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RESEARCH ARTICLE

EXPERIENCE ROBOTIC SURGERY AT NAVAL MEDICAL CENTER ROBOTIC SURGERY EXPERIENCE AT THE NAVAL MEDICAL CENTER

[1,*]Ochoa Viveros Edwin Yuzeth, [2]Hernández Rojas Manuel Alejandro and [3]Larracilla Salazar Ivanhoe

[1]Medical Resident of General Surgery CEMENAV, Escuela de Postgrados en Sanidad Naval, Universidad Naval, Mexico
[2]Doctor Seconded Service CEMENAV General Surgery, Prof. Adj. Course General Surgery, Universidad Naval, Member of the Mexican Association of Robotic Surgery, Mexico
[2]Service Staff Physician General Surgery CEMENAV, Head of General Surgery Course, Universidad Naval, Member of the Mexican Association of General Surgery, Mexico

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Corresponding author:
Ochoa Viveros Edwin Yuzeth

ABSTRACT

It is Necessary to report the overall results of surgical procedures Carried out to Establish a reference point in the Marine Secretariat. Objective: To report overall results and initial experience in general surgery With the Da Vinci robotic system and Xi If in CEMENAV. Material and methods: a prospective, observational and descriptive study was Carried out. The statistic used was descriptive, According to the unit of measurement of each one of the variables. We Took the database Obtained During the conduct of surgeries of General surgery from June 2016 to June 2018. Results: With the Da Vinci robotic system, 134 procedures performed in 64 Patients Were of the General Surgery service. The variables Measured Were the type of surgery, the transoperative and postoperative complications. Conclusions: excellent results Within the beginning of the robotic surgeon's learning curve. Further studies will be needed by descriptive statistics Compared Among other hospital centers at the national and international levels. It Should be Obtained NOTED That the experience in the two robotic systems (Si and Xi) Gives an excellent level of recognition to the institution and the staff of General Surgery That performs them.

INTRODUCTION

In April 2016 the Secretary of Navy Marina- Mexico, through the Naval Medical Center in conjunction with the General Hospital "Manuel Gea González"; Start a program of Robotic Surgery with two specialties, General Laparoscopic Surgery and Urology, with the appropriate training from the technical point of view, for the use of the instrument and performing the number of necessary procedures requested for certification, a general surgeon and two urologists. Experience being reported in this paper, is the Department of General Surgery. Our goal is to report the results we have had to have started Robotic Surgery Program and where we are as an institution, regarding the experience in other national and international institutions. On the other hand, the Navy - Navy Mexico has attached great importance to infrastructure, equipment, education and training of the Naval Health, which is why report achievements in the field of Robotic Surgery is crucial institutional and puts us in the national and international map of telemedicine and the technology used in our beneficiaries and military patients.

Background: Medical care and health services have experienced an incessant and rapid evolution as a result of scientific and technological advances, these advances have been; in the last 50 years, higher than in the entire history of mankind.After conceiving anesthesia, antisepsis and antisepsis, antibiotics, improved surgical instruments ago a few hundred years; medicine was in an advanced state of technology, for its time. Providers of medical and surgical services that were innovative, they had to face before the paradigms of his era and defend their ideas, research and techniques to groups of doctors with extensive experience and resistant to change; (As we have seen this has not changed much). Surgery meanwhile, he achieved great progress over the past century; achieving better to surgical techniques; to perform procedures through and through large abdominal incisions; with the maxim that "a large incisions great surgeons". Some time later we began the era of "Minimally Invasive" the era of Laparoscopy or Laparo Surgery - Endoscopic. Technological advances and practical skills in all its glory.

With Minimally Invasive "Basic and Advanced" surgical procedures are performed through incisions ranging from 5 mm to 10 mm, using Co2 for insufflation of the abdomen, inserting work ports through which the instruments are introduced, also using monopolar, bipolar energy and sound to seal blood vessels for addressing the or organs on which the surgical procedure is performed (Mucius Moreno-Portillo *et al.,* 2014; Sanchez *et al.,* 2007; Sackier and Wang, 1994). It began with laparoscopic cholecystectomy, (a great achievement for surgery a few decades ago); and now, at present, they can be addressed more bodies technically in the same surgical time, thanks to developments in optical technologies and instruments. Until recently we believed that minimally invasive approaches with laparoscopy would be the last in the history of surgery; However, as we are seeing, technological developments in laparoscopic surgery starts to get a big boost with the issue of Robotic Surgery. It is not something new, at least brings 10 years of study in other countries, and about 30 years in the United States, reaching

