

*Editorial***Artificial Intelligence is Pushing The Boundaries in Orthopaedic Surgery**

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Three convergences of the digital world have an impact on world life, the use of artificial intelligence (AI), robotics, and autonomy. This can be seen clearly in the development of many industries in the world, whose valuation increases are companies that are able to adopt these three things. It seems to have grown quite exponentially and heavily influenced medicine. It reveals that nearly 72% of AI research within orthopedics have been published in the past 2 years.<sup>1</sup>

Artificial intelligence (AI) is the application of algorithms that provide machines the ability to solve problems that traditionally required human intelligence. AI at its core involves machines that can perform tasks innately characteristic of human intelligence. This includes tasks like planning, understanding language, recognizing patterns, learning, and problem-solving. AI can be thought of as an umbrella term that encompasses a broad range of subfields, including machine learning (ML), which in turn contains a subfield called deep learning (DL).<sup>2,3</sup>

AI can learn and improve from examples in large data sets, these algorithms serve as the fundamental AI using experience to improve performance or to make accurate predictions.<sup>4</sup> The most common usage of AI research is in imaging, Thong et al. proposed optimization of 3-D spine model vectors for the automatic detection of adolescent idiopathic scoliosis.<sup>5</sup> In 2019, Shah et al sought to Automatic measurement and segmentation of articular cartilage thickness in healthy knees on MRI.<sup>6</sup> Another study from Chung et al. sought to apply DL to not only detect but also classify proximal humerus fractures using anterior-posterior shoulder radiographs. For detecting proximal humerus fractures, showed a high performance of 96% top-1 accuracy.<sup>7</sup> AI's imaging capabilities can also play a role in preoperative planning and risk stratification. The first introduction of the patient-specific payment model is from Ramkumar et al., the model can predict the length of stay, inpatient costs, and patient disposition for lower extremity joint replacement.<sup>8</sup>

Advance in AI, have an interest in robotic-assisted surgery and navigational systems to limit human error in orthopedic procedures. For example, robotic arm provides tactile, visual, and auditory feedback to assist the surgeon.<sup>9</sup> Seibold et al. detect drill breakthrough events and show the potential of deep learning-based acoustic sensing, they found that acoustic sensing offers a very accurate, to prevent errors in surgery.<sup>10</sup>

The future is here, it is not machine that replace human. With more research being published, AI and

medicine are merging. It is now easier than ever to push the boundaries of what is possible in orthopedic surgery.

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