EDITORIAL

Are orthopaedic surgeons smart enough?

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In today's health-care environment, the integration of artificial intelligence (AI) has become ubiquitous, revolutionizing practically all facets of medical practice. From electronic health records to the implementation of cobots and robots, AI has permeated the health-care sector, offering unprecedented opportunities and challenges. In this context, one may question the relevance and savvy of orthopaedic surgeons in their understanding of the consequences of this technological (r)evolution. We need to better comprehend the connections between our practice of orthopaedic surgery and the benefits and pitfalls provided by the penetration of AI into our professional activity.

The advent of AI has brought about transformative changes in the health-care domain, which are touted as enhancing efficiency, accuracy, and accessibility. Electronic health records (EHRs), where available, have streamlined patient data management, providing a comprehensive and accessible repository for health-care professionals. The political hurdles are, today, the only obstacle in many countries to the universal use of transmissible health data records.

Although AI-powered algorithms have demonstrated remarkable capabilities in diagnostic imaging, particularly in radiology, where anomalies such as a subtle disarray of trabeculae, nondiscernible by the human eye, signaling a fatigue fracture can be identified. We must stay alert, however, as personal experience has taught me that the algorithms often cannot differentiate between a fresh fracture and a healed one.

Orthopaedic surgery, a discipline reliant on meticulous skill and precision, has not remained untouched by the influence of AI. The advent of computer-assisted surgery (CAS) and robotic-assisted surgery (RAS) has introduced a new dimension to orthopaedic procedures. These technologies offer advantages such as enhanced accuracy in implant placement, reduced surgical invasiveness, and improved postoperative outcomes. Clearly the integration of AI-driven technologies in orthopaedic surgery has potential benefits, such as improved preoperative planning, personalized implant design, and real-time intraoperative assistance. These are real advances for our patients. Yet, to this day, not many studies have proven the superiority of machine-assisted surgery compared to traditional techniques. One exception may be the unicompartmental knee prosthesis that seems to benefit from the use of a dedicated robotic device. But, there is a cost to the use of these techniques, namely, a longer installation time and, perhaps as a corollary, a greater infectious risk.

Education will greatly benefit from the introduction of machine-assisted surgery. Surgical instrumentation enhanced by AI technology can become a powerful educational tool. Before going into the operating theatre, the use of advanced simulation tools and devices by learners can have a very positive influence on their clinical performance. Practicing complex techniques in a realistic and risk-free environment will allow surgeons in training to acquire the confidence and accuracy essential for quality performance in the operating room setting. AI-driven algorithms will also allow for mentoring in the operating room to smoothen the workflow. Think of today's sets of instruments for implanting a total knee prosthesis or for performing a spinal procedure, for example. It regularly takes a number of staff, sterile and nonsterile, to master the complexities of the instrumentation, often comprising up to a hundred different components so as to avoid errors during the procedure.

When surgeons leave the operating theatre, they are overwhelmed with time-consuming administrative tasks, from operative reports to complicated assessments and multiple insurance forms. AI can greatly alleviate these tasks by using the information and data already stored in the institution's data banks to generate texts and reports. Obviously these AI-generated forms must be carefully scrutinized before adding one's signature.
When visiting patients in the ward, the AI-generated patient charts could also be a time-saver. Laboratory test results and radiology reports are always on hand, and gone are the days spent chasing after an X-ray or a lab result! The medication list checked by AI will avoid prescribing inaccurate dosages or drugs interfering with existing medications.

In the follow-up of our patients, automatic recalls for periodic controls can be set up so as to avoid the misery of the asymptomatic loose or particle-producing implant that destroys the surrounding skeleton and soft tissues. Early identification of potential problems will save much unnecessary operative activity or the use of massive implants to fill large, avoidable, defects. Registry data can also be generated and retrieved. AI, using registry data, will allow the choice of implants to be tailored to the individual patient taking overall health status and comorbidities into account. Patients with special needs such as high-performance athletes can be counselled, using pooled outcome data, and not only intuition or expert opinion, as to the best solution for their orthopaedic issue.

One of the primary dangers associated with the integration of AI in orthopaedic surgery is the risk of overreliance on technology. The problems are identical to the use of the driverless vehicle. In the future how will surgeons, dependent on technology and automated processes, react to unforeseen events? Will they have the necessary skills to overcome the complications that may arise during the operation? As always, hard work is the answer: training will provide the proper reflexes and knowledge of the needed expertise.

The integration of AI in orthopaedic surgery brings forth ethical and legal considerations. In the event of a technological failure or an error in algorithmic decision-making, questions arise about accountability and responsibility. Surgeons should have no doubts, as the responsibility will always lie with them. I do not see, in the near future, a patient victim of operative failure successfully suing the robot.

In conclusion, orthopaedic surgeons need to get smart about AI, not only as to the technical aspects but also, and including, the patient–doctor relationship, the clinical inpatient management, the administrative aspects, and, foremost, the ethical issues surrounding the use of AI in clinical practice.

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