here in Mexico a trend in recent years (Herron *et al.,* 2008). In recent decades, with the advent of the free market, progress in industry, technology and communications, and globalized companies that are real giants of the medical industry, sales professionals, sheltered by strategies structured marketing and marketing , overwhelm health services with compelling information; so for the doctor and the institutions providing health services it is difficult to know which of the "innovations" presented as great discoveries and great techniques with reduced expenditures for the doctor, the patient and of course for the institution, represent a fleeting mirage or a true enduring discovery (Mucius Moreno-Portillo *et al.,* 2014; Sanchez *et al.,* 2007; Sackier and Wang, 1994; Herron *et al.,* 2008; Chen *et al.,* 2009; Wilson *et al.,* 2009).

Robotic surgery: Robotic Surgery or Assisted Surgery Robot, is a way to Minimally Invasive Surgery, by a technologically advanced instrument that connects the surgeon with a computer, linking it to a mechanical instrument through a platform or specialized software obtaining with this, the surgeon / Software / Hardware connection. The surgeon is in contact with the rest of the circuit by means of a console which has master controls, viewer for 3D vision, and controls for camera movements and energy use. The software consists of the tower with the brain and the touch screen and finally the hardware, is the robot, which consists of the 4 arms are the most important part, because they go directly to the patient, doing well; an approach Minimally Invasive with improvement in vision 2D to 3D vision; with depth perception, important image enhancement for distinguishing tissues, absolute control and optical instruments, allowing intuitive movements of the instruments, disappearing tremor instrumental, extending the life of the surgeon;

The process for Robotic Surgery: Surgeons have rapidly adopted Minimally Invasive Surgery Assisted Robot in recent years, beginning with urological procedures, Gynecological, and now in General Surgery, Thoracic Surgery, Colorectal Surgery, Pediatric Surgery, Neurosurgery and Spine Surgery and Procedures head and neck, among others (Rodriguez *et al.,* 2009). Robotic surgery has evolved from a technology under research to an alternative routine for laparoscopy and traditional open surgery, and can perform hybrid or fully robotic procedures for certain oncological and benign pathologies conditions (Suri *et al.,* 2011). Some inexperienced surgeons in robotic surgery, might consider that this type of high-tech surgery, is merely "a fad" with other laparoscopic device more in the diversity of instruments that exist in the arsenal for carrying out different surgical techniques, only more expensive and profits or limited uses, however, it is necessary to clarify and emphasize that it is not, is required to use the device and instrumentation to note and take into account that a substantial and significant change is required in the surgical technique, additional training and a new set of skills and abilities, all accompanied by a new learning curve, which is to some extent much shorter than with open surgery, laparoscopic surgery or other techniques used (Ballantyne, 2002). International literature and national experience, supports the idea that there is a learning curve for mandatory separately; even in the hands of the most skilled laparoscopic surgeons and experienced. It is estimated that it requires at least 5 to a maximum of 20 cases of the same surgical technique to achieve a basic level (this level is measured by the operating time in general, and movements and apticas skills) for the use of each of the robotic systems. Surgeons begin to perform Robotic Surgery are required to submit to a training program using simulator in which a certain number of hours before surgery planning are made, taking into account the anatomy of the region to be addressed always individualizing each case in particular. The implementation of the embodiment the same surgical procedure a number of times, it is recommended to improve the art; since there are substantial changes in the techniques known and used; Also, with this there is an improvement in the skills of the surgeon apticas start this new experiencia (Giulianotti *et al.,* 2003). In our experience it has worked to make a Robotic Surgery Committee which is responsible for analyzing each of the cases of patients who will undergo robotic surgery. Another function is to accept, authorize and supervise training and the first steps of the robotic surgeon. To perform the surgeries, we have classified into Basic and Advanced, and surgeons have classified the new and experienced; and with this we can clearly define that each surgeon perform surgery in order to achieve the greatest benefit to obtain the patient, the surgeon and the institution. Commonly completion of only a number of operations (5 to 10) under observation by a supervisor or Proctor is required; the latter is often a colleague of the same specialty and certified to evaluate the new Robotic Surgeon; this could be biased since, could not give a bad rating surgeons evaluated, likewise, there is no uniform on individual aspects of evaluating a Proctor for an operation or what is required to "pass" standard assessment in this case the trading house to send a representative despite having no interference with medical issues or issues surgical technique, serves as auditor to try to make more standardized assessment Robotic Surgeon Novato, ultimately; Given the current literature on the learning curves in robotic surgery, there may be considerable and highly variable between accreditation and surgical competence difference. This gap has ethical consequences that affect the commitment of care drugs | Surgical SANITARY -The modern and contemporary culture of patient safety (Taylor *et al.,* 1997; Lavery *et al.,* 2011; Nikiteas *et al.,* 2011; Menon *et al.,* 2002; Haseebuddin *et al.,* 2010; Ou *et al.,* 2010; Herrell; Tewari *et al.,* 2012). In our institution and particular way and supported by the Committee of Robotic Surgery, has been put as perform 15 to 20 procedures a rule, there is an external Proctor and an experienced surgeon assistant, this in order to minimize bias that could occur as mentioned above. As for the consideration of performing 15 or 20 procedures, determined in accordance with the decision of the Committee itself Robotic Surgery Institution, by experienced surgeons who make, according to the skills and competencies of each surgeon Novato training.

