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Response to Letter Regarding "Epidural Transforaminal Infraneural Infiltration Using Corticosteroids in Lumbar Radiculopathy"

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We thank Dr. Fernandez and colleagues[1] for their interest in our article, "Epidural Transforaminal Infraneural Infiltration Using Corticosteroids in Lumbar Radiculopathy,"[2] and for their methodological comments. We believe that this type of discussion is fundamental for the maturation of the scientific literature regarding minimally invasive treatment of lumbar radiculopathy.

We would like to emphasize that the objective of our study was clearly defined in the manuscript: to describe in detail the infraneural transforaminal epidural infiltration technique using corticosteroids and to evaluate its clinical efficacy in the treatment of radiculopathy secondary to acute lumbar disc herniation. At no point was the study presented as a randomized clinical trial, a comparative superiority study, or an investigation capable of establishing definitive causality. On the contrary, the methodological design was explicitly described as a "descriptive, nonrandomized, retrospective, and uncontrolled single-center study," without a control group for comparison with another surgical or interventional technique. The manuscript also clearly states that the primary objective was to present a case series of patients undergoing epidural corticosteroid infiltrations and their respective clinical outcomes. Therefore, part of the methodological criticism raised in the letter corresponds to limitations already recognized and declared by the authors themselves. We agree that retrospective studies without a control group do not allow robust causal inference. Nevertheless, we believe this does not eliminate the clinical value of a well-characterized observational series, especially when the goals are to describe the evolution of patients treated in a real-world clinical setting, to generate hypotheses, and to stimulate future studies with a higher level of evidence.

One central point deserves clarification: our study was not intended to demonstrate that the infiltration alters the biological natural history of disc herniation or induces reabsorption of the herniated fragment. The discussion regarding spontaneous regression of lumbar disc herniation is relevant, but it does not exactly represent the main clinical question of our study. The focus was to evaluate clinical control of radicular pain and functional improvement in symptomatic patients refractory to conventional medical treatment and with persistent radiculopathy. This is aligned with the inclusion criteria themselves, which required persistent lower-limb radiculopathy symptoms for more than 8 weeks. Furthermore, in the discussion section of the article, we stated that the retrodiscal/infraneural technique was used in patients refractory to conservative medical treatment as a strategy to avoid surgical procedures, including minimally invasive surgery.

We also stated that the objective of the study was to evaluate functional improvement and the rate of symptom control in refractory acute radiculopathy secondary to lumbar disc herniation. Thus, the clinical question evaluated was not "did the infiltration cause the herniation to regress?" but rather: did patients with persistent radicular pain, refractory to conventional analgesia, experience clinical improvement after infiltration? This distinction is fundamental. Spontaneous improvement may occur over time, but the included patients were neither asymptomatic nor affected by a mild self-limited condition; they were patients with persistent pain, clinicoradiological correlation, and refractoriness to initial conservative management.

We also partially disagree with the statement that there was no prospective baseline evaluation. It is correct to state that the preprocedural Oswestry Disability Index (ODI) was obtained retrospectively, and this was transparently described in the article. However, the numeric pain rating scale was applied prospectively at baseline, on the day of the procedure, and during follow-up, associated with a detailed physical examination including provocative tests such as Lasègue's sign in all patients. Therefore, the pain baseline was prospective; the retrospective limitation specifically applies to the preprocedural ODI.

Regarding follow-up, patients returned for outpatient evaluation and were assessed with the numeric pain rating scale at 10 days, 3 months, and 6 months. At the end of follow-up, the ODI validated for Brazilian Portuguese was applied, with assessment of current functional status and retrospective recall of preprocedural functional status. We acknowledge that retrospective ODI assessment may introduce recall bias, but this aspect was transparently declared in the manuscript. Furthermore, the ODI was used as complementary functional information, while control of radicular pain remained the central clinical outcome.

