ORIGINAL ARTICLE

PREFERENCE FOR LUMBAR EPIDURAL STEROID INJECTIONS IN ELDERLY PATIENTS: A COMPARISON WITH ADULT PATIENTS

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Abstract

Introduction: Epidural steroid injections are often preferred in elderly patients with low back pain. The present study aimed to determine the types of injections applied to elderly patients, evaluate the choice of procedure type according to diagnosis, and assess the effectiveness of pain control.

Materials and Method: Patients who underwent lumbar epidural steroid injections between January 2024 and January 2026 were retrospectively evaluated. The patient's age, gender, body mass index, numeric rating scale, diagnosis, type of procedure, procedure time, and radiation dose were evaluated. The study also investigated which type of procedure was preferred in patients based on their diagnoses.

Results: The study included 243 elderly patients and a control group of 581 patients aged 18-65. No significant differences were found between elderly and adult patients in terms of gender, body mass index, or numeric rating scale scores. It was found that the number of caudal and interlaminar approach was significantly higher in the elderly. Also, it was found that the transforaminal approach was preferred in disc herniation patients, interlaminar approach in spinal stenosis, and the caudal approach in the failed back surgery group. Furthermore, radiation dose and procedure times were significantly lower in the control group.

Conclusions: In elderly patients, interlaminar epidural steroid injections and caudal epidural steroid injections are performed more frequently than in adult patients; the choice of epidural steroid injection approach varies according to diagnosis and is associated with longer procedure times and higher radiation exposure.

Keywords: Back Pain; Aged; Injections, Epidural; Pain Management.

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INTRODUCTION

Chronic low back pain (LBP) is a common health problem that significantly impairs quality of life, especially in the elderly population (1, 2). This is because the increasing frequency of pathologies, such as intervertebral disc degeneration, facet joint osteoarthritis, and spinal stenosis with aging, makes the treatment of LBP symptoms more difficult (3). In elderly patients, spinal degeneration is common, and treatment is limited due to comorbidities, typically involving conservative treatment, interventional procedures, and surgery (4). Epidural steroid injection (ESI) is the most frequently used interventional treatment for patients who do not respond to conservative therapy or cannot undergo surgery (5). It aims to reduce inflammation and nerve irritation by delivering local anesthetic agents and/or corticosteroids into the epidural space via various methods, such as interlaminar (ILESI), caudal (CESI), and transforaminal (TFESI) routes (3, 6). Among these three methods, the TFESI has shown superior analgesic efficacy in some studies, particularly due to its more direct drug delivery to the anterior epidural space and the affected nerve root (7). In contrast, CESI is preferred in spinal stenosis or multi-level pathologies due to its ease of application and wider epidural spread (3). Systematic reviews and randomized studies on the effectiveness of ESIs report positive effects in reducing pain and functional loss in the short and medium term (usually up to 3 months); however, evidence regarding long-term benefits and the optimal approach is heterogeneous (5). In elderly patients, well-being after ESI may depend on the initial diagnosis, the technique used, and the degenerative burden. Retrospective analyses in the elderly population have shown that the ILESI, TFESI, and CESI approaches all provide significant pain reduction in VAS scores after 3 weeks and 3 months; however, inadequate analgesia in some patient groups may necessitate additional ESI or surgical intervention (2). This situation is particularly evident in progressive degenerative pathologies, such as spinal stenosis. Pathophysiological evaluation of epidural interventions in elderly patients suggests that factors such as epidural space narrowing, ligamentum flavum thickening, and the more sensitive response of nerve roots to degenerative changes may affect the treatment response (2, 3). Therefore, the main objective of this study is to determine whether the type of ESI applied to elderly patients differs from that of the adult control group, to evaluate the choice of procedure type according to diagnosis, and to assess the effectiveness of pain control.

