Abdulwahab *et. al.,* Babcock Univ. Med. J.2026 9(2):161-169
https://doi.org/10.38029/babcockuniv.med.j..v9i2.1410
eISSN: 2756-4657

RESEARCH ARTICLE OPEN ACCESS

Efficacy of caudal epidural steroid injection for lumbar disc-related sciatica: Influence of symptom duration in a prospective study

Abdulwahab DM[1ID], Faris W[1ID], Abdul Lateef SA[1ID], Mutasem SM[1], Hamad KH[1], Bohan AH[1], Al Radhwany YAR[1ID]

[1]Department of Surgery, Al-Iraqia Medical School, Baghdad, Iraq

Submitted: 20th February 2026
Accepted: 2nd March 2026
Published: 30th June 2026
ID: Orcid ID

Abstract
Objective: To evaluate the effectiveness of caudal epidural steroid injections (ESI) for sciatica from lumbar disc prolapse and determine if symptom duration affects outcomes.
Methods: 98 patients with MRI-confirmed lumbar disc prolapse and sciatica were recruited. They were divided by symptom duration: Group A (acute/subacute, <4 months, n=50) and Group B (chronic, >4 months, n=48). Each received one caudal injection of 80 mg triamcinolone acetonide with normal saline. Pain was measured using the Visual Analogue Scale (VAS) at baseline, one, three, and six months post-injection. Data were analysed using repeated measures ANOVA and independent t-tests, with significance set at $p<0.05$.
Results: Both groups showed significant VAS reduction at one month (Group A: 7.56±1.31 to 3.86±1.82, p=0.001; Group B: 7.52±1.41 to 4.52±2.19, p=0.001). At three months, only Group A maintained significant improvement (4.87±1.64, $p<0.001$ vs. baseline), while Group B's pain returned toward baseline (5.54±1.47, p=0.08). At six months, neither group showed significant improvement from baseline. However, 24% of Group A reported ≥30% pain reduction at six months versus 6% in Group B (p=0.01).
Conclusions: Caudal ESI effectively provides short- and medium-term pain relief for sciatica from lumbar disc prolapse. Treatment within the first four months yields better and more durable outcomes. Symptom duration is a key predictor of treatment response.

Keywords: Sciatica, Epidural Steroid Injection, Caudal Approach, Intervertebral Disc Displacement, Prognosis

Plain English Summary

Sciatica results when one of the slipped discs of the lower back presses a nerve that transmits the pain down the leg. Injections of steroids around the nerve are usually done by the doctors to reduce inflammation and pain. However, is it really that important when you receive the injection? It is what we wanted to investigate.

We tracked 98 patients who had been injected with steroids due to sciatica. One-half had less than four months of pain, and the other half had over four months of pain. We measured the extent of the pain they experienced before the shot and after one, three, and six months.

The results were clear. One month later, the two groups had significantly improved. But by three months, only the early treated were feeling the relief as real. In the majority of patients, the pain came back at six months. Nevertheless, only one out of four in the early group retained good pain relief, whereas only one out of twenty in the late group did.

The takeaway? Don't wait. In case you are facing sciatica, earlier steroid injection is better and prolongs pain relief. Early intervention is indeed significant.

Correspondence:
Abdulwahab Dheyaa M
Department of Surgery,
Al-Iraqia Medical School
Baghdad, Iraq
dheyaa.m.abdulwahaab@aliraqia.edu.iq

© BUMJ. 2026 Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.

Introduction

One of the primary causes of individuals presenting to spine surgery clinics all over the world is sciatica (1). It can be described as pain that is radiating along the course of the sciatic nerve that starts in the buttock and then runs down the back of the thigh, and is usually accompanied by pain in the outer side of the calf and foot. Sciatica may be caused by many factors, though lumbar disc herniation is considered to be the most frequent (2).

In the case of discogenic sciatica, there are two major mechanisms that cause the symptoms, which are mechanical pressure and inflammation. The herniated disc literally crowds the nerve root, and this is evidently painful. Nevertheless, the importance of inflammation has been given more attention in recent years. The release of the contents of herniated discs contains enzymes and inflammatory mediators ile phospholipase A 2 and prostaglandins, which irritate the neighbouring nerve roots (3). It is this whole process of inflammation that makes corticosteroids the choice of treatment in sciatica.

