EDITORIAL
Turk J Surg 2025;41(2):118-120

Artificial intelligence in surgical practice: Truth beyond fancy covering

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INTRODUCTION

In recent years, the role of artificial intelligence (AI) in surgical applications has been increasing, leading to significant changes in the healthcare field. AI is used in areas such as supporting surgeons' decision-making processes, evaluating surgical skills, and improving training processes. However, literature reviews on the applicability and effectiveness of this technology also show that integrating AI into surgical practice has some challenges.

When considering the application areas of AI in surgery, the main headings are as follows. In the preoperative period, diagnosis, clinical risk prediction, and selection of suitable patients for surgery, evaluation of the patient's preoperative data, identification and intervention of concomitant conditions that can be optimized, informing the patient about the surgery, presentation of appropriate written and visual materials, and AI contributions to the patient's education and consent process can improve the results. Intraoperatively, identifying surgical instruments and the stage of the operation and predicting procedural next steps may accelerate surgical decision-making and provide recommendations regarding possible outcomes. Additionally, perhaps after the development and integration of the operating room black box, one can envisage the operating theater of the future with access to dashboards updated with real-time data specific to the patient and surgical team. Developments in the fields of surgical robotics and automation are becoming increasingly important. The evaluation of intraoperatively obtained data streams and autonomous systems can be prepared based on these. The objective criteria and feedback produced through AI can improve the field of surgical training, and dynamic simulations can offer more realistic surgical training opportunities. During the postoperative period, monitoring patients via wearable device technology and sensors can improve many parameters, such as early warning, mobilization, and discharge. Prediction of complications can enable follow-up recovery. With the inclusion of mobile technologies, innovations toward the goal of remote monitoring are increasing and allow for a home-based recovery model (1,2).

Visual AI applications have also attracted attention as a part of surgical practice. In one study, an algorithm for predicting unwanted bleeding caused by surgical instruments during robotic and laparoscopic surgery was developed. This algorithm detects sudden movements of surgical instruments and predicts the possibility of bleeding. The authors state that such an early warning system can help surgeons work more safely (3).

The impact of AI on surgical decision-making processes is particularly evident at the intraoperative stage. In a review, AI-based systems offer functions such as accelerating intraoperative pathology and recommending surgical steps by increasing surgeons'

Cite this article as: Ergenç M. Artificial intelligence in surgical practice: Truth beyond fancy covering. *Turk J Surg.* 2025;41(2):118-120

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Received: 17.01.2025
Accepted: 05.03.2025
Publication Date: 30.05.2025

DOI: 10.47717/turkjsurg.2025.6797

Available at www.turkjsurg.com

access to information. AI-based decision support systems help surgeons better understand the current situation and thus enable them to make faster and more accurate decisions. These systems accelerate the decision-making processes of surgeons and contribute to better patient outcomes. Another study reported that AI allows surgeons to make more accurate predictions in decision-making processes and thus reduces the workload of surgeons. Such applications help surgeons work under less stress and achieve better patient outcomes (4,5).

Moreover, the potential of AI to reduce surgeons' workload is also noteworthy. In a review, the weaknesses of traditional clinical decision support systems are addressed, and how AI can be used to enhance surgical decision-making processes is discussed. The integration of AI into surgical decision-making has the potential to transform patient care by strengthening the decision to operate, the informed consent process, the identification, and mitigation of modifiable risk factors, decisions regarding postoperative management, and shared decisions regarding resource utilization (6).

A review evaluating the clinical applications of AI in robotic surgery revealed that AI modeling allows surgeons to improve intraoperative metrics such as force and touch measurements, better detect positive surgical margins, and even complete the automation of certain steps in surgical procedures. AI modeling applied to intraoperative surgical video streams and instrument kinematics data allows the creation of automated skill assessments. AI also holds promise for the creation and delivery of highly specialized intraoperative surgical feedback for training surgeons. However, further innovation raises important and complex ethical questions such as data privacy, the transparency of AI models, bias, accountability, and inappropriate models for financial incentives (7).

AI is emerging as a field with the potential to revolutionize surgical education and practice. One study discussed how AI can transform education, practice, and patient care. By addressing the current applications of AI and technological developments, the authors explain how these two fields can be combined in the future. In this context, the role of AI in surgical training is evaluated as an important tool that can help surgeons develop their skills and improve patient outcomes (8).

The increasing use of AI in healthcare services has also led to changes in the education of healthcare professionals. In a study addressing how AI affects clinical decision-making processes and how healthcare professionals should adapt to these new technologies, it is emphasized that training curricula should be updated to ensure that healthcare professionals gain knowledge and skills related to AI. This is important for surgeons to make more effective and reliable decisions when interacting with AI (9).

The potential of AI in surgical applications also faces some challenges. In this context, a study was conducted to demonstrate the feasibility of using a toolkit of deep neural networks simultaneously in the operating theatre for real-time assistance during laparoscopic cholecystectomy. This study suggested that predictions from AI tools could be used to improve surgical safety by providing information to surgeons, operating theatre staff, and administrators. However, the applicability of such systems is directly related to the level of surgeons' confidence and training in these technologies. There are also challenges to be solved, such as surgical safety, the need for multicenter datasets, data sharing and security, ergonomics, optimization of human-machine interfaces, and ethical problems related to AI assistance (10).

AI-powered analytics can help researchers increase efficiency through various big data analytics functions, such as code completion, automated machine learning, data visualization, and statistical testing. A large language model (LLM), a form of AI built to understand and produce human-like text, can facilitate surgical research. LLMs can provide benefits in many areas, such as identifying and refining research questions, conducting literature reviews, designing studies, and drafting and editing drafts during the writing process. These generative AI tools can help authors organize articles, improve readability, assist with grammar and translation, and perform administrative tasks such as citing references. However, there are limitations to the use of AI in scientific writing, such as potentially incorrect information due to hallucinations, a lack of human creativity, and the inability to understand complex scientific concepts. There is concern that scientists may over-rely on AI and use these tools to author entire papers with little supervision. Many surgical journals have provided guidance to authors and reviewers on the use of AI in the editorial process, stating the need for clear disclosure of the tools used and content generated, the importance of adhering to journal policies on confidentiality, and confirmation that authors and reviewers take responsibility for the content generated by AI (11-13).

Given the promise of AI and machine learning, the lack of knowledge about the nature, capabilities, and pitfalls of AI has led to anxiety. It is important not only to learn from and understand AI but also to recognize its potential limitations (14).

AI is a tool with the potential to transform many aspects of surgical practice. From training to patient care, a wide range of AI applications are helping surgeons develop their skills and improve patient outcomes. However, this transformation should aim to be realized with attention to the impact on healthcare and ethical practices, data privacy, and the humanitarian aspects of surgical practice.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The initial draft of this article was written in Turkish and later translated into English using DeepL Translator (deepl.com/en/translator). To enhance grammar, language quality, and proofreading, the author utilized Grammarly (app.grammarly.com) and Trinka AI (trinka.ai). After using these tools, the author thoroughly reviewed and edited the content and took full responsibility for its publication.

Keywords: Artificial intelligence, machine learning, perioperative care

Footnotes

Financial Disclosure: The author declared that this study received no financial support.

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