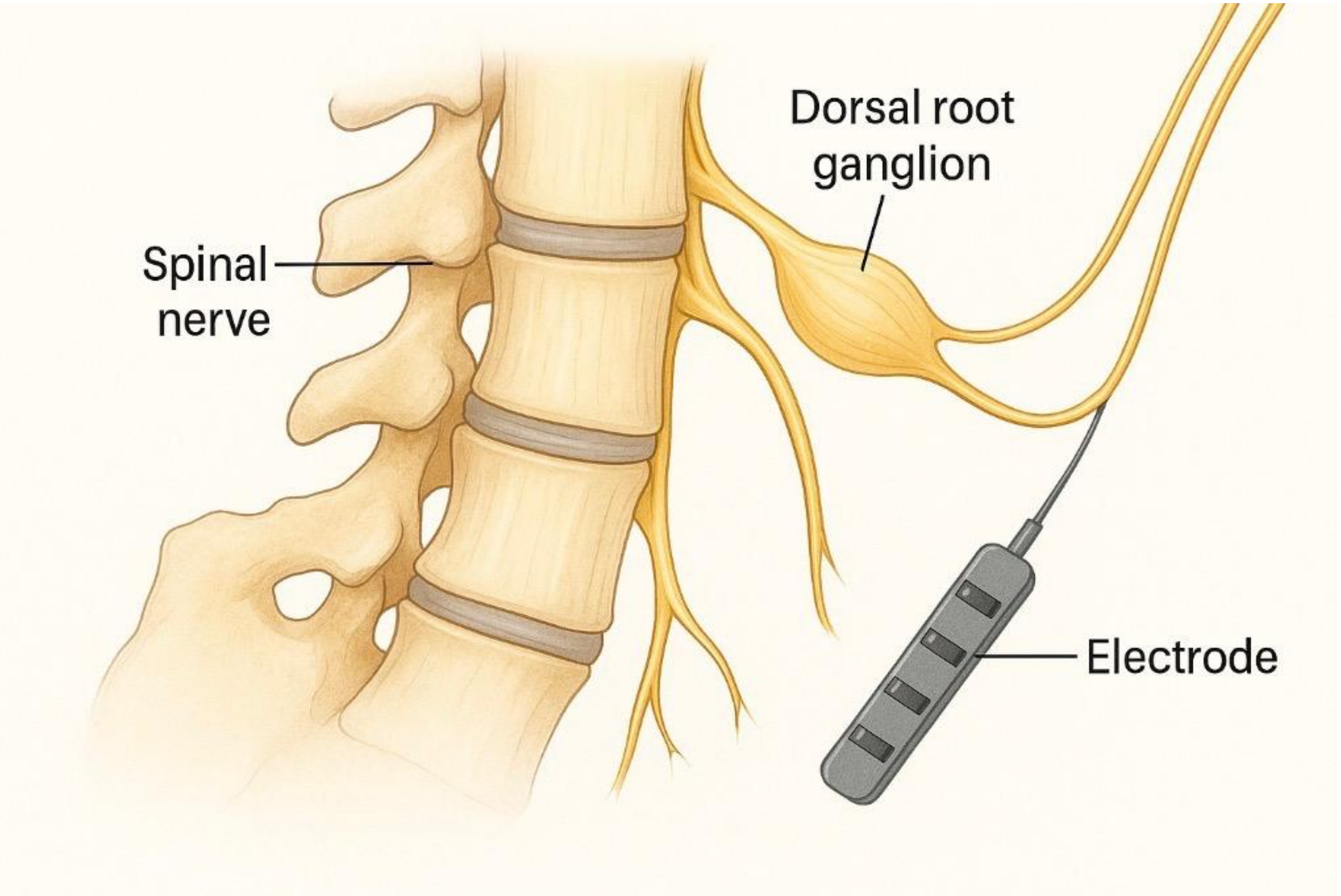


Background

Complex Regional Pain Syndrome (CRPS) and causalgia represent debilitating neuropathic pain disorders marked by allodynia, dysesthesia, and functional impairment. Conventional therapies, including pharmacologic regimens, sympathetic nerve blocks, and spinal cord stimulation (SCS), frequently provide partial or inconsistent relief. Dorsal Root Ganglion (DRG) stimulation is an emerging neuromodulatory approach that targets the sensory neuron cell bodies responsible for transmitting nociceptive signals. Because DRGs are anatomically segmental and located outside the cerebrospinal fluid, this technique allows highly localized stimulation with stable, posture-independent paresthesia coverage.