ESI has become an established method of treating sciatica due to disc prolapse (4). The logic is simple: place steroids directly into the epidural space close to the affected nerves, inhibit focal inflammation and decrease pain. The epidural space can be accessed in three major ways, including the caudal mode, interlaminar mode, and transforaminal mode. The reason why the caudal method is commonly used is that it is easy, less risky of accidental dural puncture, works with anticoagulant patients, and patients with spinal scarring (resulting from a prior surgery) (5). Moreover, the higher volume of medication is injected under this method, and it leads to a transmission of the medication to a variety of nerve roots, which is useful in patients with widespread or poorly localised symptoms (6).

Despite its broad usage, there is still much controversy over the actual effectiveness of ESIs. Other systematic reviews have argued that these injections do not work much better than a placebo, particularly in long-term function and outcomes (7, 8). The use of short-term analgesics is often effective, yet long-term effects are less assured. On the other hand, the data presented by more recent meta-analyses show that ESIs may offer significant and small but helpful relief, especially to patients with acute radicular pain (9).

Determining the patients who are most likely to benefit from the ESI is a major priority. In case clinicians are able to identify predictors of positive response in a reliable manner, it becomes possible to choose the patients more efficiently, use the resources in a prudent manner, and help patients make more accurate decisions. Symptom duration is one of the aspects that is often addressed. The biological explanation is also obvious: the more a nerve root is in pain, the more chances to suffer central sensitisation and neuropathic pain, and the less efficient anti-inflammatory injections can be (10). Inflammation may also become chronic, resulting in scarring and permanent nerve damage, reducing the prospects of successful treatment.

Some reports have examined the effects of the symptom duration on ESI outcomes. Hopwood and Abram found that the longer the duration of symptoms, the worse the post-injection results (11). Billy and the associates established that with every extra week of radicular pain preceding injection, the likelihood of improvement was reduced by 0.07 per cent (12). However, few prospective studies specifically test symptom duration as a predictive factor, especially those that look at the use of ultrasound caudal approach as standardised.

This prospective study aimed to evaluate the efficacy of ultrasound-guided epidural steroid injections at the caudal position on sciatica patients as a result of lumbar disc prolapse. The main aspect of the results was to define whether the duration of the symptoms, acute or subacute (below 4 months) or chronic (above 4 months), is a predictor of patient outcomes. We postulated that patients whose symptoms would have a reduced duration would have more and prolonged pain relief than patients with chronic symptoms.

Materials and Methods

Study Design and Setting

The study was a prospective cohort study that was conducted at the Department of Surgery, Al-Iraqia Medical School in Baghdad, Iraq. It took us more than 15 months, between January 2024 and March 2025, to conduct it and adhere to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) standards of reporting a cohort study.

Participants

We filtered over all the patients presenting to the outpatient spine clinic with radicular leg pain that presented in the appearance of being a result of lumbar disc prolapse. Every patient received a complete clinical examination: we took a detailed history, conducted comprehensive neurological examinations and ordered plain X-rays and an MRI of the lumbosacral spine to confirm the diagnosis and have a better look at what was going on.

The criteria used in the inclusion were: adults aged between 18 and 80 years, MRI evidence of a lumbar disc herniation at one or more levels,

clinical signs and symptoms of nerve root irritation, pain beyond a dermatome and possibly with some sensory alterations. Each of them had already experimented with at least eight weeks of conservative therapy, involving pain medications and modifications in activities, to no effect. We didn't include anyone who'd already had lumbar spine surgery.

We excluded patients if their imaging showed a migrated or sequestrated disc herniation, or if they had significant motor weakness (less than grade 4 by the Medical Research Council scale). We also excluded anyone with signs of cauda equina syndrome, segmental instability on imaging, or who couldn't safely have corticosteroid injections, so people with active infections, bleeding disorders, or allergies to the medications, as well as those who were pregnant. Other exclusions: anyone unable to give informed consent, patients with spinal tumours, infections, traumatic injuries, inflammatory spondyloarthropathies, or psychiatric disorders that could get in the way of follow-up.