Basic knowledge in Techniques and Advanced Laparoscopy: Robotic Surgery currently is accompanied by knowledge of the anatomy of the abdominal wall for access by using trocars and insufflation of Co2 and laparoscopic physiology by the use of gas handling equipment electrosurgery, and recognition of complications own each and every one of the above procedures and finally, knowledge of treatments to solve in the best way and using the best technique; complications that may occur during surgery or after this. Surgeons with Robotic Training should be aware and be prepared to master basic laparoscopic techniques to access, use of insufflation needle Veress or by Hasson technique or using point Palmer and own changes at the level pulmonary, cardiac, renal and vascular occurring with increased intraabdominal pressure and by the different positions of the patient and unique complications that accompany Laparoscopic Surgery. Therefore, understanding possible deleterious effects, changes in the patient's condition

and constant communication of these changes from the top of the console with the team is an important principle of security. Access techniques pneumoperitoneum, the trocar placement and the correct position during a trocar placement, are an important and necessary part of the learning curve for surgeons; that is why the domain of Basic and Advanced Laparoscopic Surgery is required.

Complications and adverse events: The reported incidence of adverse events in large series Robotic Surgery is 2% to 15%, and although this effect is not significantly different laparoscopic or open techniques even question the results. As mentioned pneumoperitoneum drives physiological responses in most organs, including the kidney, lung, and the cardiovascular system. These basic physiological changes may not be as obvious for robotic surgeon sitting at the console, it is why we must be in constant communication with the Department of Anesthesiology and Assistant. The robotic surgeon must have extensive knowledge of electrosurgery equipment, the use of bipolar and monopolar energy and sealants vessels and complications that can arise during use, in order to solve in the best way these complications (Stoianovici *et al.,* 2002; Galvani *et al.,* 2005).

Patient selection: The selection of appropriate cases for robotic surgery is essential to maximize the outcome of the surgical technique applied to the patient and minimize the chances of preventable complications. This is especially true during the initial learning curve, since this may be influenced by appropriate selection of patients and the degree of operational complexity. Patients with significant comorbidities, medical or surgical complex problems, extreme obesity or malnutrition may be less able to compensate for the prolonged surgical times experienced during the learning curve. Proper progression of selection of cases and complexity, coupled with the experience of the surgeon, it is essential to improve outcomes, minimize damage and minimize avoidable complications and conversions, however, despite these screening protocols, it is common it is mentioned that the complications that can arise are due to the use of the robot. That is why it is essential to make a proper selection, the institutional protocol attached in close communication with the Anesthesiology and Nursing, not put Robotic Surgery as a scapegoat for surgical complications occurred. For example, injury during dissection of the surrounding structures to target due to difficulties in the anatomy. This type of situation can occur in any type of surgery and risks in all operations, Open, Laparoscopic, scheduled and emergency and not only for being Robotic Surgery; In fact, the risk of complications goes hand in hand with patient risk factors and pathology itself by the surgical procedure was performed. twenty-one. Lengthy operating times may occur in any surgery regardless of the technique used, the morbid factors of the patient and the surgical technique performed. Conversion to another form, ie Robotics to Laparoscopic and Laparoscopic to Open may also not necessarily prevent complications and difficulties approach in performing surgery. The surgeon's experience and theoretical, clinical and technical guidance do not necessarily prevent complications in case of difficulties; what helps is experience in solving and making the best decision to make or modify the surgical technique, in order to obtain the best possible result. When necessary for safety reasons, the conversion of Robotic Surgery for laparoscopy or laparotomy should be encouraged by the group of Robotic Surgery, the medical institution without being punitive and be acceptable to the surgeon, the patient and the surgical team to keep before all patient safety. Conversion to other surgical or completely abort mode surgery may be necessary at any time, any type of surgery and in any type of approach, and even with a surgeon with extensive experience; such an event should not be seen as a complication and the surgeon should explain, before surgery, this patient possibility of the broadest and simplest way possible. During robotic surgery, especially in the initial learning curve, the surgeon Novato and operating team must continually assess surgical time, blood loss, and progression in the difficulty of each case and consider an alternative approach if necessary, for planning prior to surgery. Informed consent must clearly communicate the possibility of conversion to another mode. It is equally important that such conversion is acceptable in the organization (in culture, in material equipment and staffing needed for the transition to another technique), as well as ask for and receive help from colleagues in a timely manner and professional (Müller-Stitch *et al.,* 2007; Horgan *et al.,* 2005; Dunn *et al.,* 2013; Tieu *et al.,* 2013; Giulianotti *et al.,* 2010 & 2011; Kwak *et al.,* 2011). Industry representatives or commercial houses may be present to ensure that equipment is functional, but are not able to influence medical or surgical decisions. Representatives of industry Robotic Surgery and equipment suppliers ensure that the system and the robotic equipment operate as intended, they can troubleshoot the hardware, software and system patient interface, all from a technical point of view and no doctor. From a medical, surgical, and ethical position, they are not present to provide specific advice on surgical decision making. These representatives are not trained in surgical principles and its role is not analogous to a nurse or surgical technician. If expert advice or guidance is needed, the surgeon must consult a colleague or Proctor. The presence of representative industry should be transparent to the institution and the patient, and their actions must be linked to aid in operational support team. As our experience with this technology increases, training issues must evolve and ethical principles should remain the main thing to accomplish (Marx, 2001; Larson *et al.,* 2014).

