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3D-printed biliary anastomosis surgical simulator: Is the use of artificial intelligence relevant?

Annar Aileen Cuesta-Pertuz [1], Jorge Andrés Castrillón-Lozano [2], Juan Andrés Lozano-Arce [3].

1 Physician, General Surgery Specialist. Diagnosticar Clinic SAS, Quibdó, Colombia. 0009-0007-6170-4991
2 General Practitioner. Infettare Research Group, Cooperative University of Colombia, Medellín, Colombia. 0000-0001-7566-5478
3 General Practitioner. Cooperative University of Colombia, Medellín, Colombia. 0000-0002-3675-7190

Dear Director:

We have read with particular interest the study by Gasque et al (1) entitled: "Design, manufacture and initial evaluation of a biliary anastomosis surgical simulator using 3D printing" which aimed to describe the creation of a biliary anastomosis simulator using additive manufacturing and to evaluate it by surgeons at various stages of training. Therefore, we would like to make the following observations.

Weidener et al (2) define that artificial intelligence (AI) has demonstrated better diagnostic and prognostic results, enhancing all medical areas in which it has ventured and that the future impact is promising. In the surgical field, it is mentioned that AI improves anatomical teaching and education, allowing for more solid and long-term retained learning. Gordon et al (4) summarize more than 250 studies related to the application of AI in medical education and are clear in mentioning that training should focus on preserving clinical skills and even more so, human interactions that AI could not replace. In this sense, Gasque et al (1) make models based on 3D printing, which aim for reliability and low cost, however, in the same way that they use software for 3D design and modeling, it would have been beneficial to be able to enhance their models through AI, being able to automate and improve the design and creation processes, in order to have more solid results and with greater validity for their sample.

Traditionally, surgical education involves training a student while repetitively performing a task inside or outside the operating room, under the supervision of a faculty member. Limitations to this methodology have been identified, such as patient complications and time-limited mentoring and feedback sessions. AI-based surgical assistants that assess the technical performance of residents performing a procedure have been described and have been found to differentiate residents' expertise and classify them according to their skills with 100% accuracy, obtaining much higher percentages compared to a panel of experts in the area. These results and analysis of their learning curve can be personalized, ultimately resulting in teaching practices that can focus on the residents' weaknesses (5).

In conclusion, it is worth highlighting the authors' study, given that all academic training strategies will always impact the creation of solid knowledge bases, decision-making in clinical practice, and the management of resolution strategies by educational institutions. We believe that today, all studies on innovation in medical education should not be oblivious to the growing wave of technological changes based on AI, because the evidence of improved outcomes when it is used is overwhelming.

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Response from the author of the cited article (1):

Dear authors:

We deeply appreciate the time you have taken to read our article, as well as the valuable recommendations and suggestions you have provided.

We fully agree with your observation about the impact of artificial intelligence, which has revolutionized and permeated all spheres of human knowledge, playing a prominent role in medicine and its related disciplines.

Regarding your recommendation to use specific biomodeling software, such as Canon's Vitrea® (Canon Inc., Tokyo, Japan) or Fujifilm's Synapse® (Fujifilm Holdings Corporation, Tokyo, Japan), it is true that these programs integrate artificial intelligence algorithms into their processes to facilitate rendering. However, since these systems require a paid license, their high cost can be a barrier, especially in regions like Latin America, where, in our opinion, open-source and free software has been widely used.

Likewise, we believe that artificial intelligence should not and should not replace the role of the mentor or tutor in a discipline as artisanal as surgery (if we may use the literary license). The relationship between teacher and student is fundamental to the transmission of both technical and soft skills within simulation spaces.

We hope this work will inspire other groups to develop new simulation strategies and tools that are accessible, reproducible, and reliable.

I remain at your disposal,

Rodrigo Gasque.