DRG stimulation’s anatomical precision makes it particularly well-suited for focal neuropathic pain syndromes such as CRPS and causalgia, where conventional SCS often yields incomplete dermatomal coverage. Early clinical observations have demonstrated significant pain relief, improved function, and superior patient satisfaction. However, despite its promise, the evidence base remains limited, necessitating a thorough review of the available data to evaluate efficacy, durability, and safety outcomes.



Results

Four key studies met inclusion criteria: one randomized controlled trial (ACCURATE, Deer et al., 2017) and three prospective investigations. In the ACCURATE trial involving 152 participants, 81.2% of patients receiving DRG stimulation achieved ≥50% pain reduction compared with 55.7% in the SCS group (p<0.0004). Responder rates remained high at 12 months (74.2% DRG vs. 53% SCS). Patients reported reduced paresthesia variation with posture, superior physical functioning, and enhanced mood.

Van Buyten et al. (2015) demonstrated durable pain reduction among CRPS patients, with mean scores falling to 62% of baseline by one month and persisting at 12 months. In the multicenter feasibility study by Vallejo et al. (2024), 16 patients exhibited a mean pain reduction of 3.3 points (p=0.0006) and significant improvements in patient satisfaction and neuropathic pain descriptors. A smaller case series by Lee & Park (2022) revealed heterogeneous outcomes: 4 of 11 patients reported complete pain relief at one month, with long-term efficacy influenced by comorbidities such as smoking and diabetes.

Collectively, these studies support the hypothesis that DRG stimulation provides superior dermatomal targeting, less positional variability, and sustained analgesia relative to conventional spinal cord stimulation.

Methods

A structured literature review was performed using PubMed and Google Scholar databases. Search terms included “dorsal root ganglion stimulation,” “complex regional pain syndrome,” “causalgia,” and “neuromodulation.” Studies were included if they were randomized controlled trials, prospective case series, or cohort studies evaluating adults with CRPS or causalgia treated with DRG stimulation. Data extracted included sample size, magnitude of pain reduction, functional outcomes, quality-of-life metrics, and reported adverse events.

- Databases: PubMed, Google Scholar
- Inclusion Criteria: Adult patients with CRPS/causalgia undergoing DRG stimulation
- Study Types: Randomized controlled trials, prospective case series, and cohort analyses
- Primary Outcomes: ≥50% pain reduction, functional improvement, and sustained relief over time
- Secondary Outcomes: Quality-of-life indices, mood, physical and social functioning, and adverse event frequency

Discussion and Conclusions

DRG stimulation demonstrates compelling evidence for the management of CRPS and causalgia, offering a mechanistically distinct and anatomically targeted approach to neuropathic pain control. Compared to SCS, DRG stimulation provides enhanced spatial selectivity and minimizes unwanted paresthesia overlap or postural changes, thereby improving patient satisfaction and functional outcomes. The higher responder rate observed across trials underscores its potential as a preferred modality for focal neuropathic pain.

Nevertheless, current literature is limited by small sample sizes, heterogeneous patient populations, and relatively short follow-up durations. Further multicenter randomized controlled trials are warranted to refine patient selection criteria, optimize lead placement techniques, and define predictors of sustained response.

- DRG stimulation offers superior focal pain relief and stable paresthesia control.
- Evidence supports robust and durable pain reduction with improvements in quality of life.
- Limitations include study size, variable methodology, and need for long-term data.
- Future research should aim to integrate DRG stimulation into broader multimodal pain management frameworks within regional anesthesia practice.

References (Scan QR)

Scan the QR code for full reference list and supplementary discussion.