MATERIAL AND METHODS

This work was done in belonging to the Ministry of the Navy of Mexico in coordination with the General Hospital Manuel Gea González with the use of the system if Naval Medical Center. System use only Xi was in Naval Medical Center. Da Vinci Robotic Systems Da Vinci Si and Xi were used. The study was prospective were collected and analyzed data from the database obtained from June 2016 to June 2018 patients undergoing Robotic Surgery in General Surgery. The data were taken into account, the type of surgery, and transsurgical and postsurgical complications. All of the above according to the database made in the service of General Surgery. The procedures were considered generally reported in a table (Table 1) the procedure performed, the salient findings, complications and the solution of such complications.

Patient Position: In the system if the patient's position was American. The pneumoperitoneum was through Veress needle pressure was 12 mmHg handled. the first trocar was the optical laparoscopic 10-12 mm, it was placed the camera laparoscope 360 is made immediately after the patient's position which was always at 30 ° Fowler or head above in the procedures performed in is performed two upper quadrants. The position in the two procedures was lower quadrants of 30° in Trendelenburg or upside down.

Table. 1. the number of surgeries are presented by Surgical Procedure

Process	Do not.	Findings (Highlights)	Complication	Solution
Nissen fundoplication: Repair Hiatus Fundoplication with Fundupexia	30 Twenty fifteen	14 Hiatuses Laxos 04.06 cms 14 Giant hiatal hernias> 6 cm	stricture	endoscopic dilatation is performed and Corrected
Robotic Surgery Review. to. Nissen fundoplication. b. Inguinal hernia repair with mesh placement. Robotic Surgery "Multitarget" to. Fundoplication Cholecystectomy more b. Bilateral inguinal hernia repair cholecystomy	6 3 3 8 7 one	1 hiatal hernia Giant 10 cm with fundoplication and intrathoracic stomach 1 Fundoplication dismantled with Pexia Pilar law. 1 stenosis with endoscopic dilations you are previous	Any	Any
Vertical gastrectomy in Manga	14	Any	Any	Any
Gastric bypass "Y" de Roux	4	1 hiatal hernia Giant 10 cm	1 Stenosis jejunum jejunum after 7 days	Laparoscopy review is performed and resolves
Heller myotomy to. Dor fundoplication b. Toupet fundoplication	4 one 3	1 Acalasia with intense Periesofagitis.	1 Stenosis two months myotomy surgery	It resolved with new laparoscopic myotomy
Inguinal hernia repair with mesh placement	16	Inguinal Hernia 1 scrotal left with sigmoid	Any	Any
Cholecystectomy	9	2 cholecystitis subacute 3 acute cholecystitis		
Repair Biliary Liver Biopsy	two one	1 Injury Right hepatic duct 1 without confluence	Any	Any

