) are cellular components of certain types of central and peripheral nervous system cells.^{22,23} A study on disc herniation after discectomy indicated the presence of anti-GSL antibodies at high rates in 54% of patients. In non-operated patients with acute sciatica, high rates were observed in 71% of patients.²⁴

Therefore, compression-related mechanical, inflammatory, and immune components are involved in the genesis of sciatica

Table 2 – Patients with lumbar disc herniation, according to the number of epidural blocks and time elapsed from the last (or only) block.

Blocks	30 days (n = 14)		90 days (n = 91)		180 days (n = 19)	
	N	%	N	%	N	%
No information	4	28.6	–	–	–	–
1	5	35.7	30	33.0	6	31.6
2	4	28.6	32	35.2	5	26.3
3	1	7.1	24	26.4	7	36.8
4	–	–	3	3.3	1	5.3
5	–	–	2	2.1	–	–

Source: Hospital files, 2012 (n = 124).

Table 3 – Patients with lumbar disc herniation, according to the outcome of epidural block and assessed variables.

Variables	Epidural block				p	RR (95% CI)
	Failure (n = 30) ^a		Success (n = 94)			
	n	%	n	%		
Sex						
Female	16	25.8	46	74.2	0.675 ^b	1
Male	14	22.6	48	77.4		1.14 (0.61–2.14)
Age (years)						
>50	13	24.1	41	75.9	0.981 ^c	1
31–50	13	25.5	38	74.5		0.94 (0.48–1.84)
≤30	3	23.1	10	76.9		1.04 (0.35–3.13)
No information	1	16.7	5	83.3		–
Number of blocks						
1	8	19.5	33	80.5	0.931 ^c	1
2	10	24.4	31	75.6		0.80 (0.35–1.82)
3	7	21.9	25	78.1		0.89 (0.36–2.20)
4–5	1	16.7	5	83.3		1.17 (0.18–7.78)
No information	4	100.0	–	–		–
Adjuvant medication						
Yes	13	28.3	33	71.7	0.417 ^b	1
No	17	21.8	61	78.2		1.30 (0.70–2.42)

If $p \leq 0.05$, statistically significant difference. The category “no information,” when present, was removed from the test calculation.

Source: Hospital files, 2012 (n = 124).

^a <80% reduction in lumbar pain after the block.

^b Chi-squared test.

^c Chi-squared test for trend.

The pathophysiology of sciatica is characterized by the fact that the nucleus pulposus, which causes inflammation, causes the involvement of key inflammatory mediators and leads to demyelination, root ganglion ischemia, and increased endoneural pressure, with consequent reduction of nerve stimulus speed.²⁴ This inflammatory reaction is followed by the immune response.

The use of corticosteroids associated with local anesthetics at the epidural site is common in several reference centers for the treatment of radiculopathy.^{25,26} In Brazil, the procedure has spread from the ideas of John Bonica apud Castro.²⁷ Multimodal analgesia is recognized as the most adequate for the treatment of sciatica.²⁸

Lumbar puncture (both median and paramedian) is preferable to sacral puncture due to lower anatomical variation, as well as greater ease of location and deposition of the solution closer to the injury.²⁹ Use of fluoroscopy is controversial. Cannon and Aprill²⁶ indicate the occurrence of route diversion in 18–52% of cases, depending on the route used and the experience of the professional. According to Johnson et al.,³⁰ results are positive in approximately 95% of cases, without using contrast and fluoroscopy.

When the desired effect is achieved with a single procedure, the need for repetition becomes unlikely.³¹ Nonetheless, there are patients who do not present an initial satisfactory response, but respond to a second or third procedure.²⁶ Swerdlow and Sayle-Creer³² postulate that the solution should remain in place for more than two weeks. Chen et al.³³ supported the two-week range of validity, but admitted repeating the procedure in a smaller interval if the clinical setting so

requested. However, they did not agree with the idea of “standardizing” a series of three blocks without intercurrent clinical evaluation, despite the fact that experience shows the number of procedures to be typically three or four. These authors indicate that there is no support for this conduct in the literature.

In the present series, a success rate of 75.8% was achieved – 12.9% of patients subsequently underwent surgery: one patient had significant urinary retention for about 6 h after the procedure, with no associated analgesic benefit, and two had no success with the technique (puncture error or dura mater puncture), and procedure was aborted. These three patients were included in the group that was later referred to surgery.

Literature indicates that 10–15% of patients with sciatica secondary to a disc herniation undergo surgery,³⁴ which corresponded with the present findings (Table 3).

In accordance with existing international protocols, positive results required two blocks, on average. Adjuvant medication was administered to 37.1% of the patients (Table 1).

Epidural block is considered to be safe, presenting good cost-effectiveness and representing a minimally invasive treatment for sciatica, particularly in acute cases. This procedure should be used in clinical situations of pain crisis, and it also allows for the prognosis of future surgery.³⁵

In a prospective study, Riew et al.³⁶ concluded that patients with lumbar radiculopathy at one or two levels are candidates for epidural block in an attempt to avoid surgical procedures. Subsequently, Riew et al. observed that patients who had managed to avoid surgery due to epidural blocks for at least one year continued to show favorable development after five years.

Study limitations

The sample size (124 patients) and the selection of subjects (restricted to those who attended a single clinic located in Campo Grande, Brazil, in the period investigated) can be considered as inherent limitations to this study. For ethical reasons, the study did not include a control group, in order to avoid depriving any patients from the treatment administered.

Conclusions

Considering the limitations of this study, the procedure was proven to be effective, as it provided relief from sciatica in 75.8% of patients, and safe, as only three cases (2.4%) had technical problems (bladder function disorder in one puncture and error in two).

Best clinical outcome (87.9% success) with the largest number of patients (91) was observed at 90 days of follow-up.

There was no association between epidural blocks (success/failure) and the variables gender, age, number of procedures, and use of adjuvant medication.

Conflicts of interest

The authors declare no conflicts of interest.

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