Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care
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Acute Alterations in Gait Dynamics Before and After Hemodialysis Assessed Using Wearable IMU Sensors

Kyung-hee Kwon, Eun-woo Lee, Woo Seok Kim, Mi-ji Jung, Myeongyu Cho, Jin Eop Kim, Gwangho Choi, Hyunsuk Kim, Hyun Woo Lee
Department of Internal Medicine-Nephrology, Chuncheon Sacred Heart Hospital, Korea, Republic of

Objectives : Hemodialysis induces acute hemodynamic and fluid shifts that may influence physical performance. We evaluated pre- and post-dialysis gait alterations using wearable inertial measurement unit (IMU) sensors.
Methods : Forty-two maintenance hemodialysis patients (age 64.9 ± 12.7 years; 50% male) performed an 8-meter walk test immediately before and after dialysis. IMU sensors attached to the waist and wrist captured spatiotemporal and dynamic gait parameters. Within-subject changes were analyzed.
Results : Post-dialysis assessment revealed significant reductions in gyroscopic variability and rotational amplitude, including GyrMag_Std ($p<0.001$), GyrMag_RMS ($p=0.004$), and GyrMag_DomFreq ($p=0.02$). In contrast, vertical acceleration (az_RMS) significantly increased ($p=0.003$). These findings indicate decreased trunk rotational dynamics accompanied by increased vertical impact loading following dialysis. The observed pattern suggests a stiffer and potentially less stable gait after treatment.
Conclusions : Hemodialysis acutely alters gait dynamics, characterized by reduced rotational movement and increased vertical instability. Wearable IMU-based gait assessment may provide a sensitive digital biomarker for detecting post-dialysis functional vulnerability and fall risk.

투석전후 gait.png

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