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Effective management of a firearm injury with multiple intestinal perforation in a COVID 19 positive patient: A rare case report

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ABSTRACT

INTRODUCTION: A challenging situation lies in front of every surgeon to perform emergency surgeries in a pandemic scenario. Gunshot injuries in a COVID-19 affected individual increases the chances of post-operative morbidity and mortality. Such cases require multidisciplinary approach with an advanced COVID care for the satisfactory outcome.

CASE PRESENTATION: We present a case of 30-year-old male with an alleged history of an accidental fire arm injury. His rapid antigen for COVID was positive. Contrast enhanced computed tomogram (CECT) abdomen was suggestive of multiple bowel injuries. Emergency exploratory laparotomy confirmed multiple bowel perforations with no associated solid organ injury. Perforated sites were sealed by primary repair and loop ileostomy was performed. Patient was discharged on post-operative Day 17 with satisfactory clinical improvement.

DISCUSSION: Deleterious effects of COVID-19 has questioned the reliance on health care system across the globe. Pulmonary complications affect the post-operative course in patients undergoing surgery. However not every patient with peri operatively detected COVID-19 will have complicated post-operative course. Managing such patients with perioperative COVID-19 is an uphill task. Hemodynamic instability and clinical signs of peritonitis mandates the operative management. Multidisciplinary approach with advanced post-operative COVID care is required for satisfactory outcome.

CONCLUSION: Management of patients undergoing emergency procedure with peri-operative COVID 19 is challenging for the attending surgeon. Consider all surgical emergencies as COVID positive unless proved otherwise. Multidisciplinary approach for management of COVID-19 infection along with good post-operative care is required.

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1. Introduction

Since the dawn of human civilization challenges has formed the basis of evolution. In recent era our world has witnessed the catastrophic effect of the deadly SARS-CoV-2 (Severe Acute Respiratory Syndrome-Coronavirus-2) responsible for Corona virus disease-19 (COVID-19). On March 11, 2020 COVID-19 was declared a pandemic by world health organization [1]. A major challenge of maintaining an equilibrium between emergency health services and restriction of pandemic spread lies in front of health care system across the

globe. Over the centuries destructive nature of fire arm injury has increased significantly [2]. Abdominal visceral injuries due to ballistic trauma are estimated to occur in 90% of cases [3]. As whole world is following the concept of social distancing and lockdown to remain confined in their home in view to prevent the spread of corona, it is really very rare to encounter fire arm injuries along with COVID 19 infection simultaneously. Age group, associated medical comorbidities and critical illness to a lesser extent are important indicators of outcome among COVID 19 positive patients however, among patients undergoing surgery adverse outcome and surge in the mortality has been observed [4,5]. The COVID-19 treatment guidelines panel recommends different strategies for the management of patients according to the severity of disease [6]. The mandatory treatment for COVID positive patients irrespective of severity are low molecular weight heparin/Apixaban, dexamethasone, antipyretic, multivitamins supplements, and oxygen/mechanical ventilation (as and when required). We present a case of COVID-19 positives 30-year-old male with accidental

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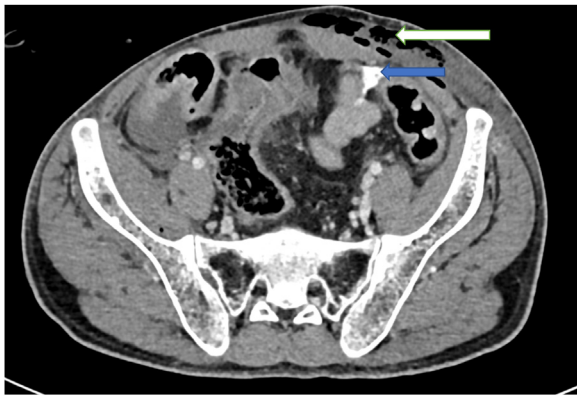


Fig. 1. CE CT Abdomen with blue arrowhead showing leak of contrast from the small bowel lumen and White arrowhead showing air in the subcutaneous tissue.

gunshot injury over abdomen, successfully managed by operative intervention. This case report is in line with SCARE criteria [7].