Then the rest of the trocars were placed under direct vision. Xi in the first trocar system is robotic and optical, is inserted through the navel with modified Hasson technique, the trocars are 8mm, the trocar laparoscopic helper is 10-12mm, in the rest of the steps, is with the same technique except that all are robotic trocars used. A prospective, observational and descriptive study. Descriptive statistics was used and according to the measurement unit of each of the variables. database obtained while performing surgery General Surgery June 2016 to June 2018. Importantly June 2016 to 10 November 2017 the Da Vinci Si System was used in the General Hospital Manuel Gea González took and on 17 November 2017 15 June 2018 Xi and the robotic system was used installed and running at the Naval Medical Center. Patients undergoing surgery were evaluated in accordance with the protocols that are performed in the hospital according to the quality standards established by the General Health Council. All patients were operated at the General Hospital Manuel Gea Gonzalez Da Vinci SI system were evaluated prior to the procedure for service of Anesthesiology, Internal Medicine. In patients it was necessary, assessed by the services of geriatrics and cardiology, completing the protocol according to the suggestions of the latter. The protocol was conducted at the Naval Medical Center this in order that the patient was as safe as possible and try to reduce to a minimum the risk of complications. Patients undergoing surgical procedure at the Naval Medical Center in Da Vinci Xi system were notarized according to the processes of Hospital Insurance Certificate and in accordance with the General Health Council.

RESULTS

With the da Vinci robotic system 134 procedures were performed in 64 patients General Surgery. With the Da Vinci Robotic System Yes June 2016 to 10 November 2017 at the General Hospital Manuel Gea González; with Xi Da Vinci Robotic System, 17 November 2017 15 June 2018 at the Naval Medical Center. Si system was used in the General Hospital Manuel Gea González in 34 patients; in 30 patients Xi Robotic System was used at the Naval Medical Center.

The procedures performed were:

Fundoplications 30
Repair Hiato 20
Fundoplication with Fundupexia 15
Heller myotomy 4
Toupet fundoplication 3
Dor fundoplication 1
Cholecystectomy 9
Biliary repair with "Y" de Roux 2
Liver Biopsy 1
Vertical gastrectomy in Manga 14
Gastric Bypass with "Y" de Roux 4
Inguinal hernia repair with mesh placement 16
Robotic Surgery Revision 6
Nissen fundoplication 3
Inguinal plasties mesh placement 3
Robotic Surgery "Multitarget" 8
Fundoplication more Cholecystectomy 7
Bilateral inguinal hernia repair cholecystomy 1

These surgeries are those reported by national and international literature as general surgery procedures in the technical and theoretical scope of the Surgeon General with specialty in Laparoscopy and they have accredited Certification Robotic Surgery. Complications presented were postsurgical. The first complication was with Si, stenosis of the "Y" de Roux, a gastric bypass, which was filed 14 days after surgery was resolved laparoscopically with the dismantling and reconstruction of the intestinal anastomosis system. The second complication was the system Xi was stenosis Nissen fundoplication with Giant hiatal hernia, it appeared 2 months after surgery, this was resolved endoscopically with balloon dilation. The third complication, and last in this report was the system Xi, this stenosis Heller myotomy in a patient with idiopathic rheumatic disease was treated three months this stricture was presented after surgery, it was resolved laparoscopically, According to our number of patients overall complications account for 4.9%. If we see complications for each procedure performed represent 2.2%.

Conclusion

According to the analysis of our database and comparing the results with national and international literature; we can say that the number of procedures performed in each of the robotic systems we are in an excellent position in the field of robotic surgery, general surgery as it is. General Surgery with

experience and already complying with the relevant certifications in both robotic systems we can make objective judgments about the use of the robot in Mexico, since there is an institution that presents the experience we have gained and we are buying, though it is too quick to make guesses; you need to get more experience and have a broader view of this new discipline of surgery. Xi acquisition system by the Secretary of the Navy of Mexico; being the first of its kind nationwide, we position ourselves even higher on experience and development of Robotic Surgery. It should be noted in each of our reports, quality and safety in the health care system is expensive, as it must invest in human resources and infrastructure, the beginning is bumpy and tortuous; but as it progresses it learns that it is necessary to do everything possible to not stop and go setting short- and medium-term, as currently delays in 5 or 6 years can be an eternity. 40 years ago nobody could imagine that the gold standard for cholecystectomy and fundoplication would laparoscopic surgery or the use of staplers would be a safer option than any other method in the anastomosis, or even more; that in oncological surgery Laparoscopy could be used. So then even in our country it is too early to pass judgment on Robotic Surgery since as mentioned this document: "This is just the beginning"

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