



## CIRUGÍA ESPAÑOLA

[www.elsevier.es/cirugia](http://www.elsevier.es/cirugia)


## Original article

# Crossing borders to change lives: Surgical mission amidst the COVID-19 pandemic



Hazim Hakmi<sup>a</sup>, Johnny Moreno<sup>b</sup>, Patrizio Petrone<sup>a,\*</sup>, Amir H. Sohail<sup>a</sup>, Galo Burbano<sup>b</sup>, Samer Sbayi<sup>c</sup>

<sup>a</sup> NYU Langone Hospital—Long Island, Mineola, New York, USA

<sup>b</sup> Centro Clínico Quirúrgico Ambulatorio “Blanca’s House Ecuador - Hospital del Día”, Guayaquil, Ecuador

<sup>c</sup> Stony Brook University Hospital, Stony Brook, New York, USA

## ARTICLE INFO

## Article history:

Received 25 May 2022

Accepted 15 October 2022

## Keywords:

COVID-19

Elective global surgery

Surgical mission

## A B S T R A C T

**Introduction:** During the COVID pandemic, elective global surgical missions were temporarily halted for the safety of patients and travelling healthcare providers. We discuss our experience during our first surgical mission amidst the pandemic. We report a safe and successful treatment of the patients, detailing our precautionary steps and outcomes.

**Methods:** Retrospective manual chart review and data collection of patients' charts was conducted after IRB approval. We entail our experience and safety steps followed during screening, operating and postoperative care to minimize exposure and improve outcomes during a surgical mission in an outpatient setting during the pandemic. The surgical mission was from February 8 to February 12, 2022.

**Results:** A total of 60 patients who were screened. 33 patients underwent surgical intervention. One patient required postoperative hospitalization for a biliary duct leak. No patient or healthcare provider tested positive for COVID at the end of the mission. The average age of patients was 46.9 years. The average operative time was 116 min, and all patients had local nerve blocks. It included 45 health work providers.

**Conclusions:** It is safe to perform outpatient international surgery during the pandemic while following pre-selected precautions.

© 2022 Published by Elsevier España, S.L.U. on behalf of AEC.

DOI of original article: <https://doi.org/10.1016/j.ciresp.2022.10.014>

\* Corresponding author at: Department of Surgery, NYU Langone Hospital—Long Island, 222 Station Plaza North, Suite 300, Mineola, New York 11501, USA.

E-mail address: [patrizio.petrone@nyulangone.org](mailto:patrizio.petrone@nyulangone.org) (P. Petrone).

<https://doi.org/10.1016/j.ciresp.2022.10.014>

0009-739X/© 2022 Published by Elsevier España, S.L.U. on behalf of AEC.

## Cruzando fronteras para cambiar vidas: Misión quirúrgica durante la pandemia de COVID-19

### R E S U M E N

Palabras clave:

COVID-19

Cirugía global electiva

Misión quirúrgica

**Introducción:** Durante la pandemia de COVID, las misiones quirúrgicas globales electivas se detuvieron temporalmente por la seguridad de los pacientes y los proveedores de atención médica que viajaban. En el presente trabajo presentamos nuestra experiencia durante la primera misión quirúrgica en medio de la pandemia. Reportamos el tratamiento seguro y exitoso de los pacientes, detallando nuestros pasos de precaución y resultados.

**Métodos:** Luego de obtener la aprobación del IRB, se realizó la revisión manual retrospectiva de las historias clínicas y la recopilación de datos de las historias clínicas de los pacientes. Exponemos nuestra experiencia y los pasos de seguridad seguidos durante la detección, la operación y la atención posoperatoria para minimizar la exposición y mejorar los resultados durante una misión quirúrgica en un entorno ambulatorio durante la pandemia. La misión quirúrgica fue del 8 al 12 de febrero de 2022.