2. Case presentation

A 30-year-old male rickshaw puller by occupation presented to Emergency Department of our tertiary care center with an alleged history of accidental fire arm injury in an attempt to escape from the security officials. Patients was referred from a secondary health care center in view of incidental COVID-19 positive status. Patients had an entry wound, oval in shape with 2 cm diameter and inverted margins over the lateral aspect of right abdomen. Exit wound was present on the lateral aspect of left lower abdomen 1.5 cm in diameter, oval in shape and everted margins. Patients had a heart rate of 110 beats per minute, blood pressure of 110/90 mm of Hg, respiratory rate of 28 cycles per minute, spo2 94% at room air. He had no significant medical or family history. Patient had history of alcohol consumption and smoking for past 10 years. Patients hematocrit level was 40.5%, hemoglobin 13.4 mg/dl, total leucocyte count was $7.22 \times 10^3/\mu\text{l}$. Abdominal examination revealed generalized tenderness with guarding. Focused assessment with sonography for trauma (FAST) suggested free fluid in the pelvis. As per the institutional protocol COVID-19 workup panel revealed CRP – 47.34 mg/l, Procalcitonin 45.36 ng/mL, Serum ferritin – 184.62 ng/mL, Plasma d-Dimer -4.42 $\mu\text{g}/\text{ml}$, Interleukin 6 - >1528 pg/mL. Contrast enhanced computed tomogram (CECT) abdomen revealed features of bowel wall thickening involving small bowel loop, ascending colon, caecum and sigmoid colon with peri colonic fat stranding and pneumoperitoneum suggestive of multiple bowel injuries (Fig. 1). Emergency exploratory laparotomy was performed by an additional professor and his team with 11 years of experience in trauma surgeries and care. Personal protective measures were followed as per institutional protocol. Intraoperative findings revealed multiple bowel perforations of size 2×2 cm at 110 cm, perforation of size 1×1 cm at 140 cm from the duodenojejunal flexure, another perforation of about 3 cm noted at sigmoid colon (Figs. 2 and 3) with no associated solid organ injury. Primary repair was done for small bowel and colonic perforation (Fig. 4). Operation was completed with loop ileostomy, to protect the integrity of primary repair sites. A 30 French abdominal drain was placed, which was removed on 7th post-operative day. Peritoneal fluid culture and sensitivity revealed *Klebsiella Oxytoca* sensitive to Amikacin, ciprofloxacin and meropenem. Management of this patient was a challenging task to the entire team in a resource constraint situation like COVID 19 pandemic. Our main challenge was how to transport this COVID positive patient from COVID ward to OR because of significant distance. So, we decided to create a dedicated corridor and isolation ward with intensive care facility adjacent to OR for safe trans-

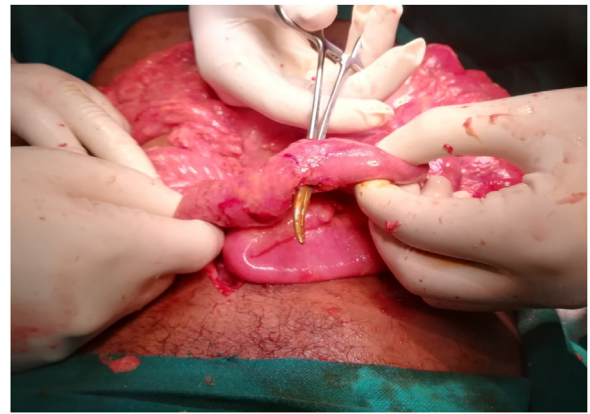


Fig. 2. Bowel perforation of size 2×2 cm at 110 cm from the duodenojejunal flexure.



Fig. 3. Perforation of size 3×2 cm at 140 cm from the duodenojejunal flexure.



