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Analysing Pre-operative Gait Patterns in Participants Undergoing Total Hip and Knee Replacement Using Inertial Wearable Sensors-A Commentary

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Commentary

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DESCRIPTION

Natarajan, et al. observational study presents a significant advancement in orthopedic surgery, particularly in the analysis of pre-operative gait patterns in patients awaiting hip and knee arthroplasty. The research adopts a transformative approach by utilizing chest-based inertial wearable sensors, diverging from traditional and more complex gait analysis methods. This technique enhances patient compliance and comfort, making gait analysis more feasible in a clinical setting [1].

This study involves a thorough examination of patients' gait patterns, comparing those with severe osteoarthritis to healthy controls. This comparison highlights the potential of wearable sensors in identifying specific gait abnormalities associated with joint pathologies. The methodology's simplicity and non-invasiveness offer a comfortable experience for patients, with significant implications in clinical diagnostics, influencing pre-operative planning and potentially improving patient outcomes. The adoption of this technology aligns with trends in orthopedics towards patient-centric, technologically advanced methodologies, as seen in related research on degenerative lumbar spine disease [1,2].

The findings reveal distinct differences in gait patterns between osteoarthritis patients awaiting hip and knee arthroplasty and healthy individuals, demonstrating the effectiveness of inertial wearable sensors in detecting and quantifying gait abnormalities. The researchers measured various gait parameters, such as step length asymmetry, gait velocity, and other biomechanical aspects. These parameters were significantly altered in osteoarthritis patients compared to the control group, highlighting the impact of joint deterioration on mobility.

The study's comparative approach provides valuable insights into the specific gait changes associated with osteoarthritis. For instance, patients exhibited reduced gait speed and altered step patterns, which are indicative of the pain and functional limitations caused by joint degeneration. These findings emphasize the potential of wearable sensor technology in diagnosing and tailoring treatment plans for individual patients based on their specific gait patterns.

This comparative analysis sets a foundation for future research in orthopedics, suggesting detailed gait analysis could be instrumental in monitoring disease progression and evaluating surgical interventions. The study also raises the possibility of using similar technological approaches to study other orthopedic conditions, potentially leading to broader applications in personalized medicine.

Parameters such as step length asymmetry and gait velocity were markedly different, underlining the potential of wearable sensors in clinical diagnostics and influencing pre-operative planning, and subsequently, patient outcomes. Moreover, recent research by Amin et al. on the use of three-dimensional-printed patient-specific implants and virtual surgery planning for Anterior Lumbar Interbody Fusion (ALIF) in an adult patient demonstrates the increasing role of technology in patient-tailored orthopedic solutions [3]. This integration of technology extends beyond physical conditions to mental health, as suggested by Koinis, et al. who explore the potential of smartphones and wearable devices in identifying and monitoring mental illness [4]. This approach also reflects a broader shift in medical practice towards personalized healthcare, where patient comfort and compliance are as important as the precision of diagnostic tools. The potential of this technology extends beyond orthopedics, with possible applications in monitoring other conditions, thus marking a paradigm shift in medical diagnostics and treatment planning. Such advancements are pivotal in paving the way for future innovations that prioritize patient-centered care while harnessing the power of technology.

While the study marks a significant advancement with its use of inertial wearable sensors for gait analysis, it presents challenges and areas for future research. One primary limitation is the study's focus on severe osteoarthritis cases within a controlled hospital environment. This specificity raises questions about the generalizability of the findings to a broader patient population and in varied clinical settings. Future research should aim to validate these findings in more diverse groups, including patients with different stages of osteoarthritis and other joint-related pathologies. Additionally, real-world testing is essential to understand the practicality and effectiveness of these sensors outside controlled environments. Such studies could provide insights into the long-term use of wearable technology in routine clinical practice, its impact on patient outcomes, and how it can be integrated with other diagnostic and treatment planning tools [1]. Exploring these areas will be crucial in fully realizing the potential of wearable sensor technology in revolutionizing orthopedic care, making it more personalized, accessible, and efficient.

In conclusion, the study by Natarajan, et al. contributes significantly to the field of orthopedic surgery. The innovative use of inertial wearable sensors heralds a new era in patient-centered care, offering a practical, non-invasive, and efficient approach to diagnosing and planning treatment for joint pathologies. This technological leap not only simplifies the gait analysis process but also aligns with the broader trend in medicine towards personalized and technologically integrated healthcare solutions. However, the study's scope, focused primarily on severe osteoarthritis cases within a controlled environment, underscores the necessity for expanded research. Future studies should aim to include a more diverse patient demographic and real-world settings to fully establish the efficacy and applicability of this technology. The potential of this research to revolutionize orthopedic care is

immense, paving the way for more accurate diagnoses, improved patient outcomes, and enhanced overall healthcare experiences. As the field of orthopedics continues to evolve, the integration of such innovative technologies will undoubtedly play a pivotal role in shaping future medical practices.

REFERENCES

1. Natarajan P, et al. Continuous data capture of gait and mobility metrics using wearable devices for postoperative monitoring in common elective orthopaedic procedures of the hip, knee, and spine: a scoping review. J Orthop Surg Res. 2023;18:812.
2. Mobbs RJ, et al. The Subjective and Objective Quality of Life Score (SOQOLTM) for the quantification of general health status: a preliminary study with initial normative population values. J Patient Rep Outcomes. 2024;8:7.
3. Amin T, et al. Anterior Lumbar Interbody Fusion (ALIF) for lumbar hemivertebra in an adult using three-dimensional-printed patient-specific implants and virtual surgery planning: a technical report. Surg Tech Dev. 2023; 12:199-210.
4. Koinis L, et al. A commentary on the potential of smartphones and other wearable devices to be used in the identification and monitoring of mental illness. Ann Transl Med. 2022; 10:1420.