**Resultados:** Un total de 60 pacientes fueron tamizados. De ellos, 33 pacientes fueron intervenidos quirúrgicamente. Un paciente requirió hospitalización postoperatoria por una fuga del conducto biliar. Ningún paciente o proveedor de atención médica dio positivo por COVID al final de la misión. La edad media de los pacientes fue de 46,9 años. El tiempo operatorio promedio fue de 116 min, y todos los pacientes tuvieron bloqueos nerviosos locales. Participaron 45 proveedores de trabajo de salud.

**Conclusiones:** Es seguro realizar una cirugía internacional ambulatoria durante la pandemia siguiendo las precauciones preseleccionadas.

© 2022 Publicado por Elsevier España, S.L.U. en nombre de AEC.

## Introduction

The spread of COVID-19 (Coronavirus Disease 2019) has considerably impacted and overwhelmed the healthcare system, halting elective global surgical initiatives due to the highly infectious and morbid impact of the virus. The risk of transmitting COVID-19 in flight is estimated to be 1 per 1.7 million travelers<sup>1</sup>. With that low transmission rate, efforts to mitigate transmission of the virus, other than particulate air filtration and social distancing, routine pre-travel testing for asymptomatic patients has shown in simulated studies to be effective in reducing passenger risk of infection<sup>2</sup>.

Inguinal hernias are reported by the United Nations International Children's Emergency Fund to be the fourth leading cause of morbidity among male discharges in the Americas<sup>3</sup>. More than 75% of the general population in Ecuador are covered only by the overwhelmed Ministry of Health system to undergo surgical interventions, thus, many of the underprivileged patients live with decades of pain due to chronic cholecystitis and growing hernias<sup>4</sup>. In our experience, many of the patients we operated on presented with chronic cholecystitis pending surgical intervention. We aimed to share our experience and review the outcomes of global elective surgical procedures during the pandemic in the ambulatory setting.

## Methods

This study was approved by the Institutional Review Board for data collection and publication. We retrospectively reviewed

and collected data from patients who attended the Centro Clínico Quirúrgico Ambulatorio “Blanca's House Ecuador Hospital del Día” from February 8, 2022 to February 12, 2022. We collected data pertaining to demographics, procedure types, vaccination status, booster status, prior COVID infection, comorbidities, type of anesthesia administered, block type, operative time, follow-up, and complications.

We organized a surgical mission with two surgeons, five anesthesia providers, a surgical resident, two physician assistants, a nurse practitioner, four nurses, and two surgical technicians. We operated in a clinic that was recently renovated to accommodate two operating rooms. All the surgical instruments were disinfected with glutaraldehyde (Cidex®). The plan was to operate for half a day on the day of arrival, allowing staff to get accustomed to the new setting and the available equipment. The teams operated the first day for 8 h, the 2nd–5th days the teams operated for 12 h, and the 6th and final day for 8 h. The postoperative follow-up was carried out by the surgical team in Ecuador's Centro Clínico Quirúrgico Ambulatorio “Blanca's House Ecuador Hospital del Día”. All patients were evaluated within two to three weeks from their procedures.

All staff members were required to be vaccinated and to have received a booster dose prior to travel. They were also required to obtain RT-PCR (Reverse Transcription-Polymerase Chain Reaction) COVID testing within two days from the departure to meet travel requirements. Staff were also asked about COVID symptoms prior to travelling and at the arrival destination.

Learning from our experience in the United States, with the increased use of telehealth as a mean to assess new patients and follow ups during the pandemic, our team carried

**Table 1 – Demographics and procedures.**

Demographics	n
Vaccinated patients	31
Patients with booster	12
Prior COVID	10
Age, mean	46
Female	25
Body Mass Index, mean	27.6
Diabetes mellitus	4
Hypertension	7
Smoking	11
Alcohol	13
Procedures and outcomes*	n
Umbilical hernia repair	10
Inguinal hernia repair	5
Femoral hernia repair	1
Ventral/epigastric/incisional hernia repair	3
Laparoscopic cholecystectomies**	24
Complications***	4

\* Several patients had more than one diagnosis and underwent more than one procedure.  
 \*\* Due to cholelithiasis and/or cholecystitis.  
 \*\*\* Three inflammations on umbilical area requiring antibiotics and one biliary leak requiring ERCP and stenting.

telehealth consultations via an online video conference platform to screen all the patients<sup>5</sup>. Prior to the telehealth consultation, the patients were assessed and triaged by the local surgical team in Ecuador. Lowering exposure to both patients and health staff. Both an anesthesiologist and surgeon evaluated the patients, along with a Spanish speaking interpreter.

