Hand It Over to the Machines: Does Machine Learning Have a Place in Orthopaedic Hand Surgery?

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INTRODUCTION:

Artificial intelligence and machine learning has garnered the interest of the medical community over the last decade. Although more readily accepted by many of the non-medical, socioeconomic platforms of our society, such as social media applications, search engines, and music devices, machine learning has made its way into the several medical subspecialties such as oncology and radiology, in the form of data analysis, radiographic and laboratory evaluation, and disease characterization and prognosis.

In the field of orthopaedic surgery, the use of machine learning has been slower to be adapted. The potential application of machine learning in orthopaedic surgery has been demonstrated by several studies.

However, even fewer studies have been performed in regard to the potential for use of machine learning in orthopaedic hand surgery. Therefore, our objective was to perform a comprehensive review on the current applications of machine learning in orthopaedic surgery and various medical subspecialties, and discuss the potential utility of machine learning in orthopaedic hand surgery.

METHODS: A literature review on the topic of machine learning and artificial intelligence in orthopaedic hand surgery was performed to provide an encompassing review of the various ways machine learning is performed now in orthopaedic surgery, and to highlight the propensity for use in orthopaedic hand surgery.

RESULTS:

The utility of machine learning in orthopaedic surgery has been demonstrated by several studies in various orthopaedic subspecialties. These studies discussed its propensity for use in the detection of adolescent idiopathic scoliosis, fracture recognition from radiographic images, hip fracture prediction using dual x-ray absorptiometry scanning, and in optimization of total hip arthroplasty implant design.

Machine learning algorithms demonstrated improved outcome measures in orthopaedic oncology survival, patient-reported outcome measures, hospital length of stay, and cost.

There have been even fewer studies that have investigated the application of machine learning in orthopaedic hand surgery. These investigations have shown its application to image analysis, hand and wrist fracture detection and characterization, as well as a screening tool for hand and wrist pathologies.

The literature in other medical fields have shown its potential as a tool for documentation and the triaging of patients who present with common signs and symptoms.

DISCUSSION AND CONCLUSION: The widespread application of machine learning and artificial intelligence in medicine is growing. There are a limited number of studies investigating the potential for use of machine learning in orthopaedic surgery, specifically orthopaedic hand surgery. In a time when machine learning is garnering promising results in regard to its medical application, more studies are warranted to further delineate the various applications of machine learning in orthopaedic hand surgery.