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RESEARCH ARTICLE

LAPAROSCOPIC HERNIA REPAIR DURING COVID TIMES: SHORT-TERM RESULTS FROM A CENTRE OF EXCELLENCE

*Dr. Ganesh Shenoy, K., Dr. Vikram J. Rao and Dr. Ramesh Makam

Department of Minimal Access and Bariatric Surgery, A.V. Hospital, Bangalore

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ABSTRACT

Background: The current COVID (Corona Virus Disease) era has brought out many questions which are still unanswered. Safety regarding treatment of non-COVID ailments has become a major concern. The aim of this study is to present short-term results, to assess the safety and feasibility of Laparoscopic hernia repair in the COVID times. **Patients and Methods:** This is a retrospective study from a prospective data base carried from 25th March 2020 till September 30th 2020. Total of 47 patients underwent laparoscopic hernia repair at our centre and 2 underwent laparoscopic retrieval of infected mesh. A novel technique of smoke evacuation was used during laparoscopic surgeries. **Results:** 44 patients underwent elective surgery & 5 on emergency basis. 16 underwent laparoscopic surgery for groin hernia and 31 for Ventral hernia. 2 patients were operated for mesh infection. 5 patients were tested positive on RT-PCR in the pre-operative evaluation. There was no major intraoperative complications. **Conclusion:** Laparoscopic hernia repair is safe and feasible in the COVID era, provided all the precautions are followed according to the approved guidelines. However, the sample size of our study is small and the follow up of patients is short term.

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INTRODUCTION

The current COVID (Corona Virus Disease) era has brought out many questions which are still unanswered. As our knowledge regarding COVID is evolving, newer recommendations are being framed and updated regularly. The main concern for the patient is how safely can one get treated for non-COVID issues during the current pandemic. Even hospitals are facing the dilemma of triaging with scarce resources in the most efficient way without compromising the safety of patients as well as the medical community. Thus risk versus benefit ratio of any intervention should be weighed accordingly. In laparoscopic surgery, there have been concerns raised about the possible generation of aerosol contaminated with COVID-19 from leaked CO₂ and smoke generation after energy device use.¹ There are limited studies regarding transmission of the virus through the smoke generated during the laparoscopic procedure. While laparoscopic surgery was highly feared at the beginning of the pandemic,¹ the evidence to date does not suggest an increased risk of COVID-19 transmission during laparoscopic surgery when compared to open surgery.^{2,3}

The aim of this study is to present short-term results, to assess the safety and feasibility of Laparoscopic hernia repair in the COVID times. Currently, there is no evidence contraindicating the use of a mesh in a COVID-19 patients. The European Hernia Society (EHS) favors mesh implantation in hernia surgery to reduce the associated risk of recurrence.⁴ A tailored approach has to be applied in managing the patients who present with hernia and merit intervention amid the pandemic situation.

METHODS

This is a retrospective study from a prospective data base. This study was carried out at Anugraha Vittala Hospital, Basavanagudi, Bangalore from 25th March 2020 till September 30th 2020. Our hospital is recognised as the Centre of Excellence in Hernia surgery training by Asia Pacific Hernia Society and Hernia Society of India.

All patients underwent thorough clinical evaluation including:

-) History of foreign travel
-) Any contact with COVID-19 confirmed cases
-) Any symptoms suspicious of COVID

*Corresponding author: Dr. Ganesh Shenoy, K.,
Department of Minimal Access and Bariatric Surgery, A.V. Hospital,
Bangalore.

All patients underwent preoperative Reverse Transcriptase – Polymerase Chain Reaction (RT-PCR) prior to elective surgery in addition to routine pre-operative work-up.⁵ Negative COVID RT-PCR status was considered mandatory before elective procedures. However, for patients who required emergency surgery in view of obstruction or strangulation, there was no delay in surgical procedure awaiting RT-PCR report. COVID Rapid Antigen (Ag) test was performed and the nasal swab for Reverse Transcriptase–Polymerase Chain Reaction (RT-PCR) was also taken. A Contrast Enhanced CT scan of abdomen to assess the hernia defect along with viability of contents and CT Chest to rule out any COVID features was performed.⁵ The need for diagnostic evaluation was balanced with the need for emergency surgical intervention to ensure optimal outcomes for the patient. They were operated without waiting for RT-PCR reports and explaining in detail about the risks involved to the patient as well to the attenders. None of the patients were positive on Rapid Ag tests.

INCLUSION CRITERIA

Elective surgery: Diagnosed case of Ventral hernia/Groin hernia

COVID negative RT-PCR status.

Emergency surgery: Obstructed/ Strangulated hernia.

