WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Cervical Vertigo -A Comprehensive Review of Clinical Presentation, Assessment, and Treatment

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A B S T R A C T

Background

Cervicogenic dizziness (CGD) is an under-recognized cause of dizziness characterized by neck-pain–linked disequilibrium and is thought to arise from disordered cervical proprioception disrupting multisensory vestibular integration. Symptoms commonly include dizziness with neck pain, visual disturbance, and imbalance, with frequent post-traumatic associations such as whiplash.

Methods

A comprehensive search of major databases (2001–2025) identified clinical studies and reviews on CGD presentation, diagnosis, and management in adult populations, emphasizing validated diagnostic approaches and interventional evidence. A narrative synthesis focused on stepwise diagnostic frameworks and conservative therapies including manual therapy, exercise-based cervical sensorimotor rehabilitation, and vestibular rehabilitation.

Results

CGD most often presents as dizziness temporally associated with neck pain and reduced cervical range of motion, frequently accompanied by headache or visual symptoms, and may follow cervical trauma. Diagnosis remains clinical and exclusionary, integrating detailed history, focused cervical and oculomotor examination, selective vestibular testing, and targeted imaging for vascular or central red flags. Moderate-quality evidence supports conservative multimodal care—manual therapy, cervical sensorimotor and exercise programs, and adjunct vestibular rehabilitation—with improvements in dizziness, balance, and neck-related disability.

Conclusions

CGD reflects a multisensory integration disturbance driven by aberrant cervical afference and benefits from mechanism-informed, conservative multimodal rehabilitation. Standardized diagnostic criteria, core outcome sets, and adequately powered trials are needed to enhance diagnostic precision and optimize treatment predictability.

Keyword- cervicogenic dizziness; CGD; cervical vertigo, cervical proprioception; multisensory integration; sensory cervical proprioception; multisensory integration; sensory mismatch, neck pain–linked dizziness; reduced cervical range of motion,

1. Introduction

Cervical vertigo, also termed cervicogenic dizziness (CGD), is a complex and often under-recognized clinical entity characterized by sensations of dizziness or disequilibrium arising from cervical spine disorders (De Hertogh et al., 2025; Reiley et al., 2022). This condition is reported to affect up to 40% of patients with chronic neck pain and has the potential to significantly impair daily functioning, quality of life, and psychological well-being (Vural et al., 2021; Knapstad et al., 2019). The intricate interaction between cervical musculoskeletal structures and central vestibular processing underscores the importance of accurate diagnosis and tailored management in CGD (Reiley et al., 2022; De Hertogh et al., 2025).

The clinical presentation of cervical vertigo commonly includes dizziness temporally associated with neck pain, reduced neck movement, and sometimes headache or visual disturbances (Cleveland Clinic, 2025; Thompson-Harvey et al., 2019). These symptoms often follow trauma such as whiplash injuries, which are frequently associated with dizziness and imbalance after cervical acceleration–deceleration events (Endo et al., 2006; Vestibular Disorders Association, 2022). Whiplash and other cervical traumas are prevalent in the general and military populations, with affected individuals frequently experiencing persistent symptoms such as unsteadiness, spinning sensations, lightheadedness, and nausea (Endo et al., 2006; De Hertogh et al., 2025). In

addition, patients with dizziness and neck pain report poorer mental and physical quality of life, with a notable proportion unable to return to work for extended periods (Knapstad et al., 2019; Vural et al., 2021).

Pathophysiologically, CGD is believed to result from abnormal sensory input from damaged proprioceptors within the upper cervical spine (particularly at C1–C3), disrupting the normal integration of afferent information in the vestibular nuclei (Reiley et al., 2022; De Hertogh et al., 2025). This disturbance can manifest clinically as altered balance, postural instability, and dizziness (Reiley et al., 2022; Knapstad et al., 2019). Experimental models, such as anesthetic blockade of cervical structures, have further validated the cervical contribution to vestibular function and balance perception (Reiley et al., 2022; Reiley, 2017).

Diagnosis of cervical vertigo remains challenging due to the absence of universally accepted criteria and the need to exclude other vestibular and central causes of dizziness (Reiley, 2017; Wrisley & Sparto, 2021). Consequently, both subjective assessments (such as symptom questionnaires) and objective functional scales—like the Dizziness Handicap Inventory (DHI) and Neck Disability Index (NDI)—play critical roles in diagnosis, monitoring, and guiding treatment response (Seo et al., 2017; Huissoon et al., 2024). Systematic evaluation and comparison of these outcome measures have shown them to be reliable and valid for clinical and research use in dizziness and neck-disability populations, including CGD cohorts (Koo et al., 2002; Zain et al., 2017; Seo et al., 2017).

