How Artificial Intelligence is Ushering in a New Era of Innovation in General and Plastic Surgery: A Short Communication

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Abstract

Surgical science is continuously faced with new changes and challenges with the advancement of knowledge. The discovery of new findings requires ingenious diagnostic tools and solutions, a process increasingly facilitated by artificial intelligence (AI). Advanced surgeries represent one of the most important medical challenges, demanding high precision. To support surgeons and improve surgical procedures, artificial intelligence has emerged as powerful technology with unique capabilities. Applications of AI in surgery include medical image analysis, complex disease diagnosis, and surgical outcome prediction. Using algorithms and complex neural networks, artificial intelligence analyzes and interprets medical data in less time and with greater diagnostic accuracy. The purpose of this article is to provide a brief overview of the transformative impact of artificial intelligence on innovation in the fields of general and plastic surgery, as well as its significant role in the near future.

Keywords: Artificial Intelligence; General Surgery; Innovation; Plastic Surgery

Introduction

The role of artificial intelligence in the future is one of the topics that has garnered a lot of attention from users around the world in recent years. Its impact on the future global economy has been so tangible that, according to many researchers in the fields of technology and artificial intelligence, human societies will be able to experience an economic growth of multi- trillion dollar by 2030 with the help of AI [1,2]. In the age of technology and the ever-increasing advancements in the field of artificial intelligence, this innovative technology offers various solutions for improving the healthcare sector.

Due to the expansion of knowledge and the increasing complexity of decision-making, the use of information systems, especially artificial intelligence (AI) systems, in supporting decision-making has become more important. The existence of many unknown variables means greater complexity in decision-making. With the help of these systems, more variables can be incorporated into the decision-making process. Additionally, by using neural networks, it is possible to consider unknown variables, unknown relationships between variables, and variables with unknown effects on the outcome variable. Examining the future performance of AI in general and plastic surgery can be approached from several prospectives, all of which are creative and innovative. We can discuss and approach to this matter from different aspects. Personalized learning, simulation and virtual reality, diagnostic support, data analysis and offering continuous learning opportunities for healthcare professionals. These are among the things where AI contributes significantly to

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Int J Transplant & Plastic Surg

the training and education of medical students and surgeons in future [3].

Preoperative planning and simulation are another service that it will provide us. Accurate drawing of patient's anatomy based on reality give the surgeon a better view to examine the pathology and chose the most appropriate surgical approach. Moreover, by using virtual consultations and allowing patients to visualize potential outcomes of cosmetic procedures before committing, both the confidence of the surgeon regarding post-operative factors and the self-confidence of the patient will increase [4]. AI maps can assist surgeons in achieving a more precise diagnosis of a patient's condition. By analysing medical images, AI can identify problematic areas and devise detailed surgical plans. This is particularly important in complex surgeries such as oncologic and reconstructive surgeries [5].

Surgical tools that will be made by the help of AI in the future will be much more advanced in terms of precision and finesse. So far, AI has not been used independently but has been limited to specific areas and controlled usage. The future goal is to grant AI greater independence. Current applications remain in the pre-clinical phases. There are few clinical studies or evidence indicating the translation of these technologies into clinical practice [6,7]. A recent successful application of AI is the Smart Tissue Autonomous Robot (STAR), which integrated camera control, instrument collision avoidance, tissue motion tracking, landmark detection and suture planning to perform laparoscopic intestinal anastomosis on live porcine models [8]. Anatomical landmark recognition, reducing hand tremors and enhancing dexterity by using AI-driven surgical robots, intraoperative video analysis and suggest optimal surgical paths, preventing intraoperative complications (Collision Avoidance), Tissue identification and differentiation such as identifying tumors versus healthy tissue and enhanced suturing and wound closure are the things that have been thought about so far and they are all under investigation and research [9,10]. By utilizing these advanced capabilities, AI can help surgeons perform more precise, efficient, and safer operations, ultimately improving patient outcomes and advancing the field of surgery.

Postoperative assessments and follow-up are an essential part of each general or plastic surgeries to reduce patient's morbidity. Medical clinical centres can use AI to provide services.

In conclusion, AI is primed to revolutionize the field of surgery by providing pioneering solutions that optimize accuracy, efficiency, and patient well-being. The perpetual development and integration of AI technologies will undoubtedly lead to significant advancements in both general and plastic surgery. Given the ongoing trend in technology development and the countless benefits provided by AI, the adoption of artificial intelligence in today's modern medicine is inescapable.

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