

Acute back pain – Role of injection techniques and surgery: WFNS spine committee recommendations

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ABSTRACT

Objective: Lower back pain is a significant cause of morbidity, and despite a range of interventions available, there is a lack of consensus on the most efficacious treatments. The aim of this systematic review is to formulate a list of recommendations for the role of spinal injections and surgery in the treatment of acute back pain.

Methods: A systematic literature search from 2012 to 2022 was conducted on Pubmed, Medline, and Cochrane Central Register of Controlled Trials for papers focusing on the role of injections and surgery for the management of acute lower back pain. Inclusion criteria included randomised controlled trials, as well as prospective and retrospective studies reporting primary outcomes (pain improvement (VAS score) and back-specific functional status) and secondary outcomes (post-procedure complications). These data were reviewed, presented, and voted on by an expert panel consisting of 14 attending spine surgeons from 14 countries at the consensus meeting of the World Federation of Neurosurgical Societies (WFNS) Spine Committee. A two-round consensus-based Delphi method was used to generate consensus, and topics with >66% agreement were categorized as having reached consensus.

Results: 100 studies met inclusion criteria. Of these, 20 were selected by the committee for full text review and presented at the consensus meeting. The committee voted on 8 statements and achieved consensus on the following 7 statements: (1) Epidural steroid injections (ESIs) show significant benefit to discogenic back pain; (2) A lateral approach is superior to a midline approach for ESIs; (3) Short-term (<1 week) effect of ESIs is similar between steroids; (4) ESIs have a variety of potential complications; (5) CT or fluoroscopy guidance can be used for lumbar medial branch blocks; (6) Lumbar medial branch radiofrequency ablations can be performed on patients with recurrent pain after a successful ESI, and (7) Acute lower back pain is usually self-limiting, resolves in <6 weeks, and does not require surgical intervention.

Conclusion: Given significant treatment heterogeneity, we provide the latest, evidence-based recommendations for management of acute lower back pain. ESIs are effective at short-term pain relief, and surgical intervention should be reserved for patients failing conservative measures.

1. Introduction

Lower Back Pain (LBP) is extremely common across all adult age groups,¹ and may be caused by pathology in the ligaments, facet joints, paravertebral structures, intervertebral discs, and/or spinal nerve roots.² However, the vast majority of LBP patients do not have a specific

symptom aetiology³ and are diagnosed with “non-specific LBP”.⁴ Acute LBP is defined as pain that lasts less than six weeks and is one of the most frequent causes of doctor visits due to pain and disability.⁵ The average prevalence of LBP is reported to be 9.4 % and is higher in males and elderly.⁶ Despite its high prevalence,⁶ acute LBP is usually self-limiting, with 9 out of 10 patients gaining recovery within six weeks of the initial

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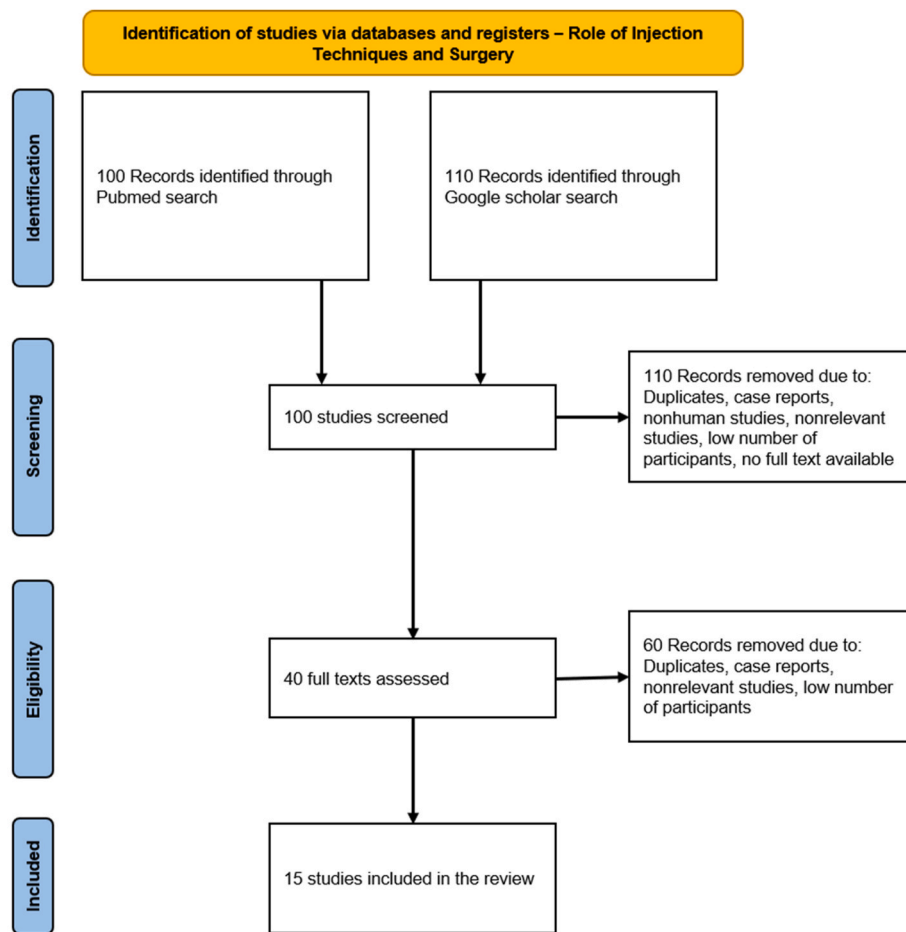