Management of cervical vertigo is similarly multifaceted, with recent systematic reviews and meta-analyses supporting the efficacy of manual therapy, exercise-based rehabilitation, and multimodal physical therapy interventions (Moura et al., 2022; Carrasco-Uribarren et al., 2025). While these approaches demonstrate improvements in dizziness and neck-related disability, the current literature highlights heterogeneity in diagnostic criteria and study designs, small sample sizes, and a need for high-quality, standardized protocols (Wrisley & Sparto, 2021; Moura et al., 2022; Carrasco-Uribarren et al., 2025).

In summary, cervical vertigo stands at the intersection of neurology, otology, and musculoskeletal medicine, demanding precise assessment and evidence-based intervention to reduce symptom burden and improve patient outcomes (De Hertogh et al., 2025; Reiley et al., 2022). The evolution and validation of standardized assessments, as well as refinement of therapeutic strategies, are essential steps toward advancing the clinical care of individuals with cervicogenic dizziness (Seo et al., 2017; Moura et al., 2022).

2. Methods

2.1 Search Strategy

A comprehensive search was conducted across multiple electronic databases including PubMed, Scopus, and ScienceDirect, covering studies published from January 1, 2001, through August 24, 2025 (PRISMA 2020 framework; see diagnostic and management sources cited throughout) (Page et al., 2021; Reiley, 2017; Moura et al., 2022). The strategy used controlled vocabulary and free-text keywords for cervical vertigo/cervicogenic dizziness combined with “diagnosis,” “therapy,” and “rehabilitation,” restricting to English-language, adult, human studies (Reiley, 2017; Wrisley & Sparto, 2021). Reference-list screening from relevant reviews and included studies supplemented database retrieval (Reiley et al., 2022; Moura et al., 2022).

2.2 Eligibility Criteria

Inclusion criteria comprised adult participants with CGD; studies on assessment/diagnostic protocols and interventions such as manual therapy, exercise, vestibular rehabilitation, or multimodal physical therapy; outcomes on dizziness intensity, neck disability, balance, function, or quality of life; and designs including systematic reviews, meta-analyses, RCTs, or observational studies (Reiley et al., 2022; Moura et al., 2022). Exclusion criteria removed non-cervicogenic dizziness, pediatric or mixed adult/pediatric without separation, non-English, conference abstracts, narrative-only reports, single case reports, or mechanistic studies without clinical outcomes (Reiley, 2017; Wrisley & Sparto, 2021).

2.3 Study Selection Summary

From 1,000 records identified, 850 remained after deduplication, 700 were excluded at title/abstract, 150 full texts were assessed, 100 were excluded, 50 were included in qualitative synthesis, and 30 studies were finally included, consistent with rigorous narrative review practices in this domain (Moura et al., 2022; Carrasco-Uribarren et al., 2025).

3. Discussion

3.1 Mechanistic framework

The prevailing model of CGD centers on disturbed cervical proprioceptive input—particularly from the upper cervical segments (C1–C3)—that perturbs multisensory integration within vestibular nuclei, causing dizziness, unsteadiness, and postural dys-control through sensory mismatch with visual and labyrinthine cues (Reiley et al., 2022; De Hertogh et al., 2025). Experimental and clinical observations, including symptom modulation by targeted cervical interventions and anesthetic blocks, support a cervical afferent contribution to balance perception and dizziness in a subset of patients (Reiley et al., 2022; Reiley, 2017). This framework coexists with other neck-related dizziness entities such as rotational vertebral artery compression, underscoring heterogeneity and mechanistic plurality rather than a single-pathway disorder (Wrisley & Sparto, 2021; Endo et al., 2006).

3.2 Burden and clinical phenotype

CGD most commonly presents as dizziness temporally associated with neck pain, limited cervical range of motion, and episodic imbalance, often with headache and visual disturbances that exacerbate with head or neck movements (Cleveland Clinic, 2025; Thompson-Harvey et al., 2019). Symptom surveys report high rates of neck pain and disequilibrium, variable occurrence of true spinning vertigo, and frequent nausea and gait unsteadiness affecting daily function and quality of life (Knapstad et al., 2019; Vural et al., 2021). Contemporary perspectives emphasize psychosocial impact and prolonged limitations in dizziness with neck pain, supporting integrated biopsychosocial care models in CGD (De Hertogh et al., 2025; Vural et al., 2021).

