



## Infanta Elena University Hospital General and Gastrointestinal Surgery Performed in “COVID-Free” Hospitals during the Sars-Cov-2 Pandemic

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### Abstract

During the worldwide pandemic caused by the SARS-CoV-2 virus, the magnitude of which has exceeded the capacity of our hospitals, we have had to adapt our facilities to provide comprehensive care for patients with COVID-19. In accordance with guidelines published periodically throughout the pandemic, general surgeons have had to limit our activity to urgent surgeries and interventions that cannot be postponed. Furthermore, we have had to adopt extraordinary measures to reduce the rate of infection among patients and health-care professionals and limit infection-related postoperative complications, thus prompting us to cancel or delay surgical treatment for all other diseases. Within this scenario, our institution, Infanta Elena University Hospital, was able to refer patients scheduled for non-deferrable surgery or interventions to treat cancer to hospitals that were free of SARS-CoV-2. Over a 4-week period, a select team of surgeons performed endocrine and colorectal surgery for 5 days, based on the guidelines available at the time and the risk of morbidity and mortality. An on-call scheme was in place and ward rounds were held until the last patient was discharged; meanwhile, all other surgeons provided COVID-19 support in the main hospital. All patients were screened for epidemiologic risk factors. Eight (8) surgical procedures were carried out in adherence with periodically published recommendations. All patients were free of SARS-CoV-2 infection at discharge and as such presented no added morbidity or mortality resulting from the pandemic. Current improvements in the epidemiologic situation are allowing us to gradually resume care delivery in the home institution; given the uncertain development of the pandemic and in light of our experience, we believe that performing surgery in COVID-free hospitals is a safe option and one that may be emulated elsewhere.

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Received Date: 25 Jul 2020

Accepted Date: 21 Aug 2020

Published Date: 25 Aug 2020

#### Citation:

Sánchez de Molina Rampérez ML, Jiménez de los Galanes Marchán SF, Pacheco Martínez PA, Alonso Murillo L, De la Fuente Bartolome MB, García Vasquez C, et al. Infanta Elena University Hospital General and Gastrointestinal Surgery Performed in “COVID-Free” Hospitals during the Sars-Cov-2 Pandemic. *World J Surg Surgical Res.* 2020; 3: 1246.

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### Introduction

Due to the ongoing pandemic caused by the SARS-CoV-2 virus, the magnitude of which has exceeded the capacity of our hospitals, we have needed to adapt our facilities to provide comprehensive patient care. General surgeons have had to limit activity to urgent surgeries and interventions that cannot be postponed, in accordance with guidelines published. Furthermore, we have had to adopt extraordinary measures to reduce the rate of infection among patients and health-care professionals and limit postoperative complications.

Meanwhile, our institution, Infanta Elena University Hospital (IEUH), was in Scenario 5 of the pandemic [1], as over 75% of inpatient and Intensive Care Unit (ICU) beds were occupied by patients with SARS-CoV-2 infection, thus compromising key hospital resources such as staff, ICU beds, Operating Room (OR) resources, and respirator availability. Surgical activity was restricted to urgent procedures following triage in accordance with the guidelines of the ethics committee; all other procedures were referred to other, “clean” or “COVID-free” hospitals in accordance with the recommendations of the Spanish Association of Surgeons [2].

### Materials and Methods

As of the time of writing, IEUH has been in Scenario V for 4 weeks, during which time the surgeons of the department have performed 5 days of surgical activity in the “COVID-free” hospital as well as daily rounds and on-call shifts.

Endocrine surgical procedures were referred in accordance with the suggestions of the

European Society of Endocrine Surgeons (ESSES) in Appendix 1 [3]; the same was the case with surgery for colorectal surgery for cancer, as per the indications of the American College of Surgeons (Appendix 2) [4] and the Spanish Association of Surgeons. Applying these criteria, 8 patients were selected. We excluded patients with advanced age, serious comorbidity, or those who declined surgical intervention under these exceptional conditions; the latter assumed the consequences of pandemic-related treatment delay and provided signed informed refusal. Cancer patients, who were candidates for neoadjuvant chemotherapy were given an additional treatment cycle in accordance with published guidelines [5].

A team of infection-free surgeons was assembled, comprising colorectal surgeons, endocrine surgeons, and the head of the department specializing in surgery of the biliary tract and pancreas. Additionally, a uninfected nurse was included. Participating anesthesiologists and all other care staff belonged to the COVID-free hospital. All other affiliated surgeons carried out different support tasks in combating COVID-19 in the main hospital.