Group Allocation

Eligible participants were allocated into two groups based on symptom duration before injection:

Group A (Acute/Subacute Sciatica): Patients with sciatica symptoms lasting less than four months (n=50)

Group B (Chronic Sciatica): Patients with sciatica symptoms persisting for more than four months (n=48)

The four-month threshold was selected based on previous literature suggesting that beyond this period, neuroplastic changes and central sensitisation may diminish responsiveness to peripherally-directed interventions (13).

Intervention

All procedures were performed in an outpatient clinic setting under aseptic conditions using ultrasound guidance. Patients were positioned prone with a pillow under the lower abdomen to flatten the lumbar lordosis and facilitate access to the sacral hiatus. The sacral hiatus was identified using a high-frequency linear ultrasound probe, with confirmation of anatomical landmarks including the sacral cornua, sacrococcygeal ligament, and the characteristic "saw-tooth" appearance of the sacral canal floor.

Following sterile skin preparation with chlorhexidine solution and local anaesthesia infiltration of the skin and subcutaneous tissues over the sacral hiatus using 1% lidocaine without adrenaline, a 22-gauge Quincke-type spinal needle was advanced under real-time ultrasound visualisation through the sacrococcygeal ligament into the sacral canal. Needle position was confirmed by loss of resistance technique and ultrasound visualisation of injectate spread within the epidural space.

All patients received a 15 mL mixture comprising one ampule of triamcinolone acetonide (80 mg in 2 mL) diluted with 13 mL of preservative-free normal saline. The injection was administered slowly over 30-60 seconds, with continuous monitoring for patient discomfort or signs of intravascular injection.

Concomitant Medications

Every patient took the same medications for seven days after the procedure: tizanidine (2-4 mg daily) to relax muscles and celecoxib (200 mg daily) for pain relief. In order to recover, patients reduced physical activity during the initial week after the injection to aid in recovery. Then slowly they returned to their normal ways.

Outcome Measures

The central result was the level of pain, which was measured according to the Visual Analogue Scale (VAS). This scale is based on 0 (no pain) and 10 (the worst pain you can imagine). The VAS scores were measured by researchers at four different times:

1. Baseline (immediately before injection)
2. One-month post-injection
3. Three months post-injection
4. Six months post-injection

According to the existing standards of meaningful change in chronic pain studies, we considered a 30% decrease in VAS score, as far as baseline was concerned, to be a clinically significant response (14).

Sample Size Consideration

We estimated the size of the sample to identify a difference in VAS scores in the groups of 1.5 points in three months. Under the assumption of a standard deviation of 2.0, 80 per cent power, and a two-sided alpha of.05, the sample size of 44 patients per group was obtained. We took this number to 50 per group to cover the possibility of dropouts.

Statistical Analysis

All the analyses were conducted with the help of SPSS 26.0 (IBM Corp., Armonk, NY, USA). To provide demographics and baseline clinical data, we have provided means and standard deviations (when the variables were continuous), frequencies and percentages (when the variables were categorical). The Shapiro-Wilk test is the test that we used to determine whether the continuous variables were normally distributed. In the case of within-group changes in VAS scores across time, repeated measures

ANOVA with Bonferroni correction was conducted. Independent samples t -tests of continuous variables and chi-square tests of categorical variables were used to provide between-group comparisons at each time point. Chi-square tests at different time points were employed to find the number of patients in every group that responded clinically significantly (the 30 per cent reduction in VAS). A mixed-model method was also taken into account to deal with missing data on the assumption that the missingness was merely random.
All statistical tests were two-tailed, with statistical significance defined as $p<0.05$. Exact p-values are reported throughout, with values <0.001 denoted as such.