MATERIALS AND METHOD

Design and study population

The study was conducted in accordance with the principles of the Helsinki Declaration. After obtaining approval from the institution's ethics committee (Ethical approval: 5313), patients who presented to the pain clinic and underwent fluoroscopy-guided lumbar ESI between January 2024 and January 2026 were retrospectively evaluated. Adult patients aged 18-65 who underwent ESI were selected as the control group. Written informed consent was obtained from all participants. The patients' age, gender, body mass index (BMI), diagnosis, type of ESI procedure, duration of the procedure, and radiation dose were evaluated. Additionally, the patients' pain scores were assessed using a numeric rating scale (NRS); for this purpose, NRS scores were recorded before the procedure, at 1 hour, 3 months, and 6 months after the procedure. The inclusion criteria were individuals aged > 65 years who underwent ESI (lumbar interlaminar, lumbar transforaminal, or caudal approaches). Patients with a history of major psychiatric disorders, a diagnosis of malignancy, missing six-month follow-ups, and those without demographic or clinical data were excluded from the study. Patients were classified according to their diagnoses as lumbar disc herniation (LDH), lumbar spinal stenosis (LSS), and lumbar failed back surgery syndrome (FBSS).

The study also investigated which type of ESI was preferred in patients diagnosed with LDH, LSS, and FBSS.

Statistical analysis

Statistical analyses were performed using SPSS version 22.0 software (IBM Corp., Armonk, NY). Continuous variables were expressed as means (standard deviation or minimum-maximum) and medians (interquartile range), while categorical variables were expressed as numbers and frequencies. The chi-square test was used to compare categorical variables. The Shapiro–Wilk test was used to analyze the normal distribution of the quantitative data. To evaluate paired groups, the t-test or Mann-Whitney U test was used in independent groups. The Friedman test was used to compare repeated measurements over time (pre-NRS vs. post-NRS, 3rd and 6th month NRS) in the same patient group. A p-value <0.05 was considered statistically significant.

RESULTS

The study included 243 elderly patients and a control group of 581 patients aged 18-65. The average age of elderly patients was 73.65 (65-91). The majority of these patients (72%) were women. Their BMI was 30.02 ± 5.70. Their pre-procedure NRS scores were 8.14 (5-10). The most frequent diagnosis was LDH, followed by LSS and FBSS. Regarding the procedures performed, the most common type of ESI was TFESI (127, 52.3%). Furthermore, the average radiation dose and procedure time in elderly patients were 9.72 mGy (1.1-103.6) and 46.21 seconds (15-197), respectively (Table 1).

Table 1. Comparison of the characteristics of the elderly and adult control groups.

		Elderly group (n = 243)	Control group (n=581)	p value
Age (years)		73.65 (65-91)	46.72 (18-64)	0.001*
BMI (kg/m2)		30.02 ± 5.70	32.08 ± 5.83	0.358
Sex	Male	68 (28.0 %)	141 (24.2%)	0.577
	Female	175 (72.0 %)	340 (75.8%)	
Pre-NRS		8.14 (5-10)	8.08 (4-10)	0.482
Post-NRS		0.90 (0-10)	0.98 (0-10)	0.535
3.Month NRS		3.25 (0-9)	3.72 (0-10)	0.383
6.Month NRS		4.18 (0-8)	3.99 (0-8)	0.320
Radiation dose (mGy)		9.72 (1.1-103.6)	7.51(1.0-71.6)	0.001*
Procedure time (s)		46.21 (15-197)	41.16 (12-217)	0.008*
Diagnosis	LDH	112 (46.1 %)	408 (70.2%)	<0.001*
	LSS	89 (36.6 %)	60 (10.3%)	<0.001*
	FBSS	42 (17.3 %)	113 (19.4%)	0.530
Procedure type	TFESI	127 (52.3 %)	467 (80.4 %)	<0.001*
	ILESI	73 (30.0 %)	79 (13.6 %)	<0.001*
	CESI	43 (17.7 %)	35 (6.0 %)	<0.001*

BMI: Body mass index, NRS: Numeric rating scale, ILESI: Interlaminar epidural steroid injection, CESI: caudal epidural steroid injection, TFESI: Transforaminal epidural steroid injection, LDH: Lumbar disc herniation, LSS: Lumbar spinal stenosis, FBSS: Failed back surgery syndrome. Note: * indicates a statistically significant difference ($p < 0.05$).

