Providence Bracing in Adolescent Idiopathic Scoliosis: A Scoping Review

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INTRODUCTION: Adolescent Idiopathic Scoliosis (AIS), a common three-dimensional spinal deformity, is often managed with conservative treatment. The Providence brace (PNB) is a night-time orthosis designed to prevent curve progression in mild to moderate AIS that continues to emerge in interest. The purpose of this review was to evaluate the effectiveness of Providence bracing, identify optimal usage strategies, compare its efficacy to fulltime orthoses, and discuss future directions in AIS management.

METHODS: A scoping review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA-ScR) guidelines (Figure 1). Following Open Science Framework registration, literature was queried using a keyword search in PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science Core Collection, Cinahl, and Scopus databases in August 2024. Articles were included if they primarily focused on PNB utilization in the treatment of AIS patients. Studies unrelated to the PNB, individuals diagnosed with AIS, or that were non-peer-reviewed, opinion, or editorial articles were excluded. Data on study participants, outcomes, and methodologies were extracted for analysis.

RESULTS: A total of 23 studies met our inclusion and exclusion criteria, evaluating 2,244 AIS patients (Figure 2). 6 articles compared outcomes with the PNB to fulltime orthoses. 11 studies investigated measures to improve PNB success, and an additional 3 studies evaluated PNB impact on quality of life. The PNB effectively treats curve progression in specific AIS subsets, particularly in curves under 35° and those with an apex below T9. Initial curve flexibility, skeletal maturity, and brace compliance influence PNB success. 83.3% of comparative studies indicate the PNB offers similar outcomes to fulltime orthoses (i.e. Boston). The PNB was also associated with superior quality of life and compliance compared to fulltime alternatives. Innovations such as artificial intelligence, ultrasound imaging, predictive models, and temperature sensors may improve brace fit, adherence, and future compliance measures.

DISCUSSION: The Providence brace provides a viable, patient-compliant alternative in the treatment of mild to moderate AIS. While the PNB demonstrates promise, variable findings and a noted lack of standardization in study design and indications furthers the need for future prospective, randomized studies utilizing SRS criteria and objective measures of compliance.

SIGNIFICANCE/CLINICAL RELEVANCE: The PNB effectively treats curves less than 35° in the lumbar, low-thoracic, or thoracolumbar regions and demonstrates more than adequate compliance in the treatment of AIS patients. Continued innovation in the form of predictive models and temperature sensors may improve future outcomes.

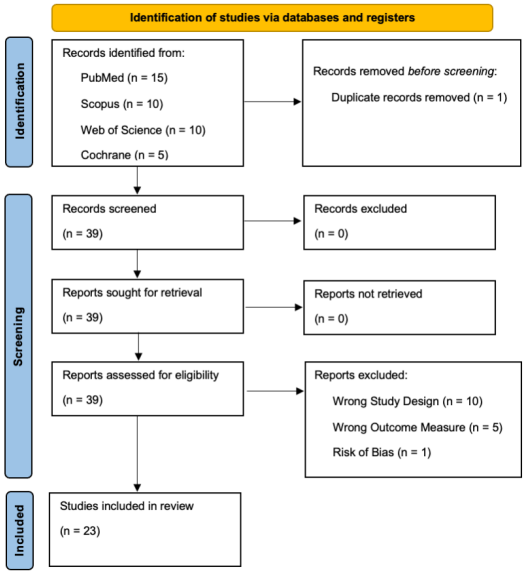

Figure 1. Depiction of PRISMA Article Screening Process

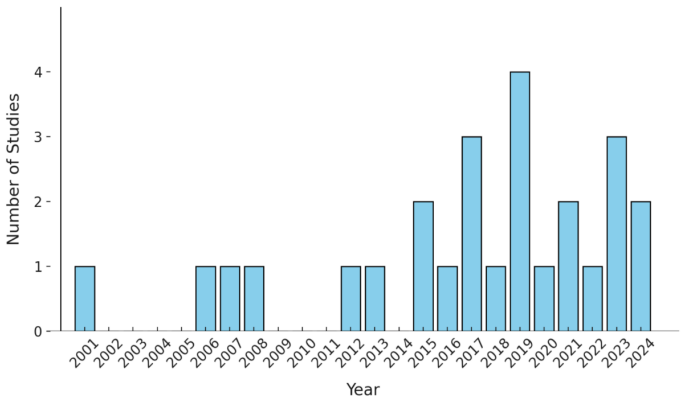

Figure 2. A graphical representation of included Providence bracing publications from 2001-2024.