EXCLUSION CRITERIA

Patients who underwent open Hernia repair during the study period. Total of 47 patients underwent laparoscopic hernia repair at our centre and 2 underwent laparoscopic retrieval of infected mesh following previous laparoscopic Totally Extra Peritoneal (TEP) mesh repairs during the study period. 44 patients underwent elective surgery & 5 on emergency basis. 16 underwent laparoscopic surgery for groin hernia and 31 for Ventral hernia. All surgeries were performed under General Anaesthesia. 5 patients were tested positive on RT-PCR. (Bar chart) On further evaluation they were found to have mild disease and hence treated by home quarantine for 14 days. Tests for COVID positive patients included D-Dimer, Lactate Dehydrogenase (LDH), C-Reactive Protein (CRP), Liver Function Tests (LFTs), Serum Ferritin and Chest X-ray.^{6,7} A repeat COVID-19 RT-PCR was performed in all positive patients after 14 days. They were operated electively once they were tested negative.

All the surgeries during this time period were performed wearing Personal Protective Equipment (PPE) by the people in theatre complex. Correct method of donning and doffing of PPE was taught to all health care personnel in the Hospital setting. Specific areas for safe disposal of PPE was established. Only four people were in the operating room while performing surgeries to minimise the number of persons exposed to possible contamination.^{5, 8, 9} The surgical team comprising of surgeon, camera assistant surgeon and scrub nurse entered the operating room only after intubation by the anaesthesiologist. The movement across the operation theatre complex was restricted till the end of procedure. A well-defined exit sequence from the operation theatre was followed. First, the surgical team left the theatre, subsequently the patient after extubation and finally the anaesthesiologist. The cleaning and sterilisation team were allowed inside the operating room at

the end. The Operation table and instruments were cleaned using 1% hypochlorite solution.⁸ During the laparoscopic procedures, the port site incisions were made just for the port to pass ensuring there is no air leak during the procedure. The insufflation pressure for CO₂ was kept low.⁵ The use of energy source was kept to minimum and the cautery settings were kept at lower level.^{5, 8, 9, 10} Bipolar diathermy was preferred over ultracision for haemostasis which was proved to generate less aerosols.¹¹ The ports were not used for evacuation of gases and for desufflation.

A novel technique which we used was to evacuate the gas or smoke generated during use of energy sources was to connect a suction tubing to the side channel of one of the secondary ports and letting out the gas in a controlled manner (Figure 1) into a chamber containing 1% hypochlorite solution. The fascial closure was done after desufflation.⁹ The patients were followed up in out-patient department on the 7th post-operative day, after 1 month, 3 months and 6 months. The patients were also consulted by us every day after discharge for 7 days on video call basis to enquire about any problems they face during their post-operative stay at home. Any additional medications required by the patient was delivered to their respective home by our health care personnel. Any problems after the first follow up, the patients were given video consultation prior to subsequent follow up in the Hospital.

RESULTS

There were 29 males (62%) and 20 females (38%) included in this study. Mean age was 48 years. 44 patients underwent elective surgery & 5 on emergency basis. 16 underwent laparoscopic surgery for groin hernia and 31 for Ventral hernia. 2 patients were operated for mesh infection. Among patients who underwent groin hernia repair, there were 9 unilateral inguinal, 5 bilateral inguinal and 2 femoral hernias. In the ventral hernia group there were 16 umbilical hernia, 5 patients each for umbilical hernia with divarication of recti and incisional hernia, 3 patients with epigastric and 2 recurrent incisional hernias. The recurrences were following previous open mesh repairs. The types of Laparoscopic procedures performed for these cases are tabulated below (Table 1). Surgeries performed on COVID-19 recovered patients (Table 2).