Results

Study Population and Baseline Characteristics

A total of 112 patients were initially screened for eligibility. Fourteen patients were excluded for the following reasons: five declined participation, four had motor deficits requiring surgical intervention, three had contraindications to corticosteroid injection, and two had incomplete baseline data. The final study population comprised 98 patients, with 50 allocated to Group A (acute/subacute sciatica) and 48 to Group B (chronic sciatica). Follow-up was complete for all 98 patients at one month, 96 patients (98.0%) at three months (one patient in each group lost to follow-up), and 94 patients (95.9%) at six months (two patients in Group A and two in Group B lost to follow-up).
Baseline demographic and clinical characteristics are presented in Table 1. The two groups were well-matched with no statistically significant differences in age, sex distribution, or baseline pain severity. Group A comprised 20 males (40.0%) and 30 females (60.0%) with a mean age of 55.16 years (SD 9.58, range 34-76 years). Group B comprised 17 males (35.4%) and 31 females (64.6%) with a mean age of 54.50 years (SD 9.49, range 37-80 years). Mean baseline VAS scores were nearly identical between groups: 7.56 (SD 1.31, range 5-10) in Group A versus 7.52 (SD 1.41, range 5-10) in Group B (p=0.556).

Table 1: Baseline Demographic and Clinical Characteristics

Characteristic	Group A (n=50)	Group B (n=48)	p-value
Age, years (mean ± SD)	55.16 ± 9.58	54.50 ± 9.49	0.732
Age range, years	34-76	37-80	-
Sex, n (%)			0.641
- Male	20 (40.0)	17 (35.4)	
- Female	30 (60.0)	31 (64.6)	
Baseline VAS (mean ± SD)	7.56 ± 1.31	7.52 ± 1.41	0.556
Baseline VAS range	10-May	10-May	-

SD: standard deviation; VAS: Visual Analogue Scale

Pain Outcomes at One Month

Both groups demonstrated a significant reduction in VAS scores at one month compared to baseline (Table 2, Figure 1). In Group A, mean VAS decreased from 7.56±1.31 to 3.86±1.82, representing a mean reduction of 3.70 points (49.0% decrease, $p<0.001$). In Group B, mean VAS decreased from 7.52±1.41 to 4.52±2.19, representing a mean reduction of 3.00 points (39.9% decrease, $p<0.001$). The between-group difference at one month favoured Group A (3.86 versus 4.52, p=0.047). The proportion of patients achieving a clinically significant response (≥30% VAS reduction) was 64.0% (32/50) in Group A compared to 58.3% (28/48) in Group B (p=0.563).

Pain Outcomes at Three Months

At three months, Group A maintained significant VAS reduction compared to baseline, with a mean score of 4.8h7±1.64 representing a 35.6% reduction from baseline ($p<0.001$). Group B, on the other hand, exhibited an average VAS of 5.54+1.47, a 26.3% decrease that was not significantly lower than at baseline (p=0.08). The statistically significant difference between the groups at three months (4.87 versus 5.54, p=0.038) exists. The clinically significant response was observed in 48.0% (24/50) and 29.2% (14/48) patients in Group A and Group B, respectively (p=0.045).

Pain Outcomes at Six Months

At six months, both groups did not show a statistically significant change in VAS as compared to baseline. A mean VAS of Group A was 6.18(1.88), which is an 18.3% decrease compared to baseline (p=0.12). The mean of group B was 6.71 1.42, which is associated with 10.8 reduction (p=0.34). The score of Group A was lower than that of Group B at six months, but this was not statistically significant (6.18 vs 6.71, p=0.09).

Table 2: VAS Scores at Baseline and Follow-up Time Points

Time Point	Group A (n=50)	Group B (n=48)	Between-Group p-value
Baseline	7.56 ± 1.31	7.52 ± 1.41	0.556
1 month	3.86 ± 1.82*	4.52 ± 2.19*	0.047
3 months	4.87 ± 1.64*	5.54 ± 1.47	0.038
6 months	6.18 ± 1.88	6.71 ± 1.42	0.09

