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Letter

Artificial Intelligence in Spinal Injury

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Dear Editor,

Spinal injuries, particularly in the cervical and thoracolumbar regions, present a serious and growing health risk for the elderly population. While these fractures were once primarily associated with younger males involved in high-impact accidents, the trend has shifted dramatically. Today, it is increasingly common for older adults, regardless of gender, to sustain these injuries from seemingly minor incidents, such as simple falls. Addressing this issue is crucial for improving the well-being and safety of our aging society [1].

Artificial intelligence (AI) represents a groundbreaking technological advancement, enabling machines and software to perform tasks that traditionally demand human intelligence. By emulating human-like capabilities such as reasoning, learning, problem-solving, perception, and language comprehension, AI has the potential to revolutionize industries and enhance everyday life, making it an essential component of our future [2].

Recent progressions in computational techniques, particularly deep learning (DL), and machine learning (ML), are revolutionizing the field of spine care by significantly improving the identification and prediction of spine abnormalities. These cutting-edge technologies excel in examining several forms of data, including MRI images, CT scans, and clinical records. Enhancing surgical preparation and optimizing patient selection improves surgical outcomes and streamlines postoperative management. Furthermore, these innovations pave the way for personalized medical strategies, ensuring each patient receives tailored care for the best possible results. Embracing these technologies will transform spine treatment and elevate patient care to new heights [2-4].

This report highlights the critical position of ML and DL in revolutionizing the treatment of spinal injuries. These cutting-edge technologies are improving diagnostic approaches for evaluating vertebral fractures and significantly broadening the capability to predict fractures in both the short and long term. Their impact is particularly profound in enabling precise diagnoses and effectively distinguishing between non-cancerous and cancerous fractures. While less frequently explored, predictive studies deliver essential comprehensions into the development of vertebral collapse and the treatment-related risk influences. With their advanced computational capabilities, these approaches perfectly address the intricate challenges associated with spinal injuries, paving the way for genuinely personalized care strategies. As these technologies evolve, they promise to substantially contribute to the medical administration and scientific accepting of spinal injuries. Future studies in spinal fracture care must order developing and refining prognostic algorithms through ML to elevate pre-operative and post-operative patient care[4].

By integrating clinical and radiological information, we can develop tailored treatment strategies that address each patient's distinct characteristics. This personalized method has the possible to dramatically enhance diagnostic precision and boost the success of surgeries like surgical stabilization and vertebral augmentation, ultimately leading to better patient outcomes [5].

There is a critical need for increased research on cervical spine fractures, as current studies are limited.

By dedicating more attention to this critical study area, we can uncover innovative diagnostic techniques and advanced treatment options that could significantly improve patient outcomes [4].

Effective collaboration among engineers, clinicians, and regulatory agencies is vital for seamlessly integrating these technologies into clinical environments. This partnership ensures the validation and auditing of models and guarantees ongoing quality monitoring and timely updates. A well-defined clinical deployment protocol is essential, as it clarifies the synergistic relationship between algorithmic support and human clinical judgment, ultimately fostering greater accountability and trust in the process[4].

Expanding research on ML algorithms to predict issues like future fracture risk, vertebral collapse, and nonunion is essential. This initiative is critical for advancing clinical decision-making, emphasizing ethical and practical aspects to ensure clinical safety and effectiveness. Investing in this research can significantly enhance patient outcomes and optimize treatment strategies[4].

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Conflict of Interest Disclosures

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