Fig. 1. PRISMA flow chart of the review process – 100 Records identified through PubMed search and 110 through Google scholar search. 110 articles removed based on duplicates and exclusion criteria. 100 studies screened and 60 of them were excluded due to duplicates and/or exclusion criteria. 40 full text articles further assessed and out of them 15 studies included in the review based on the eligibility criteria as discussed in the text.

presentation.⁷ Less than 10% of patients with acute LBP progress to developing long-term or recurrent back pain,^{4,7} which is associated with high morbidity and worldwide healthcare costs.⁸

There are a range of treatment options for acute lower back pain, including medications, physical therapy, injections, and surgery. However, due to the lack of published evidence on the most efficacious treatments, as well as different training in the physicians to whom patients with LBP first present, the treatment of acute LBP might be variable.⁸ ESIs are minimally invasive procedures that deliver steroids and local anaesthetics to the epidural space, can be used to ameliorate acute lumbosacral radicular pain,⁹ and may postpone the need for more invasive interventions, such as surgery.^{10,11}

The purpose of this review is to present the most recent, evidence-based guidelines for the role of ESIs and surgery for the treatment of acute LBP. These recommendation statements represent the culmination of a comprehensive literature review and two-round Delphi consensus method from an international expert spine panel, the WFNS Spine Committee. Our recommendations are aimed at practicing spine surgeons across the world, particularly in low- and middle-income countries, and are designed to be freely accessible online.

2. Methods

The systematic review and meta-analysis were conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and the Cochrane Handbook for

Systematic Reviews of Interventions. An international committee of spinal surgeons (14 members of the WFNS Spine Committee from 14 countries) organised a consensus meeting on acute back pain and lumbar disc herniation, which was conducted in Karachi, Pakistan, in May 2022, followed by a meeting in Istanbul, Turkey, in September 2022.

Prior to the first meeting, each WFNS Spine Committee member performed an electronic literature review of PubMed, Google Scholar Search for relevant papers on the role of injections and surgery for acute lower back pain in the English language from 2012 till 2022. In addition to the electronic database search, co-authors manually checked the list of references of all reviewed manuscripts. Articles were considered for review only if they met the following inclusion criteria.

- **Study type:** randomised controlled trials, retrospective or prospective studies
- **Participants:** patients who underwent injections/surgical intervention for acute low back pain
- **Diagnosis:** acute low back pain (<6 weeks duration)
- **Treatments:** Epidural (Steroid) Injections, Surgical Intervention (Decompression surgery)
- **Outcomes:** Pain evaluation via Visual analogue score (VAS), complications rate

Exclusion criteria:

- Languages other than English;

- case reports;
- animal studies;
- experimental studies;
- studies solely investigating surgical treatments.

Each participant prepared a presentation on their literature review and then provided statements that were discussed and edited at the Karachi meeting. After this preliminary voting session, two statements were excluded. The revised and final seven statements were then voted on at the second meeting in Istanbul in a blinded fashion using a Likert scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree). Results were presented as a percentage of respondents who scored each item as 1 or 2 (disagreement) or as 3, 4, or 5 (agreement). Consensus was achieved when the sum for disagreement or agreement was $\geq 66\%$.

3. Results

After initial review of 100 articles, 15 met final inclusion criteria (see PRISMA flow diagram of review process in Fig. 1). Through a two-round Delphi method, the expert panel achieved consensus on the following statements.