*Values presented as mean ± SD. *p<0.001 versus baseline within group*

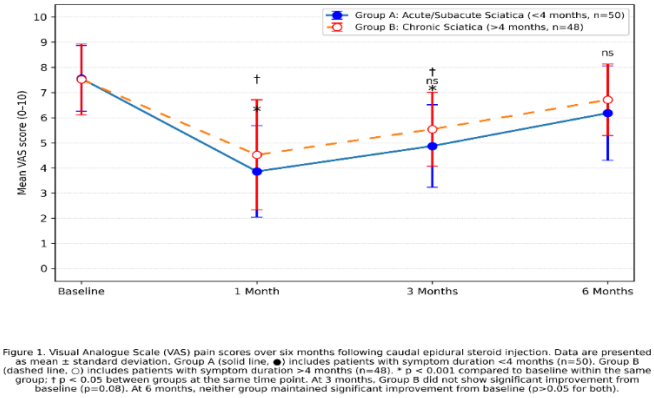


Figure 1. Visual Analogue Scale (VAS) pain scores over six months following caudal epidural steroid injection. Data are presented as mean ± standard deviation. Group A (solid line, ●) includes patients with symptom duration <4 months (n=50). Group B (dashed line, ○) includes patients with symptom duration >4 months (n=48). * p < 0.001 compared to baseline within the same group; † p < 0.05 between groups at the same time point. At 3 months, Group B did not show significant improvement from baseline (p=0.08). At 6 months, neither group maintained significant improvement from baseline (p>0.05 for both).

Figure 1: VAS Score Trends Over Six Months Following Caudal Epidural Steroid Injection

However, the proportion of patients who had a clinically significant response was much higher in Group A: 24.0% (12 out of 50) than in Group B 6.3% (3 out of 48) (p=0.01) (Table 3).

Table 3: Proportion of Patients Achieving Clinically Significant Response (≥30% VAS Reduction)

Time Point	Group A (n=50)	Group B (n=48)	p-value
1 month	32 (64.0%)	28 (58.3%)	0.563
3 months	24 (48.0%)	14 (29.2%)	0.045
6 months	12 (24.0%)	3 (6.3%)	0.01

Summary of Findings

Patients experiencing acute or subacute sciatica—less than four months in duration—fared better overall than those with chronic symptoms. Both groups experienced meaningful pain relief after one month, but Group A's results persisted more strongly at three months, and a greater proportion achieved clinically significant improvement at six months. However, the treatment's effectiveness diminished over time for both groups. By six months, neither group showed statistically significant pain reduction from baseline, although some patients who began treatment early continued to report meaningful relief.

Discussion

Principal Findings

This study shows that ultrasound-guided caudal epidural steroid injections are effective for short-to-medium term pain relief in people with sciatica caused by lumbar disc prolapse. Nevertheless, the point that matters the most is that the length of symptoms plays a great role. Better and lasting results were seen in patients who received the injection within four months of the onset of the symptoms, as compared to those who took over four months.

A significant percentage of 60 per cent of the patients reported a significant decrease in pain at one month. This is in line with the past studies on the immediate efficacy of such injections (15). The fast action is probably due to the direct anti-inflammatory effects of steroids; they relax the swollen nerve roots by inhibiting phospholipase A2, prostaglandins, and other inflammatory substances emitted when herniated by disc materials (15).

Comparison to Existing Literature.

In general, our results correspond with and extend the prior studies on the duration and consequences of symptoms. Hopwood and Abram had observed more than three decades ago that longer-term symptomatic patients react to these injections less favourably (11). More recently, it was demonstrated by Billy and others that the longer the duration of symptoms before treatment, the less likely it is that the symptoms will improve. This underlines so much the significance of early intervention (12). In their meta-analysis, Oliveira and colleagues found that epidural steroid injection is minimally

beneficial in the short-term in the treatment of lumbosacral radicular pain, but the treatment results differ across studies (9). It appears to us that part of this variation can be ascribed to the length of symptoms; the earlier a patient is treated, the better.

The processes involved in the discrepant responsiveness with regard to the duration of symptoms should be considered. The spinal cord becomes sensitised when nerve roots are irritated over a lengthy period, which increases the amount of pain despite the inflammation having subsided (10). When the inflammation persists, scars may also develop around the nerves, rendering the pain less reactive to injections. Also, as a result of ongoing pain, the nervous system may, in fact, reorganise itself and become chronic, difficult-to-treat neuropathic pain (16).

Clinical Implications

There are a number of implications that our findings have on clinical practice. To begin with, it is vital to intervene promptly; otherwise, the treatment will be less efficient. Even though it is usually advised that a trial of conservative management should be attempted before injections are further pursued, our data show that delay may decrease the possibility of getting any meaningful relief. It is important to strike a balance between giving time to rest naturally and not spending excessively long a time such that the pain turns chronic.

