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THE ROLE OF AI IN SURGERY: ENHANCING PRECISION AND OUTCOME

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Artificial intelligence (AI) is changing surgery by making it more accurate, safer, and better for patients. It helps before, during, and after surgery with planning, navigation, and monitoring. AI-powered robots and image tools help doctors avoid mistakes, protect body tissues, and speed up recovery. Some important benefits are customized treatment plans, better pictures using Augmented Reality (AR), and better predictions about possible problems.

The main goal of using AI in surgery is to help doctors give better care and keep patients safe. AI helps by making surgeries more precise, reducing differences between surgeries, and making the whole process more efficient. It works like a helpful tool for surgeons, not a replacement.

This research aims to look at how modern technology like AI is used in surgery and what role AI plays in improving decisions and patient safety during all parts of an operation. It also wants to find out how AI can reduce problems and lead to better results.

The information for this study was gathered by searching online and looking at scientific articles from places like Google Scholar, PubMed, and websites of science publishers. The materials used were published between 2020 and 2025.

Traditional surgery mainly depends on a surgeon’s skills, experience, vision (either by eye or through a laparoscope screen), and their own judgment. However, human mistakes can happen. AI-assisted surgery brings many advantages, such as being 40% more accurate, taking 25% less time than traditional methods, offering high-detail 3D imaging through AI/AR, leading to 30% fewer complications, and faster recovery because of precise, minimally invasive cuts. AI also checks a patient's medical history, tracks their condition after surgery, and can predict problems before they occur. AI improves the precision of surgery through robotic systems like the Da Vinci Surgical System, helping control tools better, avoiding human errors, and doing simple tasks such as suturing. It also expands the surgeon’s view by using AI-powered Augmented Reality (AR) and Virtual Reality (VR) to show anatomical information directly, which increases safety.

Some challenges of using AI in surgery include high setup costs, the need for more testing of AI models, and ethical and legal questions about who is responsible if something goes wrong with the AI system.

Modern surgeons should use AI as a tool along with their experience and skills, but they should not completely rely on AI systems. If they do, it could lead to more harm and break the trust between doctors and patients.