- 1) Epidural injections show significant benefit to discogenic back pain, and even saline injections may provide significant pain relief. (Totally agree – 22.2 %, More than agree – 66.7 %, Agree – 11.1 %)
- 2) A lateral approach is superior to a midline approach for epidural steroid injections. (Totally agree – 44.4 %, More than agree 55.6 %)
- 3) Short term effects (<1 week) of epidural injections are similar between particular (depot) and non-particular steroids. A longer lasting effect (>1 week) can probably be achieved with particular steroids. (Totally agree – 55.6 %, More than agree 33.3 %, Agree 11.1 %)
- 4) Epidural steroid injections have a variety of potential complications that are usually transient. Rare severe complications have been described and should be considered. (Totally agree – 77.8 %, More than agree 11.1 %, Agree 11.1 %)
- 5) CT guidance or fluoroscopy can be used for lumbar facet blocks or ablation. Ultrasound may be useful in patients in whom radiation exposure is associated with potential harm (eg, pregnancy), or when radiological adjuncts are not available. (Totally agree – 66.7 %, More than agree 22.2 %, Agree 11.1 %)
- 6) Lumbar medial branch blocks or radiofrequency ablations can be performed in patients experiencing a minimum of 3 months improvement following a previous steroid injection. The procedure may be repeated no more than two times per year. (Totally agree – 44.4 %, More than agree 44.4 %, Agree 11.1 %)
- 7) Acute back pain is usually self-limiting: it resolves in 6 weeks in the majority of the cases and does not require surgical intervention. (Totally agree – 88.9 %, More than agree 0 %, Agree 11.1 %)

4. Discussion

In this review, we summarize the WFNS Spine Consensus statements on the indications for injections and/or surgery for acute lower back pain. Overall, the quality of evidence is not high for each statement, and further more high quality and larger studies are needed to validate recommendations. Patients that do not respond to non-invasive or less invasive measures are referred for surgical intervention. Patients who do not have lasting relief with injections may also be considered and referred for surgery.^{12,13}

4.1. Red flag symptoms

Recent debates about the most efficacious treatment have highlighted the importance of the clinical examination in patients presenting with acute LBP. A thorough history taking is the first step in

Table 1

WFNS spine committee consensus statements on role of injections and surgery for acute lower back pain.

| Statement | |
|-----------|---|
| 1 | Epidural injections show significant benefit to discogenic back pain, and even saline injections may provide significant pain relief. |
| 2 | A lateral approach is superior to a midline approach for epidural steroid injections. |
| 3 | Short term effects (<1 week) of epidural injections are similar between particular (depot) and non-particular steroids. A longer lasting effect (>1 week) can probably be achieved with particular steroids. |
| 4 | Epidural steroid injections have a variety of potential complications that are usually transient. Rare severe complications have been described and should be considered. |
| 5 | CT guidance or fluoroscopy can be used for lumbar facet blocks or ablation. Ultrasound may be useful in patients in whom radiation exposure is associated with potential harm (eg, pregnancy), or when radiological adjuncts are not available. |
| 6 | Lumbar medial branch blocks or radiofrequency ablations can be performed in patients experiencing a minimum of 3 months improvement following a previous steroid injection. The procedure may be repeated no more than two times per year. |
| 7 | Acute back pain is usually self-limiting: it resolves in 6 weeks in the majority of the cases and does not require surgical intervention. |

Table 2

Red flag symptoms.

| Red Flag Symptoms | |
|-------------------|--|
| 1 | Tumour history (could lead to understanding of possible spinal metastasis) |
| 2 | Non-specific Weight Loss (could indicate possible malignancy or long-term infection) |
| 3 | Fever, night sweats, rigors (could be due to osteomyelitis, discitis, epidural abscess) |
| 4 | Trauma (leading to spinal fractures – from falls from heights/history of osteoporosis/prolonged steroid use) |
| 5 | Deficit in Neurological Function (possible due to spinal cord or nerve compression) |
| 6 | Young age (age less than forty years) – involved congenital conditions. |

understanding the cause of the back pain, and questions targeting the nature, duration and time course, and worsening/relieving factors are critical. In addition, it is pertinent to rule out any red flag symptoms (Table 1).¹⁴ (see Table 2)

4.2. Diagnostic imaging

Most frequently, plain radiographs are used as the initial imaging modality for acute LBP, as they are readily available and the most economically viable. X-rays are helpful if one suspects a fracture or deformity. However, X-rays are not sensitive for disc degenerations and/or herniations causing nerve root irritation and/or impingement.¹⁵ MRI or CT scan is advised in cases with neuro deficits or in critical conditions when a delay in diagnosis can lead to poor prognosis.¹⁶ Patients with acute LBP are indicated for CT/MRI imaging if they present with signs/symptoms suggestive of disc herniations or if they have any red flag symptoms raising significant clinical suspicion of tumour, infection, or cauda equina syndrome.^{17,18}

4.3. Epidural steroid injections

Epidural injections are popular treatments for disc pathology in patients with short-term pain and no neurologic deficits. Their mechanism of action involves limiting the inflammatory mediators in the epidural space and vascular permeability,^{19–21} as well as limiting the injury to C fibres.^{20,21} Corticosteroids are frequently utilised with local anaesthetics. Popular options include epidural injections, intraarticular injections, and nerve blocks. Long-term usage of corticosteroids at high doses may lead to systemic side effects. However, the epidural route

