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REVIEW

Artificial intelligence, machine learning, and deep learning in orthopedic surgery

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Artificial intelligence (AI) is intelligence demonstrated by machines. The main goal of AI is not to replace healthcare professionals, but to enable better patient experience and better inform the clinical decision-making process to improve the safety of patients and reliability of clinicians. The main principle is based on the following assertion: computers can precisely mimic cognitive functions of human beings such as learning and problem solving.[1] The AI involves machine learning in the form of deep learning.

Machine learning is a form of AI using computational algorithms that can learn from large data sets and make predictions.

Deep learning uses convolutional neural network (CNN) architecture. The CNN is an artificial neural network (ANN) algorithm that applies multilayer neural network structure.[2]

Deep learning may be a beneficial assistant in the detection of bone fractures, for the evaluation of cervical arthrosis and robotic joint arthroplasty.[1-3] However, the public unawareness of the doubtful outcome superiority associated with robotic-assisted orthopedic surgery may contribute to misinformed decisions in some patients. For a better evaluation of the utility of robotic joint arthroplasty, further well-designed, prospective, controlled studies with long-term follow-up would be helpful.[4]

Finally, even a smartphone application that can measure the accelerometer-based spatiotemporal gait parameters in a valid and safe manner is available, which eliminates the need for a computer, engineering knowledge, or additional applications.[5,6]

In conclusion, the ethical and legal issues and the clinical superiority of AI over decision-making remain to be resolved with further well-planned scientific studies.

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