Another relevant point is that the criterion adopted for clinical success was rigorous. We considered a satisfactory outcome only in patients who, at the end of 6 months, remained free of radicular pain—that is, with 100% improvement of painful symptoms. Although there are criteria for clinically significant improvement based on partial pain reduction, we opted for a more stringent and easily interpretable definition. Therefore, our results were not inflated by partial improvement or minimal thresholds of clinical response.

Regarding the selection process, we understand the concern about selection bias, but the article clearly presented the inclusion flow. A total of 455 lumbar infiltrations performed between 2022 and 2024 were identified; after application of the inclusion criteria, 110 patients were identified; 11 patients were excluded according to predefined criteria, including lumbar stenosis, adjacent segment disease, segmental instability on dynamic radiographs, and seronegative spondyloarthritis, leaving 99 patients in the final analysis. It is important to emphasize that 455 corresponded to the total number of lumbar infiltrations performed during the period, and not to 455 patients eligible for the specific analysis of acute radiculopathy secondary to lumbar disc herniation, and this is clearly described in the article.

Regarding the technical description, the manuscript detailed the fluoroscopic trajectory, use of the Ferguson view, confirmation of positioning, and infraneural approach. The corticosteroids used were also specified: Triiancil and Depo-Medrol. We agree that doses, volumes, and criteria for selecting the agent could have been described in greater detail, and this observation is pertinent for future studies. Clarifying the doses and medications routinely used in our infiltrations, we use a solution prepared by mixing Triiancil (triamcinolone hexacetonide 20 mg/mL, 5 mL vial) and Depo-Medrol (methylprednisolone acetate 40 mg/mL, 2 mL vial). We dilute this mixture with an additional 3 mL of 0.9% saline solution, resulting in a total volume of 10 mL, with a triamcinolone concentration of 10 mg/mL and methylprednisolone concentration of 8 mg/mL. We inject 2 mL of the solution into the foramen and 1 mL into the musculature as the needle is withdrawn. If multiple foramina are to be approached and the 10 mL dose is insufficient, additional dilution with 0.9% saline solution is performed until the desired volume is achieved, although with a less concentrated solution. However, the primary objective of the technical description was to demonstrate the anatomical and fluoroscopic approach of the retrodiscal infraneural technique.

Regarding safety, we agree that prospective studies with predefined adverse event definitions and standardized surveillance protocols may provide greater methodological robustness. Nevertheless, all patients included in our series underwent regular outpatient follow-up after the procedure, with scheduled clinical reassessments throughout the follow-up period. Although the study was not blinded and did not use a formal independent adjudication protocol for adverse events, no vascular, neurological, infectious, or procedure-related complications were identified during the clinical follow-up of the patients.

Regarding statistical analysis, as explicitly described in the manuscript, this was a descriptive, retrospective, observational, nonrandomized study without a control group. Therefore, the primary objective of the study was not to establish causal inference or direct comparison with alternative techniques, but rather to describe the observed clinical and functional evolution in a specific population of patients with refractory lumbar radiculopathy undergoing infraneural transforaminal epidural infiltration. We agree that future prospective comparative studies, particularly randomized clinical trials and multicenter investigations, may contribute to a more robust evaluation of therapeutic effects and strengthen the level of evidence in this area.

Finally, we would like to highlight that one of the main purposes of the present article was precisely to raise this discussion within the specialized literature, bringing attention to a technique widely used in clinical practice but still lacking studies with a higher level of evidence. Our objective was never to end the discussion regarding the efficacy of infraneural transforaminal infiltration or to present definitive conclusions regarding causality, but rather to contribute to scientific debate and stimulate the development of new methodologically robust studies, including prospective, comparative, multicenter, and randomized research. Observational studies such as ours may play an important role in hypothesis generation, technical refinement, and the initial construction of evidence that may later be confirmed by designs with greater inferential power. Therefore, we believe that despite the recognized limitations, our study maintains clinical and scientific relevance by describing a minimally invasive technique applicable to spine surgery practice in patients with refractory lumbar radiculopathy.

We thank the authors of the letter once again for the opportunity to clarify these points and contribute to the advancement of scientific debate on this topic.

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