

Minimally Invasive Interventions for Axial Back and Neck Pain in the Pediatric Population: A Systematic Review



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INTRODUCTION

- Chronic axial neck and back pain are **rare but disabling** in children¹.
- Conservative management (PT, meds, bracing) remains first-line¹.
- Evidence for **minimally invasive interventions** (MII), e.g., facet injections, RFA, epidurals, is limited in pediatrics.
- Objective:** To systematically review literature on minimally invasive procedures for axial spine pain in pediatric populations.

METHODS

- Databases:** PubMed, Embase, Cochrane (search through Jan 2024).
 - Inclusion:** Studies on patients <18 years receiving MII for neck/back pain.
 - Exclusion:** Non-axial pain, surgical procedures, adult-only data.
 - Data extracted:** Intervention type, diagnosis, outcomes, complications.
 - Quality assessment:** Modified Oxford Centre of Evidence Levels.
- This case report does not contain identifiable patient information and is exempt from IRB review under NYU and NYC-HHC policy. Informed consent was obtained from the patient for academic presentation.*

Minimally invasive spine procedures may provide short-term pain relief in children, but evidence is sparse and low quality.

RESULTS/FINDINGS

- Total studies included:** 8. **Total pediatric patients:** 258.
- Study design: Mostly retrospective case series and case reports; no randomized controlled trials.
- Short-term pain improvement** in most cases.
- Functional gains** rarely quantified.
- No major complications;** only mild transient soreness, 1 sciatic nerve block and 1 dural puncture.

