

Editorial

PRESENT AND FUTURE OF ROBOTIC SURGERY PRESENTE Y FUTURO DE LA CIRUGÍA ROBÓTICA

Dr. Marcos Gómez Ruiz

CBC (Hon), EARCS, FEBS, EBSQ Coloproctology. Colorectal Surgery - General and Digestive Surgery, University Hospital Marqués de Valdecilla. Santander, Spain.
Email: marcos.gomez@scsalud.es

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In the last 25 years there have been important changes in surgery with the aim of reducing surgical aggression. On one hand, by applying biological knowledge on the response to surgical aggression to minimize it and on the other hand by applying new technologies that allow to perform more and more minimally invasive surgery. Aligned with this idea robotic surgery became a reality.

Robotic surgery has been a paradigm shift in surgery. Until now the process of surgery was a process in which the surgeon, obtaining patient information from the surgical field through his senses, performed a process of analysis of that information to make decisions and materialized that decision in a surgical action using surgical instruments.

With robotic surgery a computer system interface is used between the surgeon and the patient. Analysable data acquired from the surgical field and the actions of the surgeon are registered by this computer interface. This data flow allows the surgeon to perform a more efficient and safe surgery for the patient. In turn, the storage of this data will allow “big data” analysis with an artificial intelligence system that will help in the not too distant future better decision making. The execution of surgical gestures will be completely or partially automated, filtered to block or control unsafe manoeuvres or even performed by another surgeon remotely. Training process will change decisively.

Robotic surgery is a phase of the development of this digital surgery. It begins at the end of the last century, on March 3rd, 1997 in Seattle, when Jacques M. Himpens, MD, PhD, a laparoscopic bariatric surgeon in Brussels, performed the first robotic laparoscopic operation in the world: a laparoscopic cholecystectomy operation performed with “Mona”, a prototype Da Vinci robot by Intuitive Surgical. Since then, there has been a technological development to reach the fourth generation of da Vinci robots and a progressive clinical development.

At the 2018 World Congress of Endoscopic Surgery It was concluded that this form of high-tech surgery had advanced more slowly than many had predicted 20 years ago when the first modern surgical robots were introduced. This progress was slowed down not only for economic reasons but also by technological limitations and questions about its applicability, which had to be answered. It was concluded: “That these obstacles are diminishing a lot in the last years, and that the robots will drastically remodel in the coming years the practice of surgery, radiology and interventional medicine”.

Today robotic surgery is reaching the age of majority and is spreading mainly in America, Europe

and in areas of Oceania and Asia. Only in 2018 there have been more than one million robotic surgical procedures in the world.

The robotic system “Da Vinci” was tested by the FDA in 1998. It was originally applied in cardiac surgery and soon in urological surgery, with a success in this last one that helped in a decisive way to the progressive implantation of this robot and its use in almost all surgical specialties: gynaecology, general surgery mainly in colorectal surgery, oesophageal surgery, bariatric surgery and abdominal wall surgery where it has had a very important growth, especially in the USA where in 2016 they had performed 2,035 ventral repairs and 2,744 inguinal repairs. Likewise, robotic surgery is reaching a progressive application in hepatobiliopancreatic surgery. Other applications where robotic surgery is helping to decrease dramatically surgical aggression are in the field of transoral surgery in otolaryngology or head and neck surgery.

The future of robotic surgery is determined by technological improvements that allow a surgery with even less aggression and an easier access to robotic platforms for surgeons and patients. Da Vinci SP System or the Medrobotic Platform are starting to allow the possibility of performing endoluminal procedures and with the use of a single port entry and, above all, decreasing surgical aggression. Systems like Senhance with the capacity for haptic feedback have the ability to automate some surgical gestures.

Other robots like Cambridge Medical Robotics or Medtronic will begin the clinical phase very soon and will allow the reduction of the costs of the procedures, achieving an expansion of robotic surgery in many other surgical areas. Robotic appendectomies or robotic cholecystectomies will be performed and justified because of the lower cost of the procedures and increased safety of those procedures.

Verb Surgical robotic system promises to incorporate artificial intelligence capacity and “big data” analysis with advanced image processing such as virtual simulation and augmented reality. This will take in the next decade surgery to the level of aviation industry.

Given this development, it is not unthinkable that in the next years all surgical platforms will be robotized and laparoscopic surgery as we know it today will go down in the history of surgery.

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