The goal of preoperative COVID testing in asymptomatic patients is to detect viral ribonucleic acid in the pre-symptomatic phase. Preoperative testing is important and cost effective in areas with high prevalence of infected patients to recognize COVID positive patients and to limit exposure to the staff and other patients<sup>6</sup>. During our visit, the Omicron variant had a high prevalence in Ecuador, necessitating COVID testing.

Querying patients for COVID-19 symptoms could be unreliable, as some patients have been waiting for the surgical opportunity for months/years and would not declare symptoms for the sake of undergoing the surgical intervention. Thus, all patients underwent RT-PCR COVID testing 2 days prior to surgery and were excluded if they had positive results, keeping in mind the limitation of RT-PCR with a sensitivity rate of 70% in diagnosing COVID-19. As an extra precautionary step, patients also underwent rapid IgG/IgM (Immunoglobulin G/Immunoglobulin M) testing the day of surgery. In our experience the initial RT-PCR test was useful to exclude patients who tested positive whether symptomatic or not.

It is important to note that we forwent IgG/IgM testing later during the mission, as two patients had positive antibody testing the day of surgery but had negative RT-PCR testing 2 days prior and had no signs of COVID-19 on exam. We elected to use RT-PCR as the sole reliable test along with physical exam to help exclude patients.

Commuting included a hotel van service transporting the healthcare providers from the hotel to the clinic and back, reducing exposure during the mission.

A hotel was chosen as the site of stay, as the hotel rooms could have been utilized for quarantine in case of COVID exposure, evidence of symptomatic COVID-19, or positive COVID-19 RT-PCR testing.

One family member was allowed to escort the patient to the hospital. As this was elective outpatient surgery, the patients were overall healthy and didn't need aid with ambulation.

Families got in touch with the patients via telephone and once the patients were stable for discharge (after a night's sleep in the medical center), the family would be waiting outside the center in a waiting area to receive their family members. The exception was for kids, one parent would be allowed to accompany the child to the operating room and then would wait outside until after the procedure where they would be allowed to be at bedside in the recovery room.

### Statistical analysis

A statistical analysis has not been performed in this manuscript due to its nature, in which the correct design

**Table 2 – Types of surgery performed and reasons of cancellation.**

Patients screened (n)	Patients undergoing surgery (n)	Hernias repaired (n)	Cholecystectomies (n)	Cases cancelled (n)	Reason for cancellation	
60	33	20	23	27	BMI > 40	13
					COVID positive	7
					Prior extensive abdominal surgery	4
					Acute appendicitis	2
					Complicated gallbladder	1

**Table 3 – Estimated sum of resources and procedures donated (in US dollars).**

Workdays	Estimated sum of surgical procedures donated	Estimated sum of anesthesia donated	Estimated sum of medications donated	Estimated sum of manpower	Miscellaneous	Total estimated sum of services donated
6	\$551,500	\$120,400	\$100,000	\$180,000	\$101,600	\$1,053,500

and the follow-up of pre-established guidelines for the prevention of COVID-19 during a surgical mission amidst the pandemic are mainly discussed.

## Results

A total of 60 patients were screened preoperatively, 33 of which underwent surgery (14 laparoscopic cholecystectomies, 9 laparoscopic cholecystectomies along with umbilical hernia repair, and 10 open hernia repairs).

