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Editorial

Digital surgery

Cirugía digital

Since the birth of abdominal surgery in 1805 with the first Laparotomy performed by Ephrain Mcdowell,[1] our specialty has experienced moments of authentic revolution and changes, such as the discovery of laughing gas, by Horace Wells, which although later was attributed to William Morton in 1844, revolutionized the concept of pain and allowed interventions to be performed under anesthesia.[2]

During the following years, new advances appeared as a result of greater knowledge of human anatomy and physiology, associated with technological development in the field of medicine, making it possible to perform the first transplants in 1963, the appearance of extracorporeal circulation and assisted ventilation, among others.[3]

During the 80s, another great revolution emerged in the field of surgery, the birth of minimally invasive surgery. Since Kurt Semm performed the first laparoscopic appendectomy in 1980, this new access route to the abdominal cavity has progressively developed, establishing itself not as a diagnostic weapon, but also as a therapeutic one.[4] The advantages of this approach over classic laparotomic surgery were the main reason for its global diversification. Currently, almost 70% of elective surgery in hospitals in our country use this minimally invasive approach.

These achievements and advances during all those years of surgical development established the basis of today's modern surgery.

We are currently experiencing a new surgical revolution, in which ''data'' occupies the center of all this change. In this way, our written medical records, the X-rays, CT scans or MRIs that we evaluate on photographic paper in the preoperative period, cease to exist and we obtain everything through digital platforms that accelerate and facilitate our work in all phases of the surgical process. We have therefore moved from the analogue to the digital era, in which technology, engineering and computing come together around surgery, to achieve a noticeable improvement in surgical results.[5]

The open surgery that we have practiced for centuries was only recorded in surgical reports written by hand in analog form. The minimally invasive surgery, which we have been performing for three decades, was recorded in the recordings that we made for our study or to disseminate it at conferences. Currently our surgery is digitalized from the beginning. Our big data is the image, and the computing of the pre, intra and postoperative image is what introduces us to the digital era of surgery. Through 3D CT reconstructions, we can simulate the surgery we are going to perform using simulation platforms, which use these previously reconstructed anatomical models, to be able to previously practice the surgery and thus reduce errors.[5]

Due to everything previously stated, this monograph on Digital Surgery is of great importance today. We are beginning to be aware that we are immersed in another revolution in surgery. All perioperative data is recorded, analyzed and processed to assist the surgeon in pre-surgical planning, during each step of the intervention and subsequently during the postoperative course. In this way, a large amount of data on the anatomy of thousands of patients can be obtained, obtaining an accurate atlas of the anatomical variability that we can encounter during any regulated surgery. Likewise, specific algorithms can be created for each procedure to s guide the surgeon, with the data generated during said procedure, to the safest anatomical planes, minimizing the risk of injury to neighboring organs or structures, or increasing the probability of performing R0 surgeries.

In short, we are currently facing the digitalization of surgery, a fully registered surgery. Our experience is little by little reflected in digital algorithms, which will be the basis of automatic learning with Maching Learning and Deep Learning. All of our experience currently passes through digital platforms capable of storing all this information, managing to transform surgery and, in some way, storing our individual experience in collective summative algorithms that will teach us and guide us in our daily tasks.[6]

We will then talk about the digital solutions that we can use to facilitate our work, the problem of governing the data generated during surgical procedures; Of robotic platforms as digital platforms capable of computing all our work; Of new surgical learning methods such as telesurgery and tele-

mentoring; Of the image as the basis of preoperative training and the soul of surgical simulation with the use of virtual and augmented reality; The use of 3D technology in surgical planning and the support of holograms; Surgery guided by fluorescence and other tracers, to be able to discriminate healthy tissue from pathological tissue or clearly identify vascular structures; Of the metaverse and its applications in surgery; Social networks as the main driver of surgery dissemination. We will also talk about how with the image and our digitized data, the different platforms will be able to learn through artificial intelligence algorithms to lead us to more precise and safer surgery, changing our way of learning this science, performing surgeries remotely or guiding the patient. surgeon located anywhere in the world during the procedure he is performing in real time.

We are at the beginning of a new surgical revolution called Digital Surgery. The future of surgery is in our hands. We are the true architects of the resurgence of this science, which is considered more of an art than a craft, and which will manage to store all the experience that many generations have lost, to be able to use it in the training of the next generations of surgeons.

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Available online 7 June 2024

2173-5077/