Patient discussions are also informed by such findings. One should explain that an injection can provide relief but not be long-term in case a patient has had sciatica over a span of four months, and more treatments might be required. Those whose symptoms are new have more cause to anticipate a lasting improvement.

Lastly, the paper advocates the caudal pathway in such injections. With ultrasound guidance, the procedure was easy, and it did not expose the patient to radiation like is the case with fluoroscopy (17). Side effects were not severe. Also, there are increased amounts in caudal injections, fine in cases when the pain is multifocal or the pain is diffuse, since the drug can spread in a wider locality (6).

Safety Considerations

There were no noteworthy complications in this series, no dural punctures, intravascular injections, or infections, which means that the ultrasound-guided caudal ESI is safe in the hands of qualified professionals. Ultrasound enables the operator to see the needle in real time, determine the positioning of the needle in the sacral canal and determine anatomical variations which may otherwise make the procedure difficult (18). We chose triamcinolone acetonide, which is a particulate steroid because it lasts longer than non-particulate steroids. Nevertheless, since particulate steroids have a potential risk of embolisation in case they are accidentally injected into a blood vessel, the operators must be accurate and careful (19).

Study Limitations and Future Directions.

Several obvious constraints have to be recognised. To begin with, there was no control group, there was no placebo, or alternative treatment, and this made it hard to conclude that the improvements that were realised were a result of the injection. Comparator natural recovery, regression to the mean or placebo effects cannot be ruled out as the possible causes. Lack of randomisation brings the risk of an enrolment selection bias, but serial enrolment and related baseline differences between groups moderately address this risk.

In terms of outcome measurement, the VAS of pain intensity was our main measure of pain, which only captures one of the facets of the patient experience. We have not utilised functional scales like the Oswestry Disability Index (ODI) or the Roland-Morris Disability Questionnaire, which is a major shortcoming. Pain reduction is not necessarily measured by a better quality of life or better functioning. Future studies should adopt a more comprehensive approach, assessing not only pain but also function, quality of life, work ability, and the patient's overall impression.

Certain procedural variables also warrant consideration. All patients received tizanidine and celecoxib for one week following the procedure, which may have influenced the outcomes. While this reflects real-world practice, patients often require additional pain management in the early post-injection period, which complicates the attribution of benefit specifically to the injection. We also used a uniform injectate volume and steroid dose for all participants, whereas in clinical practice, dosing may need to be individualised based on patient anatomy or pathology.

A six-month follow-up provides valuable information on medium-term outcomes but does not address long-term durability or the potential need for repeat interventions. It would be beneficial to have a one or two-year follow-up, which would give a more thorough picture of the procedure in the context of the general treatment picture.

Statistically, our sample size was adequate to recognise the differences in the VAS scores between the groups, but this is not necessarily the sample size that is adequate to determine predictors of response by use of multivariate

regression. Regression analyses were not done, so we cannot establish the independent predictors of the duration of the symptoms, which may include age, sex, BMI, smoking, or level of the affected disc.

Lastly, our study is not large-scale research in any way since it is a single-centre study, which might not be generalised to other healthcare settings. The divergence in patient backgrounds, practice pattern or healthcare systems may produce varying results. Our patients were predominantly female, 60 per cent and 64.6 per cent of the two groups, which can perhaps represent patients referred or prevalence of the disease, but must be taken into account when generalising the results.

All these drawbacks give future research priorities. ESI, compared with placebo or alternative therapies, preferably using stratification by symptom duration, needs to be studied using randomised controlled trials to demonstrate its efficacy and which patients respond best to it. The outcomes, pain, function, quality of life, and work ability should be measured over a wide range, and in the long term, in these studies. Mechanistic studies exploring the biological basis of the duration of symptoms, such as inflammatory and neuropathic pain indicators, might aid in detecting new treatment objectives. Lastly, the caudal, transforaminal, and interlaminar techniques of ESI may be compared in terms of their symptom duration, which might be used to complete the treatment algorithm.