Two of the 33 patients undergoing surgery had not received COVID vaccination. Type of vaccination and booster status, and comorbidities and demographics including age, sex, comorbidities, and social history are included in [Table 1](#).

One patient required hospitalization after discharge from our ambulatory center, requiring ERCP (Endoscopic Retrograde Cholangio-Pancreatography) and stent placement for a bile leak. Otherwise, three patients had incisional inflammatory/infectious changes requiring a repeat course of antibiotics.

In [Table 2](#) is shown the types of procedures performed in total and the numbers of excluded patients and reason for exclusion. Body Mass Index (BMI) greater than 40 and COVID-19 positive test were the two most common causes for surgical exclusion during patient screening. [Table 3](#) highlights the estimated sum of monetary donated resources and services in US dollars if the procedures were to be performed in the United States.

Following the mission's protocols and precautions, none of the travelling healthcare providers tested positive for COVID, neither did the staff nor patients in Ecuador. Our workforce included 45 healthcare workers. None of the providers had COVID symptoms immediately prior to the mission.

All the cholecystectomies during our mission were performed laparoscopically and all hernias were repaired via open approach. Either mesh or sutures were used to repair the hernias, depending on defect size and BMI of the patients. All the procedures were done under general anesthesia along with either a Transversus Abdominis Plane block or an inguinal block using bupivacaine.

Staff were required to wear surgical masks in the facility. Staff were not mandated but encouraged to wear N95 masks.

Each surgeon operated with either another surgeon, surgical resident or physician assistant. Medical students were encouraged to observe and learn during the surgery.

Interestingly, none of the patients received narcotics postoperatively, which coincides with the same findings Leon Herszage published in 2004, where all patients ambulated immediately after surgery and had no issues with pain control<sup>7</sup>. Acetaminophen and ibuprofen were used for pain control in the recovery room and after discharge. All patients received prophylactic antibiotics in the recovery room and on discharge for seven days.

From prior experience, some patients were lost to follow-up after surgery as they came from rural areas, thus all patients were admitted overnight in the clinic and were examined by the surgical team before discharge. Patients were also seen within two to three weeks postoperatively for follow-up, this was achieved by having patients undergo a clinical assessment at the clinic in Ecuador and through telehealth

consultations. None of the patients had complications immediately postoperatively and only one patient had a complication after discharge, where he developed a cystic duct leak requiring ERCP and stenting.

Surgical services provided by internationally travelling healthcare providers in the form of surgical mission trips to underserved communities might represent a cost-effective and viable option for communities with unmet surgical needs of their populations<sup>8</sup>. If those procedure were to be performed in the United States, the total estimated sum of services would sum up to about \$1 million as detailed in [Table 3](#).

## Discussion

The pandemic placed a cog in the wheel of global surgery. The rapidly instituted travel and safety restrictions made international travel difficult. Travel restrictions on health care providers by healthcare institutions hindered the organization of surgical missions during the pandemic. Most elective surgeries were paused in highly populated cities during the height of the pandemic<sup>9</sup>. Global surgical missions were paused for a longer period due to the pandemic.

Resource-poor countries with baseline difficult patient access to surgical services during the pandemic were overwhelmed with symptomatic COVID patients. An overwhelmed system along with initial unknown operative outcomes in COVID positive patients lead to a transient suspension of elective surgery, prolonging the surgical wait time and queue for an elective procedure, particularly in low-income countries.

As surgeries were resumed during the pandemic, data showed that postponing elective surgery and adopting non-operative management, when reasonable, should be considered in COVID positive patients, especially in elderly males<sup>10,11</sup>.

After a two-year interruption to our surgical missions, we resumed our 20-year long history of surgical missions in early 2022 with recent alleviation of travel restrictions.

