

# Telemedicine and Artificial Intelligence in the Management of Endometriosis: Future Forecast Considering Current Progress

## Telemedizin und künstliche Intelligenz bei der Behandlung von Endometriose: Zukunftsprognose unter Berücksichtigung der aktuellen Fortschritte



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Dear Editor,

In recent decades, communication and computer-based technologies have successfully been adapted to healthcare management [1]. Besides, these technologies have been widely implemented into daily practice, especially for managing patients suffering from chronic diseases such as endometriosis during the COVID-19 pandemic [2].

Due to pandemic restrictions, most endometriosis patients who seek a remedy for pain relief or infertility could not attend hospitals. This situation caused a potential risk for endometriosis patients considering acute complications such as intestinal obstruction, rectal or urinary bleeding, cyst rupture, and severe abdominal pain [3].

Apart from urgent hospital admissions, endometriosis management requires experience and dedication both in medical and surgical management. However, it is not always easy to attain an experienced endometriosis center or specialists for patients with

severe endometriosis. Therefore patients need to look for appropriate healthcare professionals or clinics in different cities or countries.

All practical options provided by technology should be considered in endometriosis management regarding the necessities mentioned above. Recently, many qualified centers have encouraged healthcare providers to use Telemedicine (TM) appointments to maintain health care and support patients with chronic diseases. TM is accessible simply via a computer, tablet, or smartphone, which only requires a proper internet connection and a video transmission platform [4].

TM offers various advantages, such as remote communication with physicians and laboratory or imaging findings interpretation. Furthermore, TM could contribute to an appropriate patient follow-up and decision-making process [4]. From the endometriosis aspect, TM could allow physicians to communicate with patients who suffer from pain and are anxious about the side effects or

effectiveness of the previously recommended medical treatments [3].

In addition to adapting communication technologies to the healthcare system, computer-based advancements are also used in various specialties. Artificial intelligence (AI) systems have recently been investigated for diagnostic purposes in cardiology, ophthalmology, psychiatry, radiology, and nuclear medicine [5]. The majority of AI studies have concentrated on improving medical image quality, noise reduction, quality assurance, triage, computer-based diagnosis, and radiogenomics as an emerging area of research [6].

AI system-based developments substantially mimic human neuronal connections via various processors, including artificial neurons like human beings [7]. The AI systems require machine learning technology, big data analysis processes, and advanced robotic systems. Besides, many graphic processing units are needed to process massive data following segmentation and regeneration steps. As a plain explanation, the AI processes enable analyzing and interpreting radiological or surgical images by matching previously registered proven data [8]. Although AI in surgery practice is still in its infancy period, the progress of technology is promising.

Regarding the diagnosis of endometriosis, the patient's history, gynecological examination, and imaging methods have a crucial role. However, experience in ultrasonography or MRI interpretation is required in the diagnosis of endometriotic lesions. For that purpose, AI-based software could interpret an MRI or sonographic image [5, 9].

Moreover, aside from the diagnosis of endometriosis, it could be possible to utilize AI in the surgical management of endometriosis. The studies regarding the prototypes of artificial surgery programs that mimic surgeons' movements in predetermined cases have already been reported [10].

The AI-based surgical software includes regenerated video content obtained from essential frames after extraction from thousands of hours of surgery videos that correspond to key events of the procedures (i.e., dissection and coagulation, restoration of the pelvic anatomy, reaction to bleeding, resection of the affected organ, and suturing) performed by experts [1, 10].

The idea behind including only essential frames of the surgery is related to the fact that each surgery has relevant or redundant short movements, even performed by experienced hands. The AI aims to choose those frames with as much relevant data as possible. The system then combines the appropriate frames and regenerates them to obtain an accurate surgical flow.

This AI-based advancement could create many opportunities for both surgeons and patients. Besides, AI may allow physicians to compare their movements with the data acquired from expert surgeons [1, 10]. AI-based platforms may also be adapted to robotic surgery systems that convert the entire process to an automated surgery. Moreover, AI-based surgeries could enhance

the intra/postoperative outcomes by combining with the preoperative imaging data [1, 5, 10].

In conclusion, over the next few years, it is evident that the development of communication technology and AI will provide a mind-blowing advancement. Healthcare providers should be familiar with the current progress in technology since inevitable outcomes are on the line.

## Contributors' Statement

CK: Conceptualization, Data curation, Project administration, Writing – review and editing. TU: Writing – review and editing. EO: Writing – review and editing.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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