FIGURES

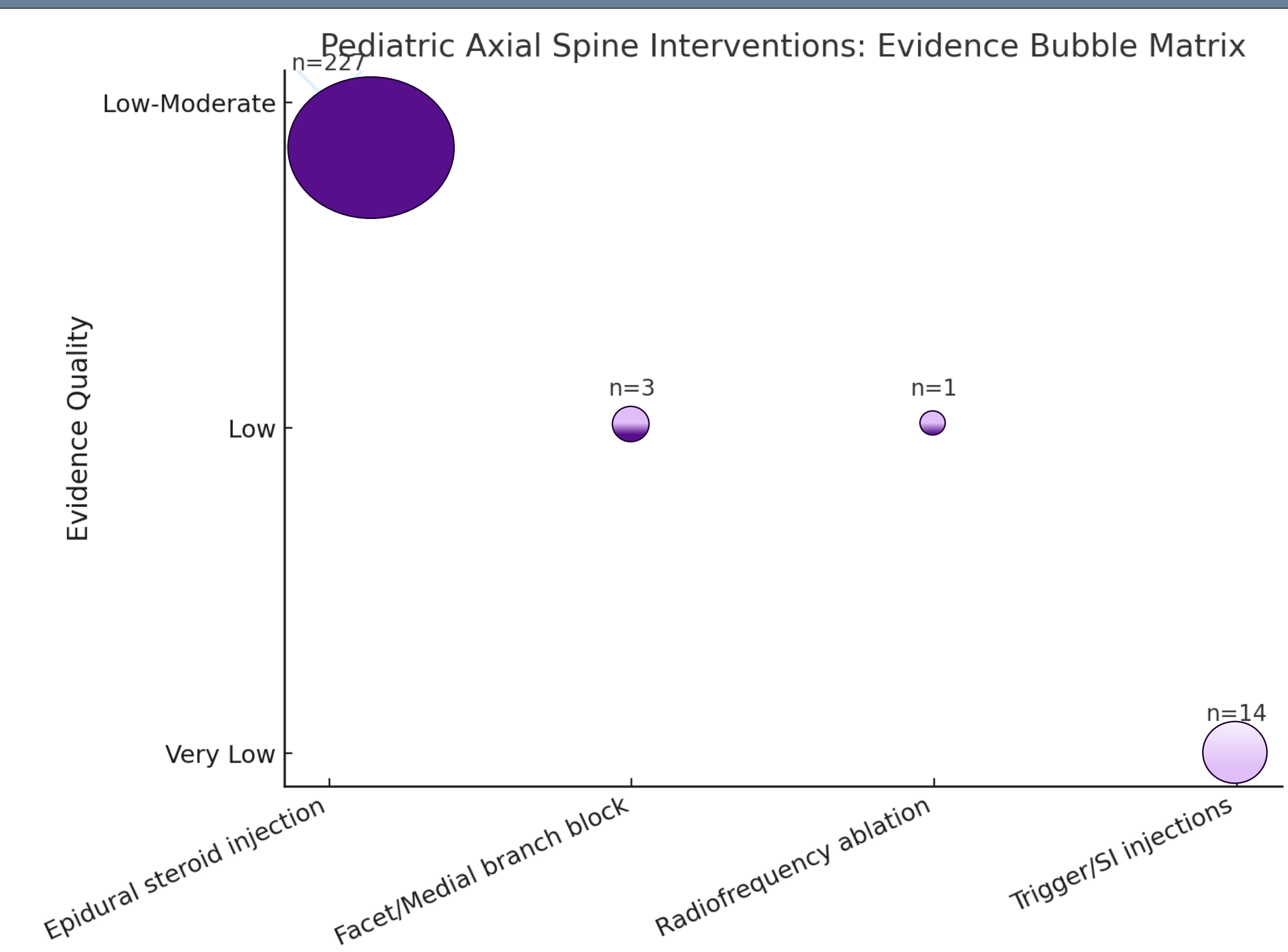


Figure 1: Bubble size = patient count. Color shade = darker is higher evidence quality