In January 2022 the American College of Surgeons stated that "Maintaining access to surgery is an essential part of quality patient care, whether the surgery is needed to cure a medical condition, address infirmity, extend life or contribute to patient well-being". Once making the correct adjustments on surgical services based on local case incidence, ongoing testing of staff and patients, aggressive use of appropriate personal protective equipment and physical distancing practices are required<sup>12</sup>. Elective surgical procedures such as laparoscopic cholecystectomy and hernia repairs during the pandemic can potentially have improved outcomes by having a COVID-19 oriented protocol regarding travel and patient screening. During our process we set up a protocol to set a course of action when there are patients who test positive for COVID-19, with set transportation, postoperative care and follow-up.

We conclude that global elective surgery during the COVID pandemic is safe with good patient outcomes. Early pre-set guidelines for the mission and staff could allow for a harmless experience.

## Conflict of interest

The authors have no conflict of interests to declare.

## REFERENCES

1. Pang JK, Jones SP, Waite LL, Olson NA, Armstrong JW, Atmur RJ, et al. Probability and estimated risk of SARS-CoV-2 transmission in the air travel system. *Travel Med Infect Dis.* 2021;43:102133. <http://dx.doi.org/10.1016/j.tmaid.2021.102133>.
2. Kiang MV, Chin ET, Huynh BQ, Chapman LAC, Rodríguez-Barraquer I, Greenhouse B, et al. Routine asymptomatic testing strategies for airline travel during the COVID-19 pandemic: a simulation study. *Lancet Infect Dis.* 2021;21(7):929–38. [http://dx.doi.org/10.1016/S1473-3099\(21\)00134-1](http://dx.doi.org/10.1016/S1473-3099(21)00134-1).
3. PAHO (2008) Indicadores básicos de salud 2008, Quito, Ecuador, INEC, UNFPA, UNICEF, PAHO.
4. Chelala C. Bringing surgery to the rural areas of Ecuador. *Lancet.* 1998;352(9129):715. [http://dx.doi.org/10.1016/S0140-6736\(05\)60837-9](http://dx.doi.org/10.1016/S0140-6736(05)60837-9).
5. Chao GF, Li KY, Zhu Z, McCullough J, Thompson M, Claflin J, et al. Use of telehealth by surgical specialties during the COVID-19 pandemic. *JAMA Surg.* 2021;156(7):620–6. <http://dx.doi.org/10.1001/jamasurg.2021.0979>.
6. Villa J, Pannu T, McWilliams C, Kizer C, Rosenthal R, Higuera C, et al. Results of preoperative screening for COVID-19 correlate with the incidence of infection in the general population—a tertiary care experience. *Hosp Pract (1995).* 2021;49(3):216–20. <http://dx.doi.org/10.1080/21548331.2021.1898158>.
7. Herszage L. Hernia surgery in the South American woodlands: a surgical adventure in Argentina. *Hernia.* 2004;8(4):306–10. <http://dx.doi.org/10.1007/s10029-004-0253-2>.
8. Gyedu A, Gaskill C, Boakye G, Abantanga F. Cost-effectiveness of a locally organized surgical outreach mission: making a case for strengthening local non-governmental organizations. *World J Surg.* 2017;41(12):3074–82. <http://dx.doi.org/10.1007/s00268-017-4131-3>.
9. COVIDSurg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. *Br J Surg.* 2020;107(11):1440–9. <http://dx.doi.org/10.1002/bjs.11746>.
10. COVIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet.* 2020;396(10243):27–38. [http://dx.doi.org/10.1016/S0140-6736\(20\)31182-X](http://dx.doi.org/10.1016/S0140-6736(20)31182-X).
11. COVIDSurg Collaborative. Outcomes and their state-level variation in patients undergoing surgery with perioperative SARS-CoV-2 infection in the USA: a prospective multicenter study. *Ann Surg.* 2022;275(2):247–51. <http://dx.doi.org/10.1097/SLA.0000000000005310>.
12. American College of Surgeons. American College of Surgeons Recommendations Concerning Surgery Amid the COVID-19 Pandemic Resurgence. American College of Surgeons website. October 27, 2020. Accessed January 24, 2022. <https://www.facs.org/covid-19/clinic>.