When elderly patients and the control group were compared, no significant differences were found in terms of gender, BMI, pre-NRS, or follow-up NRS scores. When elderly patients and the control group were compared in terms of diagnosis, LDH was significantly more frequent in the control group ($p<0.001$), while LSS was significantly more common in the elderly group ($p<0.001$). The frequency of FBSS did not show a significant difference between the groups (Table 1). Furthermore, it was found that the number of CESI and ILESI procedures was statistically significantly different in elderly patients compared to the control group ($p < 0.001$) (Table 1). Additionally, the TFESI was found to be significantly higher in the control group (Figure 1). In addition, the radiation dose and procedure times were found to be significantly lower in the control group compared to the elderly group (Table 1). When the preferred procedures were evaluated according to the diagnosis, it was found that TFESI was preferred in LDH patients, ILESI in the LSS group, and CESI in the FBSS group ($p < 0.05$) (Figure 2).

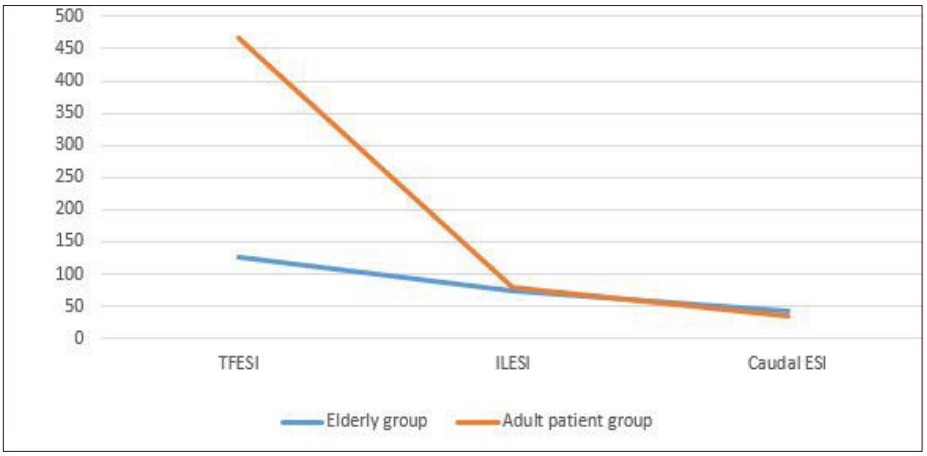


Figure 1. Comparison of epidural steroid type selection in elderly and adult patients.

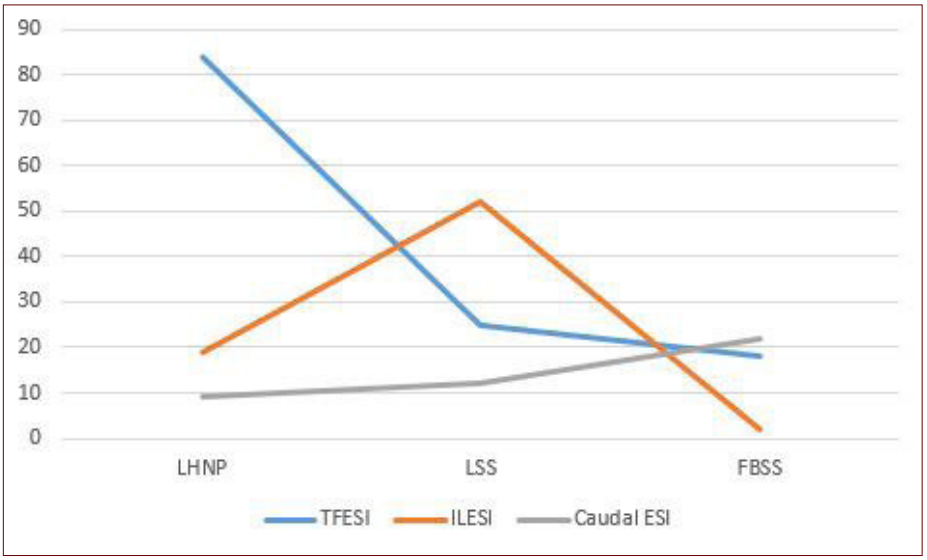


Figure 2. Types of epidural steroid injections preferred in elderly patients according to diagnosis.