Conclusions

Caudal epidural steroid injections are effective in the short-term, at least in the medium-term relief of sciatica pain related to lumbar disc prolapse when performed under ultrasound guidance. This is critical about timing. Those who are injected within four months of the onset of the first symptoms get the benefit and long term of relief as compared to patients who have suffered pain longer than four months. The majority of patients experience improvement in the first place, although it gets less effective in many, and six months later, only a few still experience considerable pain relief. Such data highlights the need to deal with acute sciatica promptly and pay close attention to the period of the problem when giving patients recommendations or evaluating the likelihood of success. The research ought to adopt randomised controlled trials and follow a broad spectrum of outcomes in future to understand the extent of epidural steroid injections in treating sciatica and other variables that will assist in determining other patients who will respond optimally.

List of Abbreviations

ANOVA: Analysis of Variance
BMI: Body Mass Index
ESI: Epidural Steroid Injection
MRI: Magnetic Resonance Imaging
ODI: Oswestry Disability Index
SD: Standard Deviation
SPSS: Statistical Package for Social Sciences
STROBE: Strengthening the Reporting of Observational Studies in Epidemiology
VAS: Visual Analogue Scale

Declarations

Ethics Approval and Consent to Participate

The study protocol received approval from the Research Ethics Committee of Al-Iraqia Medical School (Approval Number: 1339-1-11-2023, dated November 1, 2023). All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments. Written informed consent was obtained from all individual participants following a detailed explanation of the procedure, potential benefits, and possible complications.

Consent for Publication

All authors gave their consent for the publication of this work under the Creative Commons Attribution Non-Commercial 4.0 license.

Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding Sources

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contributions

ADM: Conceptualisation, Methodology, Investigation, Writing- Original Draft, Project Administration
FW: Validation, Formal Analysis, Data Curation, Writing- Review & Editing
ASA: Investigation, Resources, Data Curation
MSM: Investigation, Follow-up Assessments
HKH: Investigation, Follow-up Assessments
BAH: Investigation, Data Collection
AYAR: Supervision, Validation, Writing- Review & Editing
All authors read and approved the final manuscript.

Acknowledgements
The authors would like to thank the staff of the Department of Surgery at Al-Iraqia Medical School for their support and assistance throughout this study. We are particularly grateful to the patients who participated in this research and generously contributed their time and experiences.

