Surgery in the Age of Artificial Intelligence: The Art That Only Human Hands Can Learn

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ABSTRACT

In the age of artificial intelligence, orthopedic surgery faces the challenge of integrating technology without losing its human essence. This article reflects on the importance of practice, manual dexterity, and continuous surgical training as irreplaceable pillars of our specialty. Based on the experience of courses and workshops organized by ACARO and AAOT, it emphasizes that the surgeon's precision and judgment remain the true driving forces of the surgical act.

Keywords: Artificial intelligence; surgical dexterity; continuing medical education.

Level of Evidence: V

La destreza quirúrgica en tiempos de la inteligencia artificial: el arte que la inteligencia artificial no puede aprender

RESUMEN

En la era de la inteligencia artificial, la cirugía ortopédica enfrenta el desafío de integrar la tecnología sin perder su esencia humana. Este artículo reflexiona sobre la importancia de la práctica, la destreza manual y la formación quirúrgica continua como pilares insustituibles de nuestra especialidad. A partir de la experiencia de cursos y talleres organizados por la ACARO y la AAOT, se destaca que la precisión y la decisión del cirujano siguen siendo el verdadero motor del acto quirúrgico.

Palabras clave: Inteligencia artificial; destreza quirúrgica; formación médica continua.

Nivel de Evidencia: V

In recent years, we have heard more and more about artificial intelligence, algorithms, and digital tools that promise to transform medicine. Orthopedics is no exception: prosthesis planning, image analysis, outcome prediction, all of these are useful and hold tremendous potential. Yet, amid the enthusiasm, it is important not to lose sight of something simple: no patient recovers their life through an algorithm. Surgery is resolved in the operating room, through the surgeon's practice, experience, and ongoing training.

In 2025, this was evident in every hands-on course organized by ACARO and AAOT: stations with instruments, bone models, prostheses, and colleagues sharing techniques and experience. The same occurred at the Congress, where hundreds of surgeons donned gloves, practiced maneuvers, fine-tuned details, and confirmed once again that orthopedics is transmitted live, from mentor to apprentice, from colleague to colleague (Figures 1-4). No screen or software can replace that experience.

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Figure 1. AAOT Surgical Skills Teaching Coordination Committee.

Figure 2. Practical course on knee arthroplasty. Participants performing ligament alignment and balance exercises on an anatomical model – ACARO 2025.

Figure 3. Advanced University Course in Hip and Knee Surgery – ACARO and Maimónides University. Advanced training for surgeons in surgical technique.

Figure 4. Teaching team of the Advanced University Course in Hip and Knee Surgery – ACARO and Maimónides University 2025.

Artificial intelligence can enhance our diagnostic accuracy or assist in planning an osteotomy, but it will never feel the resistance of a ligament, the balance of a knee prosthesis, or the satisfaction of watching a patient walk again. That kind of learning comes only through practice, trial and error, courses, and real surgical training. And therein lies the true strength of our community: we never stop training, sharing, and teaching.

For this reason, we believe the message for this issue is clear: let us celebrate technological progress, adopt what is useful, but never forget that the heart of orthopedics remains in our hands. Let us keep practicing, learning, and defending those spaces of practical teaching, because that is where the future of our specialty is truly built.

Conflicts of interest: The authors declare no conflicts of interest.

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