Analyses based on injection type showed a significant decrease in NRS scores in all three procedures (TFESI, ILESI, CESI) in both the elderly and control groups (pre-NRS vs. post-NRS, 3rd and 6th month NRS comparisons; $p < 0.001$). However, no statistically significant difference was found in NRS scores in direct comparisons between the elderly and control groups (TFESI: p= 0.088–0.949; ILESI: p = 0.179–0.860; CESI: p= 0.141–0.707) (Table 2). Analyses based on diagnosis (LDH, LSS, and FBSS) revealed a significant decrease in pre- and post-treatment NRS scores in both groups (p< 0.001). No statistically significant difference was found in NRS scores when comparing the elderly and control groups based on diagnosis (LDH: p= 0.135–0.793; LSS: p= 0.179–0.860; FBSS: p= 0.179–0.654) (Table 3).

Table 2. Comparison of pain scores according to injection type between elderly and control groups

		Pre-NRS	Post-NRS	3-Month NRS	6-Month NRS	p value
TFESI	Elderly	8.25 (5-10)	0.90 (0-7)	3.67 (0-10)	4.00 (0-10)	<0.001*
	Control	8.02 (4-10)	0.93 (0-10)	3.61 (0-10)	3.87 (0-10)	<0.001*
	p value	0.088	0.840	0.949	0.419	
ILESI	Elderly	7.90 (6-10)	0.60 (0-8)	2.86 (0-10)	4.01 (0-10)	<0.001*
	Control	8.33 (5-10)	0.87 (0-9)	3.40 (1-9)	4.67 (0-10)	<0.001*
	p value	0.179	0.259	0.537	0.860	
CESI	Elderly	8.30 (7-10)	1.40 (0-8)	4.60 (2-10)	5.00 (2-10)	<0.001*
	Control	8.20 (6-10)	1.89 (0-10)	3.63 (1-10)	4.03 (1-10)	<0.001*
	p value	0.660	0.333	0.141	0.707	

NRS: Numeric rating scale, ILESI: Interlaminar epidural steroid injection, CESI: caudal epidural steroid injection, TFESI: Transforaminal epidural steroid injection. Note: * indicates a statistically significant difference ($p < 0.05$).

Table 3. Comparison of pain scores according to diagnosis between elderly and control groups

		Pre-NRS	Post-NRS	3-Month NRS	6-Month NRS	p value
LDH	Elderly	8.04 (5-10)	1.07 (0-10)	3.38 (0-10)	4.11 (0-10)	<0.001*
	Control	8.07 (5-10)	0.90 (0-10)	3.60 (0-10)	3.90 (0-10)	<0.001*
	p value	0.793	0.368	0.770	0.135	
LSS	Elderly	8.15 (6-10)	0.64 (0-8)	2.69 (0-10)	3.98 (0-10)	<0.001*
	Control	7.95 (6-10)	0.75 (0-9)	2.57 (1-10)	4.01 (0-10)	<0.001*
	p value	0.179	0.259	0.537	0.860	
FBSS	Elderly	8.43 (7-10)	0.98 (0-10)	4.17 (0-10)	4.45 (0-10)	<0.001*
	Control	8.15 (5-10)	1.41 (0-10)	4.92 (1-10)	4.95 (1-10)	<0.001*
	p value	0.179	0.255	0.647	0.654	

NRS: Numeric rating scale, LDH: Lumbar disc herniation, LSS: Lumbar spinal stenosis, FBSS: Failed back surgery syndrome. Note: * indicates a statistically significant difference ($p < 0.05$).



DISCUSSION

Chronic low back pain is a common health problem that significantly impairs quality of life, especially in the elderly population. Therefore, ESI are frequently used in the management of LBP, with many studies demonstrating their effectiveness in elderly patients (8, 9). The aim of the present study was to evaluate the preferred type of ESI in elderly patients, the type of procedure preferred according to diagnosis, and the clinical responses. The study found that ILESI and caudal ESI were preferred more often in elderly patients than younger patients. Furthermore, it was determined that the preference for ESI type differed in diagnoses such as LSS and FBSS. During the procedure, the radiation dose and duration were found to be higher in the elderly patients.