The patients selected were the following:

1. A 45-year-old woman with a symptomatic left thyroid nodule of 4.4 cm (FNAB diagnostic category III) which was growing size. A diagnostic thyroid lobectomy was performed. The patient was discharged 24 h postoperatively without complications.

2. A 48-year-old male patient with a history of hypokalemic periodic paralysis and lower rectal adenocarcinoma (cT2N1) who had completed neoadjuvant chemotherapy on February 5<sup>th</sup>, 2020 and revealed good response to therapy on imaging studies (grade 2). He had undergone abdominal-perineal removal due to the presence of a tumor less than 1 cm from the anal verge. He had sustained an injury to the urethra due to the effect of neoadjuvant chemotherapy, which was repaired intraoperatively. He was discharged with a urinary catheter until urologic evaluation, at which point the catheter was removed. Postoperative paralytic ileus resolved under dietary recommendations, nasogastric tube parenteral nutrition and prokinetics. He was discharged 13 days postoperatively, including 1 day in the ICU.

3. A 46-year-old woman with localized primary hyperparathyroidism and hypercalcemia with approximate calcium levels of 12 mg/dL. She underwent minimally invasive parathyroidectomy and was discharged without incident 24 h postoperatively.

4. A 70-year-old woman with dyslipidemia and hypothyroidism who presented adenocarcinoma of the middle rectum (cT3N1) following neoadjuvant chemotherapy that had concluded on February 26<sup>th</sup>, 2020 and grade-1 or complete response on imaging studies. Laparoscopic resection of the lower anterior rectum was performed with protective ileostomy. She was discharged 5 days postoperatively and developed no complications while under an ERAS protocol; she spent 1 day in the ICU.

5. A 57-year-old male with a thyroid nodule of 5 cm (FNAB diagnostic category IV). Following a diagnostic thyroid lobectomy, she was discharged 24 h postoperatively without complications.

6. A 52-year-old hypertensive man with dyslipidemia and papillary carcinoma of the thyroid with cystic lymph-node metastases. Total thyroidectomy, central bilateral lymphadenectomy, and right lateral lymphadenectomy were performed without incident. He was

discharged on the fourth day postoperatively following 24 h in the ICU, where he developed transient hypoparathyroidism, which had resolved at discharge, with PTH and calcium levels within range.

7. A 21-year-old woman with a right toxic nodular goiter that had responded poorly to drug therapy. Following thyroid lobectomy, she was discharged 24 h postoperatively without incident.

8. An 81-year-old woman with dyslipidemia presenting synchronous adenocarcinoma of the rectosigmoid who had completed neoadjuvant chemotherapy on February 21<sup>st</sup>, 2020 to which she had responded well in the rectum (grade 3) (50% fibrosis) and showed a grade-4 response in the sigmoid colon (fibrosis below 50%). Hartmann's procedure was performed. Concerning comorbidities, she sustained injury to the right ureter, which was encompassed within the tumor; this was repaired intraoperatively, and uncomplicated phlebitis resolved. She was discharged on the seventh day postoperatively pending an outpatient procedure to remove a double-J catheter and urinary catheter. Despite the ERAS protocol, the patient required an additional 2 days of hospitalization for ostomy management and mobility rehabilitation.

All patients completed an epidemiology questionnaire before surgery (Appendix 3) and had a radiologist-interpreted chest X-ray. Patients with suspicious findings on the questionnaire underwent a high-resolution chest CT scan; in the event of continued suspicion, patients received PCR testing for SARS-CoV-2 infection. None of the patients were candidates for preoperative PCR testing. However, patients transferred to the ICU received PCR testing during their stay; all such results were negative [6-8].

Despite the scarcity of published results, studies in China have found an increase of up to 34% in morbidity and mortality due to COVID-19 among cancer patients ( $p=0.0008$ ) [9]. Additionally, infected patients undergoing surgery of the neck showed a 22.5% increase in morbidity and mortality ( $P<0.005$ ), prompting the study authors to advocate for new protocols for the management of these patients [10]. In our study, endocrine surgery was performed without complications, though we discontinued outpatient surgery due to the distance between the hospital and the homes of these patients and the overextended state of the emergency department of their referral hospital due to the influx of COVID-19 patients. All patients scheduled for colorectal surgery were outfitted with a stoma protector or underwent the Hartmann procedure to reduce the likelihood of complications and comorbidities [5].

The approach taken was consistent with the needs of each patient, as recommended in published guidelines; for laparoscopic surgery, however, we used the AirSeal filtering system to prevent the propagation of gases in the OR, which may limit infection [5].