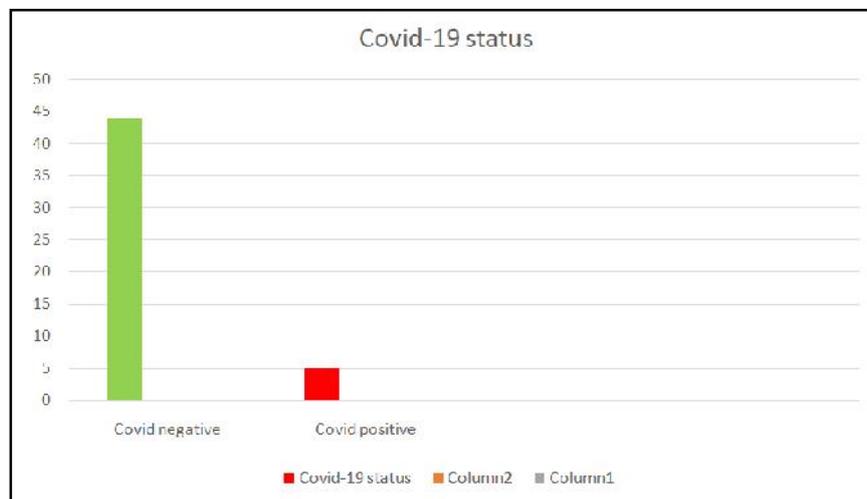
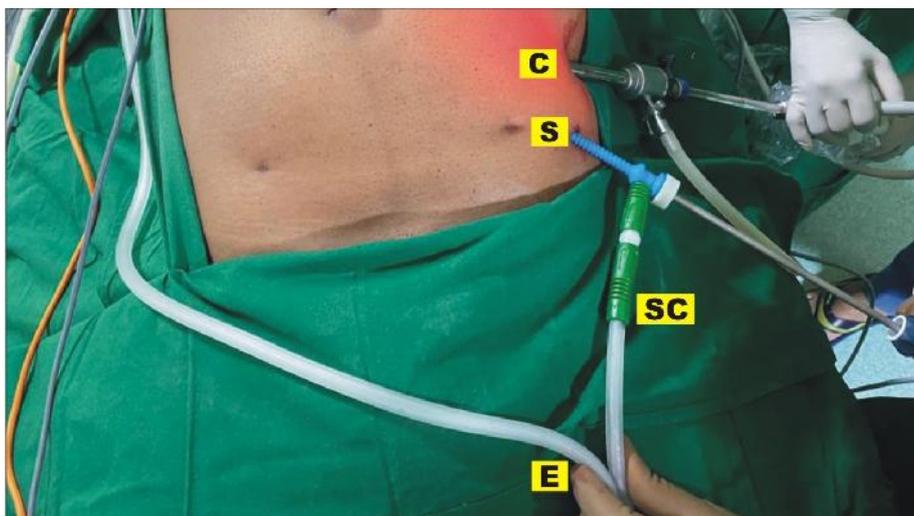
Mesh was used in all the patients except one who underwent resection of small bowel for strangulation. Parietex Mesh (Polyester with Collagen layer, Covidien 15 Hampshire Street, Mansfield MA02048, USA) mesh was used in all patients who underwent IPOM Plus repairs. Medium weight Polypropylene mesh of appropriate size was used in other extra peritoneal repairs. No major intraoperative complications were encountered. Mean duration of surgery was 35 minutes for unilateral groin hernia repair, 55 minutes for bilateral groin hernias repair and 65 minutes for ventral hernia repairs. The mean duration of stay in the hospital was 1.5 days. During follow up, 3 patients with groin hernia repair and 4 patients with ventral hernia repair were noticed to have developed seroma, which resolved without any further intervention. 2 patients following groin hernia repair developed pain in the groin which resolved with analgesics and anti-inflammatory agents. No cases of wound infection, mesh infection or recurrence of hernia was observed during our study period.

Table 1. Types of Laparoscopic procedures performed

Surgical Procedure	Number of patients
TEP	16
Trans Abdominal Pre Peritoneal (TAPP)	1
Enhanced view TEP (E-TEP)	1
Intra Peritoneal Onlay Mesh (IPOM) Plus	19
Laparoscopic Pre peritoneal mesh repair	1
TARM Trans Abdominal Retro Muscular	1
E-TEP Rives Stoppa repair	1
Subcutaneous Onlay Laparoscopic Approach (SCOLA)	5
Sub Cutaneous Onlay Mesh (SCOM)	1
Laparoscopic retrieval of infected mesh	2
Laparoscopic assisted resection anastomosis of small bowel with divided Transverse colostomy with anatomical repair of hernia	1

Table 2. Surgeries performed on treated COVID-19 patients

Diagnosis	Surgery Performed
Umbilical hernia	Laparoscopic IPOM Plus
Umbilical hernia with divarication of recti	SCOLA
Incisional hernia	Laparoscopic IPOM Plus
Bilateral Inguinal hernia	Laparoscopic Bilateral TEP Mesh repair
Recurrent Incisional hernia	Laparoscopic IPOM Plus

**Bar chart****Figure 2. Suction catheter connected to secondary port to evacuate the smoke in controlled manner.**

Labels:

Camera port: C

Secondary port: S

Suction catheter: SC

Smoke evacuation in controller manner: E

DISCUSSION

Safety regarding treatment of non-COVID ailments has become a major concern during the pandemic. Medical community is striving to deliver medical care with limited resources in the most efficient manner. The concern regarding aerosol spread of the COVID-19 virus during laparoscopic surgery has arisen from not only the discovery that COVID-19 virus RNA can be found in the stool of infected cases but also the suggestion that the virus can be found in the gastrointestinal mucosa.^{12, 13} These theoretical risks may be guessed from previous evidence where Human papilloma virus (HPV), Hepatitis B Virus (HBV), Human immunodeficiency virus (HIV) have been detected in smoke produced during surgeries.¹⁴⁻¹⁹ There are limited studies regarding transmission of virus through the smoke generated in laparoscopic procedure. These pathogens are not an absolute contraindication for laparoscopic surgeries provided adequate precautions are taken.^{20, 21} While laparoscopic surgery was thought to be risky at the beginning of the pandemic, the evidence to date does not suggest an increased risk of COVID-19 transmission during laparoscopic surgery when compared to open surgery.^{2, 3}

In fact, the laparoscopic approach seems to allow better control of surgical smoke/fume than laparotomy.²² There is little to know evidence of infection via blood transmission or as a consequence of a pneumoperitoneum per se from patient to health care worker.²³ Currently, no evidence exists in favor of "Wait & Watch policy" for symptomatic male patients with hernia. "Wait & Watch policy" is less easy to advise on in the case of females (since they present in 17% of cases with acute complications) and femoral hernias (36–39% acute presentation).⁴ There is no evidence contraindicating the use of a mesh in a COVID-19 patients. The EHS favors mesh implantation in hernia surgery for the associated reduced risk of recurrence.⁴ Five patients underwent Emergency laparoscopic surgery. A patient who presented with Intestinal obstruction 5 days following TARM repair underwent laparoscopic adhesiolysis with IPOM Plus repair as a salvage procedure. The intestinal herniation and obstruction was due to the breakdown of posterior rectus sheath due to violent cough in the post-operative period. This patient was a known case of COPD which was optimized before her elective surgery. Another woman who presented with obstructed incisional hernia was a known case of Chronic Myeloid Leukaemia with history of laparoscopic adrenalectomy for adenoma 2 years back. Laparoscopic preperitoneal mesh repair was performed. A 82 year old lady with multiple co-morbidities presented with 3 days history of obstructed recurrent incisional hernia. CT scan abdomen showed features of Strangulation. She underwent Laparoscopic assisted Resection anastomosis of small bowel with divided transverse colostomy with anatomical repair of hernia. (Figure 2) She expired on the 7th post-operative day due to septicaemia and Multiple Organ Dysfunction Syndrome (MODS). Her COVID RT-PCR report was negative. There were 2 male patients who underwent laparoscopic retrieval of infected mesh following TEP mesh repair. A 64 year old male underwent Laparoscopic TEP repair at another centre 1 year back and the other 59 year old male underwent Laparoscopic TEP mesh repair at our centre 18 months back. They were initially treated with broad spectrum antibiotics for 1 month covering aerobic, anaerobic and atypical mycobacteria with the intension of salvaging the mesh.

They continued to be symptomatic and hence decision taken to intervene surgically. The decision to retrieve the mesh laparoscopic ally was taken based on the assumption that any future recurrence following laparoscopic retrieval can be managed by anterior approach. The patients were followed up in out-patient department on the 7th postoperative day, after 1 month, 3 months and 6 months. The patients were also consulted by us everyday after discharge for 7 days on video call basis to enquire about any problems they face during their post-operative stay at home. Any additional medications required by the patient was delivered to their respective home by our health care personnel. Any problems after the first follow up, the patients were given video consultation prior to subsequent follow up in the hospital.

Conclusion

Laparoscopic hernia repair is safe and feasible in the COVID era, provided all the precautions are followed by the patients and healthcare personnel according to the approved guidelines. The use of the mesh was not a contraindication during this pandemic. Video consultation of the patients before and after surgery regarding their hernia status, post-operative course and educating them regarding the pandemic results in lesser visits to the hospital. However, the sample size of our study is small and the follow up of patients is short term. Due to the current COVID crisis and lack of sufficient data at hand, a study with larger study population and longer duration of follow up is recommended for further conclusion.

Funding: Nil

Conflicts of interest: Nil

Key points:

-)] Laparoscopic hernia repair using mesh is safe during COVID era.
-)] A well planned protocol based on present guidelines ensures safety to the patient as well as to the health care team.
-)] Novel technique of connecting the suction apparatus to one of the secondary ports and controlled evacuation may lead to decrease aerosol spread due to electrosurgical fumes and gas.
-)] Video consultation and home visits by health care professionals during follow up limits the hospital visits by patients.
-)] A tailored approach has to be applied in managing the patients who present with hernia and merit intervention amid the pandemic situation.

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