Age-related degenerative changes in spinal anatomy influence both the diagnostic evaluation and the selection of the appropriate ESI type in elderly patients. Multilevel disc degeneration, facet joint hypertrophy, and ligamentum flavum thickening progressively narrow the epidural space and predispose patients to spinal stenosis (8,10). This degenerative alteration may reduce transforaminal accessibility and favor interlaminar or caudal approaches in elderly patients (11). Previous studies have shown that TFESI facilitates targeted medication delivery to the ventral epidural space and is associated with superior radicular pain relief in foraminal spinal stenosis, whereas ILESI, due to its wider epidural spread, is commonly favored in central canal stenosis (12,13). In addition, CESI has been recommended in FBSS, as postoperative fibrosis and distortion of epidural anatomy may limit foraminal and interlaminar access, making these approaches more technically difficult (14). Consistent with this evidence, TFESI was predominantly used in LDH in our cohort, while ILESI was more common in LSS and CESI in FBSS. Taken together, these findings suggest that procedural preferences in elderly patients are shaped not so much by age itself, but rather by the diagnostic spectrum and anatomical constraints associated with degenerative spinal disease.

Interestingly, despite differences in diagnosis and procedural preference, pain reduction over six months was similar between elderly patients and the adult control group in present study. Given the higher prevalence of spinal stenosis and multilevel disc degeneration in elderly patients, along with longer symptom durations, a reduced therapeutic response to epidural steroid injections might be expected in this population (10). However, multiple studies have reported that the clinical benefit of ESI is not substantially influenced by age alone (15). Several studies have demonstrated that TFESI is superior to conservative treatment in achieving short-term pain relief and may reduce or delay the need for surgery in older patients with radiculopathy (16, 17). Furthermore, studies in patients with LSS have demonstrated favorable early pain relief following interlaminar ESI, even in the presence of advanced degeneration(18). These findings indicate that the analgesic response after ESI is influenced predominantly by the underlying pathology and route of administration rather than by age alone. The similar NRS scores in the present study supports this view and implies that aging does not diminish the therapeutic impact of lumbar ESI, underscoring the clinical relevance of interventional pain approaches in elderly patients who may be suboptimal candidates for surgery.

There are studies examining the radiation dose and procedure duration for different ESI procedures in the lumbar region (19, 20)17. However, there is insufficient data regarding dosage and duration in elderly patients. Elderly patients with complex spinal pathologies, such as multilevel degeneration, lumbar spinal stenosis, and failed back surgery syndrome, often present technical challenges during fluoroscopy-guided ESI (8, 21). These factors can necessitate multiple

needle placements, extended fluoroscopic visualization, and more extensive planning series, all of which contribute to longer procedure times and increased radiation exposure. Additionally, age-related anatomical changes and degenerative alterations may obscure landmarks and require iterative adjustments to achieve accurate epidural access, particularly in stenotic or post-operative anatomy, where epidural fibrosis and altered spatial orientation complicate targeting (8, 21). In the present study, anatomical and technical considerations resulted in longer fluoroscopy times and higher radiation doses in elderly patients compared to the adult control group. This supports the idea that workload is affected not only by age but also by age-related diagnostic spectrum and anatomical feasibility.

This study has a number of limitations. First, it is a retrospective study with short-term results. Second, while pain scores were systematically evaluated, other clinically relevant parameters, such as functional status, quality of life, opioid consumption, or need for repeat interventions, were not assessed. Finally, anatomical variables, such as the severity of stenosis, degree of fibrosis, surgical history details, and imaging characteristics, were not quantified. However, this study also has strengths, as it is the first study to evaluate age-related ESI type selection. Furthermore, procedural preferences were analyzed according to specific diagnoses (LDH, LSS, and FBSS).

CONCLUSION

Among ESI procedures, ILESI and CESI were significantly more frequently preferred in elderly patients compared to adult patients. In addition, it was found that TFESI was preferred more often in patients with LDH, ILESI in patients with LSS, and CESI in patients with FBSS. Furthermore, it was observed that the procedure time and radiation dose were higher in elderly patients.

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