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LETTERS TO THE EDITOR

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THE REVOLUTION OF ROBOTIC SURGERY IN LATIN AMERICA AND THE FUTURE IMPLEMENTATION IN THE PERUVIAN HEALTH SYSTEM

LA REVOLUCIÓN DE LA CIRUGÍA ROBÓTICA EN LATINO AMÉRICA Y LA FUTURA IMPLEMENTACIÓN EN EL SISTEMA DE SALUD DEL PERÚ

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LETTERS TO THE EDITOR

Mr. Editor

Surgery has marked a milestone in history, since its origins and for many centuries, this specialty was closely related to the healing of wounded in combat, great evidence is denoted in the case presented during the beginnings of Open Surgery, with the interventions called Trepanations Craniums that were made in the years 700 BC. - 200 AD for the Paracas Culture in Peru; with the over time, various techniques were perfected that were complemented by the use of of new instruments and the development of technology leading to a revolution in the various surgical specialties(1).

Thousands of years later, a German surgeon George Kelling is credited with first abdominal examination with Laparoscopic Surgery thanks to the creation of the endoscope in 1901; later, in Latin America had the first laparoscopic cholecystectomy performed in 1990 by surgeon Leopoldo Gutiérrez in Mexico, and in Peru, it was carried out in October 1990 by Dr. Mario del Castillo Irygoyen at the Hospital Nacional Cayetano Heredia, it is also worth mentioning Dr. Gustavo Salinas Sedó who is a pioneer and influential in this technique in Peru and is also a founding member of the Sociedad Peruana de Cirugía laparoscópica and from Sociedad LatinoAmericana de Cirugia Endoscópica, it is currently a procedure that gives the surgeon the opportunity to perform the same operations as Open Surgery, but with smaller incisions and better cosmetic results(2).

However, the event that has marked the Revolution of the Biomedical Industry has been the introduction of the Robotic Surgery; procedure where advanced technology, artificial intelligence agree and manufacturing processes, in order to design more sophisticated medical equipment and instruments to perform more precision surgical interventions, such as the Vessel Sealer device that allows perfect hemostasis with minimal thermal damage and dexterity-enhancing Endowrist instruments of the human hand-wrist to carry out the simulation of 7 degrees of freedom and are of dimensions very small, also mention a device that has fluorescence capacity that detects the vascularity from an anastomosis called Firefly(3). See Figure 1.

Worldwide, the most widely used robotic surgery system is the da Vinci® with its Si and Xi platforms, the use of these presents advantages compared to laparoscopic surgery such as less loss and requirement for blood transfusion, less postoperative pain, hospital stays and shorter recovery; at the expense of longer operative times and higher cost compared to the laparoscopic technique although with new technology and more demand in its use the times would be shortened and the costs would also go down; Likewise, surgeons can benefit from improved ergonomics and reduced effort, being able to be operated semi-autonomously from a nearby table or from far distances, granting the possibility of performing Telesurgery, since they

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have total control of the robotic arms to through a console with anatomical depth 3D vision so that the surgeon's maneuvers are firmer, more precise and safer, eliminating the shaking of the human hand[4]. See Figure 2.

This technique was quickly adopted in hospitals of the United States having as a pioneer in this technique to Dr. David Samadi, and Dr. Pier Cristoforo Giulianotti in Europe as a treatment for a large variety of diseases and pathologies, thus reaching to Latin America in 2005 having as headquarters to the Hospital de Clínicas in Argentina, where surgery on a patient with achalasia, procedure that was broadcast live during the 76th Argentine Congress of Surgery[5].

In September 2018, Sao Paulo - Brazil, during the XV Paulista Congress of Urology was presented the quantity of da Vinci® Robotic Surgical Systems that are operating in Latin America, Peru being one of the countries that lacks this technology[5]. See Table 1.

Table 1. Amount of da Vinci® Robotic Surgical Systems in Latin America.

LATIN AMERICA	DA VINCI ROBOTIC SURGICAL SYSTEM ®*
COUNTRY	QUANTITY
Brasil	37
Mexico	10
Chile	7
Argentina	6
Venezuela	5
Colombia	5
Panama	1
Uruguay	1
Dominican Republic	1
Peru	0
Others	15
Total	88

*** The da Vinci® Robotic Surgical System is Manufactured by Intuitive Surgical, Inc® Company**

The surgical technique carried out with the system gives Da Vinci® is characterized by being minimally invasive, finding various clinical applications such such as radical prostatectomy and nephrectomy in the urological area; in Gynecology allows the realization of hysterectomies, in Cardiothoracic surgery allows the mitral valve repair and lobectomy, in surgery Gastrointestinal performing pancreatic resection and cholecystectomy and in Pediatrics surgical management of congenital heart diseases[6].

The implementation of the Robotic Surgical System da Vinci® in Peru, could provide a better quality care, care diagnosis and treatment of the patients; in addition to the possible integration of a new member of the surgical health team –the Biomedical Engineer- in order to provide a efficient management of health technologies during procedures.

Introducing this technology in Peru implies a cost-accessibility analysis; in the United Kingdom,

taking as a guide the surgery of removal of prostate, through robotic surgery has a cost total ranging between US $ 2000- $ 39,215, realized laparoscopically is in the range $ 740- $ 29,771 and radical prostatectomy open between US $ 1870- $ 31,518; this difference is owes to the purchase cost of the robot, instruments and maintenance[7], which is a high price for the minimum wage of a Peruvian worker. Despite of this, its implementation could establish improvements significant in the health of the population.

The cost of the procedures developed in a start will be remarkably high, however, with the course of use and when framing all your benefits, adding to the investment of institutions national and international and to coverage by part of Health Insurers, you may have more accessibility to this robotic system; Therefore, the implementation of the da Vinci® Robot, will have an cost-benefit in the future.

The impact of this technology on the Health System of the Peru will be remarkable, which is reflected in a better development of surgical procedures due to the precision provided to the operator through better reach and range of motion; at the same time,

It should be noted that countries with an economic situation similar to ours has access to this system robotic surgical procedure, so its essential implementation so that in this way you can revolutionize Peruvian medicine.

Figure 1. Endowrist Needle Driver, Forceps, Grasper, Vessel Sealer instruments (left to right). Intuitive Surgical, Inc ®. Image available at: https://www.intuitivesurgical.com/images/on-site-banners/1008471rB-EU_Xi_IA_Catalog.pdf

Figure 2. Controlling Robotic Arms with the da Vinci Surgeon's Console. Intuitive Surgical, Inc ®. Image available at: https: //sius.davincisurgerycommunity.com/detail/videos/p9_rc_surgeon-console/video/5622753693001/ instrument-controls: -using-the-masters? autoStart = true

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