References

1. Jensen RK, Kongsted A, Kjaer P, Koes B. Diagnosis and treatment of sciatica. Bmj. 2019 Nov 19;367. https://doi.org/10.1136/bmj.l6273
2. Jung-Ha K, van Rijn RM, Koes MW, de Boer MR, Ginai AZ, Ostelo RW, van der Windt DA, Verhagen AP. Diagnostic accuracy of diagnostic imaging for lumbar disc herniation in adults with low back pain or sciatica is unknown; a systematic review. Chiropractic & Manual Therapies. 2018;26. https://doi.org/10.1186/s12998-018-0207-x
3. Mulleman D, Mammou S, Griffoul I, Watier H, Goupille P. Pathophysiology of disk-related sciatica. I.—Evidence supporting a chemical component. Joint Bone Spine. 2006 Mar 1;73(2):151-8. https://doi.org/10.1016/j.jbspin.2005.03.003
4. Cohen SP, Bicket MC, Jamison D, Wilkinson I, Rathmell JP. Epidural steroids: a comprehensive, evidence-based review. Regional Anesthesia & Pain Medicine. 2013 May 1;38(3):175-200. https://doi.org/10.1097/AAP.0b013e31828ea086
5. Dernek B, Aydoğmuş S, Ulusoy İ, Duymuş TM, Ersoy S, Kesiktaş FN, Dıracoğlu D, Aksoy C. Caudal epidural steroid injection for chronic low back pain: A prospective analysis of 107 patients. Journal of Back and Musculoskeletal Rehabilitation. 2022 Jan;35(1):135-9. https://doi.org/10.3233/BMR-200262
6. Manchikanti L, Pampati V, Benyamin RM, Boswell MV. Analysis of efficacy differences between caudal and lumbar interlaminar epidural injections in chronic lumbar axial discogenic pain: local anesthetic alone vs. local combined with steroids. International Journal of Medical Sciences. 2015 Jan 20;12(3):214. https://doi.org/10.7150/ijms.10870
7. Pinto RZ, Maher CG, Ferreira ML, Hancock M, Oliveira VC, McLachlan AJ, Koes B, Ferreira PH. Epidural corticosteroid injections in the management of sciatica: a systematic review and meta-analysis. Annals of internal medicine. 2012 Dec 18;157(12):865-77. https://doi.org/10.7326/0003-4819-157-12-201212180-00564
8. Pinto RZ, Maher CG, Ferreira ML, Hancock M, Oliveira VC, McLachlan AJ, Koes B, Ferreira PH. Epidural corticosteroid injections in the management of sciatica: a systematic review and meta-analysis. Annals of internal medicine. 2012 Dec 18;157(12):865-77. https://doi.org/10.1056/NEJMoa1313265
9. Oliveira CB, Maher CG, Ferreira ML, Hancock MJ, Oliveira VC, McLachlan AJ, Koes BW, Ferreira PH, Cohen SP, Pinto RZ, Cochrane Back and Neck Group. Epidural corticosteroid injections for lumbosacral radicular pain. Cochrane Database of Systematic Reviews. 1996 Sep 1;2020(4). https://doi.org/10.1002/14651858.CD013577
10. Wei X, Wang L, Yu F, Lee C, Liu N, Ren M, Tu J, Zhou H, Shi G, Wang X, Liu CZ. Identifying the neural marker of chronic sciatica using multimodal neuroimaging and machine learning analyses. Frontiers in Neuroscience. 2022 Nov 30;16:1036487. https://doi.org/10.3389/fnins.2022.1036487
11. Hopwood MB, Abram SE. Factors associated with failure of lumbar epidural steroids. Regional Anesthesia and Pain Medicine. 1993 Jul 1;18(4):238-43. https://doi.org/10.1136/rapm-00115550-199318040-00008
12. Billy GG, Lin J, Gao M, Chow MX. Predictive factors of the effectiveness of caudal epidural steroid injections in managing patients with chronic low back pain and radiculopathy. Clinical spine surgery. 2017 Jul 1;30(6):E833-8. https://doi.org/10.1097/BSD.0000000000000454
13. Engle AM, Chen Y, Marascalchi B, Wilkinson I, Abrams WB, He C, Yao AL, Adekoya P, Cohen ZO, Cohen SP. Lumbosacral radiculopathy: inciting events and their association with epidural steroid injection outcomes. Pain Medicine. 2019 Dec 1;20(12):2360-70. https://doi.org/10.1093/pm/pnz097
14. Farrar JT, Young Jr JP, LaMoreaux L, Werth JL, Poole RM. Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale. Pain. 2001 Nov 1;94(2):149-58. https://doi.org/10.1016/S0304-3959(01)00349-9
15. Zhang J, Zhang R, Wang Y, Dang X. Efficacy of epidural steroid injection in the treatment of sciatica secondary to lumbar disc herniation: a systematic review and meta-analysis. Frontiers in Neurology. 2024 May 22;15:1406504. https://doi.org/10.3389/fneur.2024.1406504
16. Igwesi-Chidobe CN, Kitchen S, Sorinola IO, Godfrey EL. “A life of living death”: the

experiences of people living with chronic low back pain in rural Nigeria. Disability and rehabilitation. 2017 Apr 10;39(8):779-90. https://doi.org/10.3109/09638288.2016.1161844

17. Kim SJ, Lee MH, Lee SW, Chung HW, Lee SH, Shin MJ. Radiation exposure for fluoroscopy-guided lumbosacral epidural steroid injections: comparison of the transforaminal and caudal approaches. Clinical Spine Surgery. 2014 Feb 1;27(1):E37-40. https://doi.org/10.1097/BSD.0b013e31829eb80f
18. Kim DH, Park JH, Lee SC. Ultrasonographic evaluation of anatomic variations in the sacral hiatus: implications for caudal epidural injections. Spine. 2016 Jul 1;41(13):E759-63. https://doi.org/10.1097/BRS.0000000000001448
19. Cotten A, Drapé JL, Sans N, Feydy A, Bartoli JM, Meder JF. Recommandations de la SIMS. SFR et FRI-SFR concernant les corticoïdes injectés en épidural et foraminal. 2017.