WFNS spine committee recommendations

- (1) Epidural injections show significant benefit to discogenic back pain, and even saline injections may provide significant pain relief.
- (2) A lateral approach is superior to a midline approach for epidural steroid injections.
- (3) Short term effects (<1 week) of epidural injections are similar between particular (depot) and non-particular steroids. A longer lasting effect (>1 week) can probably be achieved with particular steroids.
- (4) Epidural steroid injections have a variety of potential complications that are usually transient. Rare severe complications have been described and should be considered.
- (5) CT guidance or fluoroscopy can be used for lumbar facet blocks or ablation. Ultrasound may be useful in patients in whom radiation exposure is associated with potential harm (eg, pregnancy), or when radiological adjuncts are not available.
- (6) Lumbar medial branch blocks or radiofrequency ablations can be performed in patients experiencing a minimum of 3 months improvement following a previous steroid injection. The procedure may be repeated no more than two times per year.
- (7) Acute back pain is usually self-limiting: it resolves in 6 weeks in the majority of the cases and does not require surgical intervention.

reduces systemic adverse reactions as a lower dose is needed to attain a good response.²² In practice, local anaesthetics and corticosteroids are used in combination, as the local anaesthetics help reduce the pain from the injection itself and alleviate pain instantly.^{23,24} A systematic review conducted by Yang et al (2020) (which included six randomised controlled trials) found that epidural steroid injections were superior to non-operative measures in alleviating short to intermediate-term pain.²⁵ Another systematic review by Yun et al (2022) found that the parasagittal interlaminar approach yielded the highest alleviation of lumbosacral radicular pain, when compared to the caudal, interlaminar, and transforaminal epidural injection techniques. Since radicular pain initiates from the chemical stimuli around the nerve root sheath, the extent of perineural drug diffusion is an important variable in treating radicular pain.^{26–29} In comparison with the interlaminar approach, the parasagittal interlaminar approach is more proximal to the lesion and is believed to distribute chemicals to the lateral and ventral epidural space more effectively.^{30–32} However, other studies have shown that both transforaminal and caudal routes yield similar routes of pain relief for lumbosacral radicular pain.³³ Another study confirmed the efficacy of the transforaminal approach for alleviating pain from disk herniations significantly at 12 weeks post-injection.³⁴ Finally, Jin et al (2022) found significant improvement in pain from disk herniations and/or spinal canal stenosis with transforaminal epidural injections using the retrodiscal or subpedicular approach. A higher-grade spread was observed in the retrodiscal as compared to the subpedicular cohort.³⁵

4.4. Role of surgery for acute LBP

Literature on spinal surgery for managing acute lower back pain without red flag symptoms is lacking. Decompression surgery is widely popular for the management of back pain caused by neural compression, including radicular pain secondary to a herniated disc in the lumbar region,^{36,37} and particularly for neurological deficit owing to narrowing of the spinal canal.³⁸ Surgery becomes more intuitive when there is neurologic deficit, as the aim of surgical intervention is neural decompression to provide functional improvement. Lumbar decompression with stabilization may be required in certain patients, depending on the pathology. While there is limited evidence on acute LBP, there is some literature regarding surgical intervention for chronic LBP due to degenerative spine disease. A randomised controlled trial from the Swedish Spine Group revealed that fusion surgeries alleviated lower back pain (as measured through VAS score) in comparison to conservative measures.³⁹ A Japanese trial also showed a significant improvement in lower back pain after lumbar fusion surgery.⁴⁰ However, other trials have found no significant differences between pre and post-operative lower back pain in spine surgery.⁴¹

5. Conclusion

It is important that we employ the latest evidence-based methods to manage acute lower back pain. However, the available literature regarding the role of injections and surgery for acute LBP is heterogeneous. Further research is needed to evaluate for statistically significant differences in treatment options that can then be translated into clinical practice.

Ethics approval and consent to participate

Not applicable.

CRediT authorship contribution statement

Nikolay Peev: Writing – original draft, Data curation, Conceptualization. **Corinna Zygourakis:** Writing – review & editing, Writing – original draft. **Christoph Sippl:** Writing – review & editing. **G. Grasso:** Writing – original draft, Data curation, Conceptualization. **Joachim Oertel:** Writing – review & editing, Data curation, Conceptualization. **Salman Sharif:** Writing – review & editing, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Abbreviations

LBP: Lower Back Pain
WFNS: World Federation of Neurosurgical Societies
ESIs: Epidural steroid injections
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses
VAS: Visual Analogue Scale
PLC: Posterior ligamentous complex
CT: Computer tomography
MRI –: Magnetic Resonance Imaging