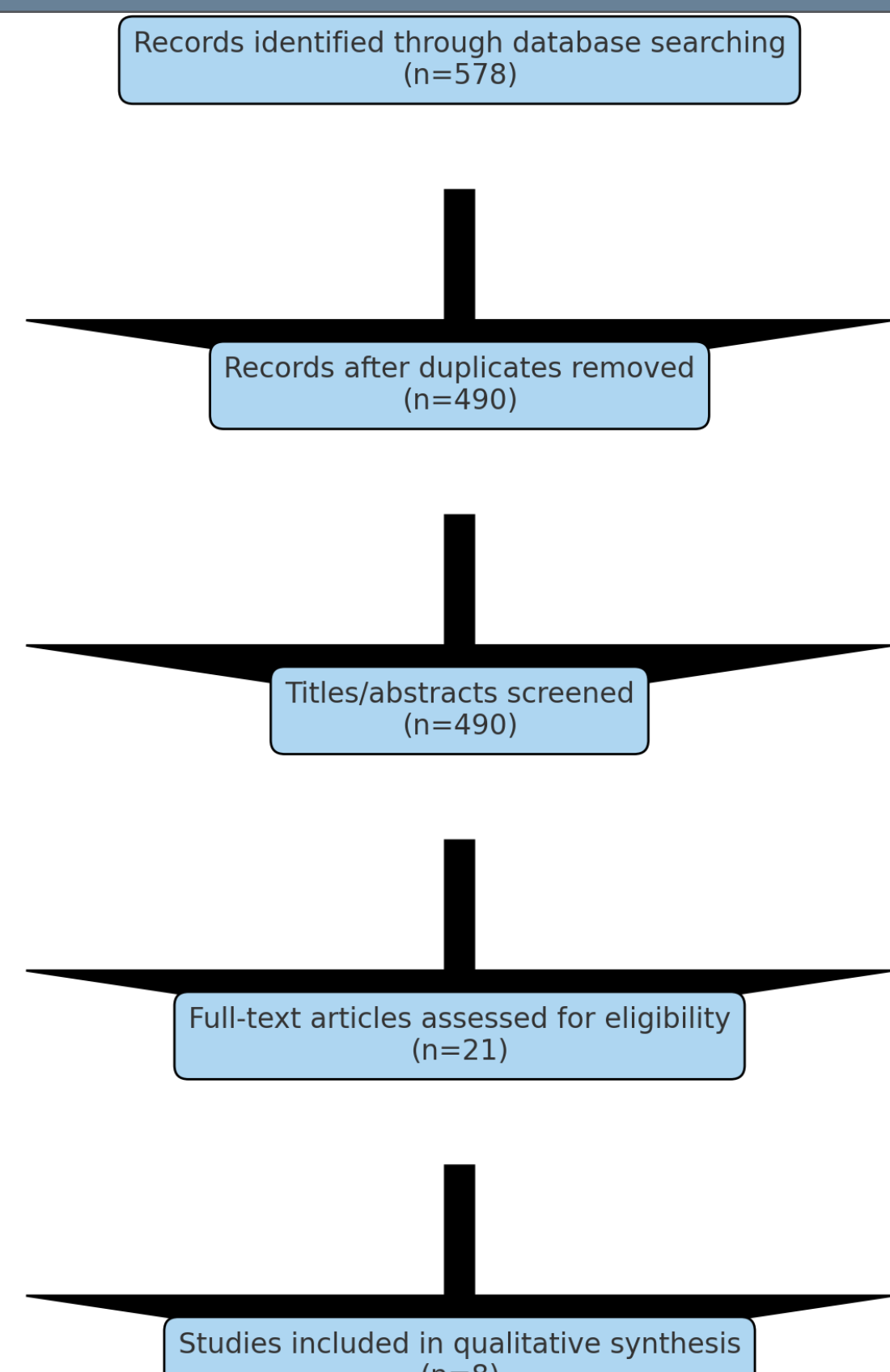


Figure 2: Final studies included: 8 (258 pediatric patients)

DISCUSSION

- Adult pain management principles are often **extrapolated** to children without pediatric validation.
- Preliminary evidence suggests that the **existing interventions** may offer **benefits in terms of short-term pain relief**.
- Findings suggest **short-term safety profile** is **similar to adults**, but **long-term safety and efficacy remain unclear**.
- Future **multicenter prospective trials** are needed to **reduce confounding variables** and **better define the pediatric populations** most likely to benefit from axial interventions.
- Minimally invasive interventions can be considered for select pediatric patients with refractory axial pain, but evidence is weak.**

REFERENCES

- Chambers CT, Dol J, Tutelman PR, et al. The prevalence of chronic pain in children and adolescents: a systematic review update and meta-analysis. Pain. Oct 1 2024;165(10):2215-2234. doi:10.1097/j.pain.0000000000003267
- Kurgansky KE, Rodriguez ST, Kralj MS, et al. Epidural Steroid Injections for Radiculopathy and/or Back Pain in Children and Adolescents: A Retrospective Cohort Study With a Prospective Follow-Up. Reg Anesth Pain Med. Jan-Feb 2016;41(1):86-92. doi:10.1097/aap.0000000000000338
- Skaggs DL, Avramis I, Myung K, Weiss J. Sacral facet fractures in elite athletes. Spine (Phila Pa 1976). Apr 15 2012;37(8):E514-7. doi:10.1097/BRS.0b013e3182368277
- Yamashita K, Sakai T, Takata Y, et al. Low Back Pain in Adolescent Athletes: Comparison of Diagnoses Made by General Orthopedic Surgeons and Spine Surgeons. Int J Spine Surg. Apr 2019;13(2):178-185. doi:10.14444/6024
- Ali AA, Jacobs BM, Gandhi A, Brooks M. Bastrup's Disease in Pediatric Gymnasts. Children (Basel). Jul 8 2022;9(7):doi:10.3390/children9071018
- Cucchiaro G, Francis C, Householder K, Fernandez A. Sacroiliac joint pain in adolescents: Diagnostic and treatment challenges. Paediatr Neonatal Pain. Jun 2022;4(2):87-91. doi:10.1002/pne2.12080
- Montejo JD, Camara-Quintana JO, Duran D, et al. Tubular approach to minimally invasive microdiscectomy for pediatric lumbar disc herniation. J Neurosurg Pediatr. May 2019;21(5):449-455. doi:10.3171/2017.11.Peds17293
- Tiendrebeggo/Zabsonne WJS, Zabsonne DS, Kabore F, et al. Pediatrics severe low back pain by disc herniation: an uncommon entity. Pediatr Rheumatol Online J. Jan 2 2024;22(1):1. doi:10.1186/s12969-023-00942-4
- Tyagi R, Kloepping C, Shah S. Spinal cord stimulation for recurrent tethered cord syndrome in a pediatric patient: case report. J Neurosurg Pediatr. Jul 2016;18(1):105-10. doi:10.3171/2015.12.Peds14645
- Walrus KM, Smith BW. Back Injuries in the Pediatric Athlete. Current Sports Medicine Reports. 2002;1(1)