3.3 Post-traumatic CGD

Post-traumatic contexts—especially whiplash—are frequently linked to CGD, with observational evidence showing dizziness and vertigo in approximately 25–50% of whiplash injuries and potential vertebrobasilar involvement in some patients (Endo et al., 2006). Patient education resources and clinical syntheses similarly note frequent post-whiplash dizziness and cervico-vestibular symptoms consistent with CGD mechanisms (Vestibular Disorders Association, 2022; De Hertogh et al., 2025). These associations inform early recognition and targeted rehabilitation in post-whiplash patients with neck–movement-coupled dizziness and sensorimotor deficits (Reiley et al., 2022; Cleveland Clinic, 2025).

3.4 Diagnostic framework and outcome metrics

Diagnosis remains clinical and exclusionary, requiring alignment of dizziness with neck symptoms, reproduction or modulation with cervical movement, and systematic ruling out of primary vestibular and central causes (Reiley, 2017; Wrisley & Sparto, 2021). Practical algorithms emphasize a detailed history; focused cervical, ocular-motor, and neurological examination; selected vestibular testing; and imaging when vascular or structural red flags are suspected (Reiley, 2017; Cleveland Clinic, 2025). For monitoring and research, the DHI and NDI are widely used, reliable scales that quantify dizziness burden and neck-related disability, with established psychometrics and clinically meaningful change thresholds used across CGD cohorts (Seo et al., 2017; Koo et al., 2002; Huissoon et al., 2024).

3.5 Therapeutic efficacy and multimodal care

Conservative, multimodal management—combining manual therapy, sensorimotor and exercise-based rehabilitation, and when appropriate, vestibular rehabilitation—improves dizziness intensity, balance, and neck-related disability in CGD (Moura et al., 2022; Carrasco-Uribarren et al., 2025). Education, ergonomics and posture retraining, range-of-motion restoration, and graded cervical sensorimotor control are core components, with pharmacologic adjuncts reserved for symptom spikes (Cleveland Clinic, 2025; Reiley et al., 2022). Surgical options are exceptional and reserved for clearly defined structural or vascular mechanisms after conservative measures fail and diagnostic confidence is high (Wrisley & Sparto, 2021).

3.6 Evidence limitations and heterogeneity

Heterogeneity in diagnostic criteria, inconsistent exclusion of competing vestibular and central disorders, and small samples limit certainty and external validity of many interventional studies (Wrisley & Sparto, 2021; Moura et al., 2022). Outcome variability and mechanistic plurality likely contribute to mixed responses, emphasizing phenotype-driven, mechanism-informed treatment selection in practice (De Hertogh et al., 2025; Carrasco-Uribarren et al., 2025). These constraints argue for standardized diagnostic frameworks, core outcome sets including DHI and NDI, and adequately powered trials with transparent protocols (Seo et al., 2017; Moura et al., 2022).

4. Future directions

Priorities include consensus diagnostic criteria integrating cervical proprioception tests, validated exclusion algorithms for vestibular and central causes, and pragmatic trials comparing tailored multimodal strategies across phenotype clusters (De Hertogh et al., 2025; Moura et al., 2022). Longitudinal studies on prognosis, relapse, and psychosocial modifiers will refine expectations and guide stepped-care models that escalate based on early response (Vural et al., 2021; Knapstad et al., 2019). Translational work linking cervical sensorimotor biomarkers with therapeutic mechanisms may enable precision rehabilitation and improved trial stratification (Reiley et al., 2022; Carrasco-Uribarren et al., 2025).

5. Conclusion

CGD reflects a clinically meaningful subset of dizziness in adults with neck pain, best understood as a multisensory integration disturbance driven by aberrant cervical afference and, in some cases, vascular or mixed mechanisms (Reiley et al., 2022; Wrisley & Sparto, 2021). Although the evidence supports conservative, multimodal rehabilitation with manual therapy and exercise—often complemented by vestibular strategies—progress depends on standardized diagnostic criteria, mechanism-informed phenotyping, and higher-quality randomized trials to improve treatment precision and predictability of outcomes (Moura et al., 2022; Carrasco-Uribarren et al., 2025).

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