Elucidating postural shift and gait alterations in discogenic low back pain: call for subgroup-specific research

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Even though it is well-established that gait and postural stability are compromised in discogenic low back pain (DLBP)[1,2], it is imperative to recognize that this broad category includes various clinical subgroups, each with its unique biomechanical impairments. Disc herniation is one of these aforementioned sub-groups, within which further variations exist based on the direction of herniation (Figure).[3] Each subgroup exhibits distinct alterations in centre of gravity (COG) shift, postural sway, gait, and other biomechanical factors. Research to date has often generalized findings across the entire spectrum of DLBP, potentially overlooking the subtle differences between these subgroups.[2] For instance, postero-lateral disc herniation is a common and debilitating subgroup of DLBP, accounting for 81% of all disc herniations[3], causing lumbar radiculopathy in 76.8%-96% of cases, displaying distinct clinical and biomechanical characteristics that differentiate it from other types of disc herniation.[3] Clinical symptoms include positive centralization and peripheralization phenomenon, straight leg raise, unilateral radiating pain, numbness, paraesthesia, and a lateral shift towards the asymptomatic side. This condition often involves nerve root impingement or compression, with symptom exacerbation upon flexion and lateral flexion/rotation towards the symptomatic side, while extension bias exercises and rotational mobilization away from the painful side tend to provide relief.[4-6] On the other hand, symptoms of patients with postero-central herniation may exacerbate in extension bias exercises, and persons with circumferential disc bulge have no specific direction bias.

These clinical manifestations are accompanied by specific biomechanical changes, including altered gait patterns and distinctive shift in COG. In individuals with postero-lateral disc herniation, it is hypothesized that COG shifts anteriorly and towards the asymptomatic side. This shift,

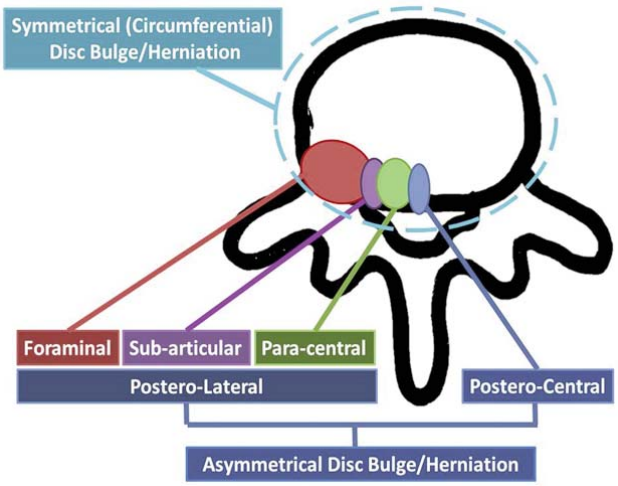

Figure:Categorization of disc herniation based on the direction of prolapse/herniation[3].

along with lateral listing and sciatic scoliosis, is suggested to serve as a compensatory mechanism to minimize pain and avoid further nerve root compression.[6] Consequently, these individuals exhibit gait impairments such as increased double support time and reduced step length, walking speed, and cadence, reflecting the body's efforts to maintain balance and alleviate symptoms.[1] Given the unique characteristics of DLBP subgroups, it is crucial to focus research efforts on specific categories. This targetted approach can help us better understand the distinct biomechanical alterations associated with each subgroup and develop effective rehabilitation strategies. Detailed investigation of these subsets will enable clinicians to use specific biomechanical outcomes, such as COG shift, postural sway pattern, lateral shift, and gait alterations, as objective measures to monitor patient progress and prognosis.

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