

In reproductive medicine and gynecologic oncology, multimodal predictive models, integrating clinical data, imaging, and biomarkers, are being used to develop individualized surgical strategies that balance treatment efficacy with functional and fertility preservation. With the advancement of data standardization and digital surgery ecosystems, surgeons will be able to utilize integrated platforms for preoperative planning, intraoperative navigation, and real-time risk prediction, facilitating a shift from experience-based to precision, individualized surgery. At the same time, AI is driving the evolution of surgical environments toward greater intelligence and semi-automation, while being deeply integrated into multidisciplinary care pathways. Robotic platforms are increasingly serving as central hubs that integrate computer vision, image-guided navigation, and large language model-based decision support, enabling real-time access to patient information and evidence-based guidance during surgery. In addition, AI applications in gynecologic cancer screening, diagnosis, and staging are further promoting the development of AI-supported multidisciplinary decision-making models.

However, the widespread implementation of AI-assisted minimally invasive gynecologic surgery still depends on the establishment of standardized frameworks and the advancement of clinical translation. Most current studies remain in early stages, with limitations such as small sample sizes, methodological heterogeneity, and lack of external validation, and there is still limited evidence demonstrating improved patient outcomes in real-world clinical settings. Therefore, consensus is urgently needed regarding data standards, evaluation systems, and research methodologies, along with the development of robust ethical and regulatory frameworks addressing data privacy, algorithmic bias, and accountability. In the future, through multicenter data sharing, high-quality clinical research, and clinically driven technological development, AI-assisted minimally invasive gynecologic surgery is expected to achieve standardized and scalable implementation, ultimately enhancing surgical safety, precision, and personalized patient care.

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Conflict of Interest Disclosure

The author affirms that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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