Histopathologic samples were handled in parallel to habitual workflows and were treated as if they were infected.

## Results and Discussion

None of the 8 patients studied was infected with the SARS-CoV-2 virus either within the hospital or while recovering in the home. Thus, we recorded no additional, COVID-19-related morbidity or mortality beyond the conditions described as part of the surgical procedure.

No patients required a second intervention and none died.

Morbidity broken down by patient is as follows: Paralytic ileus in 1

**Table 1:** Noteworthy characteristics of patients referred from the IEUH to the COVID-19-free hospital.

Patient Nº	Age	Subspecialty	Disease	NA	Surgery	ICU admission	Morbidity	SARS-CoV-2 infection
1	45	Endocrinology	Thyroid nodule		Thyroid lobectomy	No	No	No
2	48	Colorectal	Lower rectal cancer	Yes	Abdominoperineal resection of the rectum	Yes	Paralytic ileus Injury to the urethra (urinary catheter)	No
3	46	Endocrinology	Primary hyperparathyroidism with hypercalcemia		Selective parathyroidectomy	No	No	No
4		Colorectal	Adenocarcinoma of the middle rectum	Yes	Low anterior resection + protective ileostomy	Yes	No	No
5	57	Endocrinology	Thyroid nodule		Thyroid lobectomy	No	No	No
6	52	Endocrinology	Papillary carcinoma with cystic lymph-node metastases		Total thyroidectomy + lateral and central-bilateral lymphadenectomy	Yes	Transient hypoparathyroidism	No
7	21	Endocrinology	Toxic nodule		Thyroid lobectomy	No	No	No
8	81	Colorectal	Synchronous cancer of the rectosigmoid	Yes	Low anterior resection Hartmann's procedure	Yes	Repair of injury to the urethra (urinary catheter) Phlebitis	No

patient, 0 urinary infections, 1 phlebitis, transient hypoparathyroidism treated with oral supplements, and prolonged urinary catheter in 2 patients; of the latter, 1 was due to an injury to the urethra and was repaired intraoperatively and 1 was an intraoperatively repaired ureteral injury.

By the end of the surgical intervention program described here, the main hospital had been downgraded to Scenario III [1]; meaning 25% to 50% of inpatient and ICU beds were occupied with COVID-19 patients at the time. At this time, hospital and ED resources were dedicated to patients with respiratory difficulties and other patients, while the ICU and inpatient wards were reserved for patients with SARS-CoV-2 infection. In cancer patients, surgery was limited to those requiring non-delayable treatment within 3 months in order to survive, patients who were not candidates for neoadjuvant chemotherapy to postpone surgery, and operations not requiring lengthy ICU stays or ED visits. Discharged patients were scheduled for an outpatient visit to the primary hospital for follow-up, local treatment, or ostomy care. These patients were further instructed to report to our hospital's ED, where they would receive care as part of disease-free care circuits.

Only 1 patient reported to the ED due to problems with the urinary catheter; this resolved during the visit and he was discharged within a few hours, showing a favorable clinical course.

The main characteristics of our patients are shown in Table 1.

An analysis of comorbidities shows that, as a result of the screening process for risk factors and the fact that care was provided by disease-free staff, our patients were not affected negatively by the disease or any increase in morbidity and mortality. However, the two urologic injuries repaired intraoperatively merit commentary: The cause of these injuries can be linked to the selection of patients with more advanced and aggressive tumors for which previous neoadjuvant chemotherapy had been administered.

Owing to the uncertain and changing course of the pandemic, hospitals and, by extension, general surgeons must adapt our activity to the capacity of the institutions where we work, and therefore we must not lose sight of the possibility of providing patients with "COVID-free" hospital care. Our experience evidences that, in accordance with published guidelines, surgical procedures for cancer and other interventions that cannot be postponed can be performed

safely provided hospitals take the appropriate safety measures to prevent SARS-CoV-2 infection.

## Acknowledgment

We want to thank Hospital Ruber San Camilo and its entire staff who welcomed us and whose efforts contributed to the favorable outcome of our patients. We further wish to thank the Medical Director of the Infanta Elena Hospital and Quirónsalud management for giving us the opportunity to perform surgeries in COVID-free hospitals, from which our patients have undoubtedly benefited in such difficult times. And, of course, special recognition goes to all the health personnel who continue to work in this challenging context, sacrificing their physical and mental health as well as that of their relatives. Words do not do justice to your service.

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