Fig. 4. Perforation of about 3 cm noted at sigmoid colon showing charring at circumference.

portation and post-operative care. Post-operatively patient clinical condition deteriorated as patient developed dyspnea, moderate hypoxia requiring oxygen supplementation by non-rebreathing face mask at rate of 12 L/min, classified as moderate to severe grade of COVID 19 confirmed case. The uphill task continued as the patient condition deteriorated from mild to moderate category of COVID 19 positive pre operatively to moderate to severe grade. As per our national protocol for the management of COVID-19, patient was treated with Enoxaparin 60 mg daily subcutaneously, intravenous Dexamethasone 6 mg IV once daily. Injection Remdesivir 200 mg intravenous on Day 1 followed by 100 mg daily for next 4 days was

administered. Rest of the post-operative course was uneventful. However, the effective multidisciplinary approach and aggressive postoperative care resulted in recovery of patient from COVID 19. This was a different experience to our team as we had to address both pulmonary complications related to COVID 19 and focussed post-operative care in the constraint resource. At the time of discharge patient was maintain spo2 at 99% at room air, respiratory rate of 16 cycles/min and had no febrile episodes for 8 days Patient was discharged on post-operative Day 17 with satisfactory clinical improvement and training in ileostomy care. At follow up after eight weeks patient was doing well.

3. Discussion

Revolving uncertainties about the disease and lack of preparedness for tackling a pandemic of such sort has questioned the reliance on health care system across the globe. An additional threat of pulmonary complications and mechanical ventilation in COVID-19 affected patients undergoing surgery is evident in light of the pro inflammatory cytokines release [8]. In a recent review of literature on COVID-19 outcome in surgical patient Aziz H et al. stated poor outcomes and increased mortality in patients undergoing surgeries, however the author highlighted the limitation of fewer available studies and smaller cohorts [4]. There is limited knowledge about the consequences of COVID 19 infection on patients undergoing emergency procedures. There is a concern regarding gastro intestinal complications among severely affected COVID 19 patients, Kaafarani et al. [9] expressed an escalation in gastro intestinal complications up to 73.8% and occurrence of gastro intestinal ischemia up to 3.8%. In an international cohort study, it was concluded that patients with peri-operative COVID-19 infection, pulmonary complications affected half of the patients in post-operative period and was associated with a surge in mortality rates [8]. However not every patient with peri operatively detected COVID-19 will have complicated post-operative course. Globally firearm injuries are one of the important public health problems creating a lethal impact on social and economic status of the society in addition to loss of life. Various aspects of human life have been affected miserably due to COVID-19 pandemic, creating a havoc on mental and physical health. Although quarantine and stay at home orders should decrease the incidence of violence, contrary to the reports from different parts of the world [10]. A dramatic surge in fire arms purchase and unsafe storage is noted between March to May 2020 in USA [11,12]. Provided the bullet and shells have high kinetic energy, abdominal viscera are more prone for penetrating injuries designated as multiple injuries to solid organs, gastrointestinal tract, and vascular structures [13–15]. CECT becomes important tool in management of such patients. Navsaria PH et al. [16] advocated the importance of CECT in decision making between operative and non-operative management in patients with fire arm injuries. Role of selective non operative management in patients with fire arm injury has gain importance over mandatory exploratory laparotomy, although hemodynamic instability and clinical signs of peritonitis mandates the operative management. In this pandemic situation managing emergencies like gunshot injury is an uphill task, optimum utilization of resources is warranted. Allocation of resources like Personal preventive equipment's, ICU beds, blood products should be used judiciously to avoid unnecessary pressure on the hospital facility. Moreover, challenge to avoid contamination and restrict the spread of virus is evident which can be tackled by proper segregation of hospital complex in COVID and NON COVID blocks [16,17]. We recommend a concise guideline to operate a COVID positive patient in this pandemic situation (Table 1) like other recommendation [18].

Table 1

Recommendation for operating COVID positive patients.

Pre-operative management	1. Transportation by dedicated staff by shortest route. 2. Sanitization of the transported route. 3. Operative plan should not be delayed on the ground of awaited COVID-19 RT PCR report. 4. In all emergency surgeries, consider patient as a COVID positive unless until proven otherwise.
Operative room management	1. Use of a dedicated OR. 2. Minimal movement of required staffs in OR. 3. Door of the OR should be kept closed during surgery. 4. All the files and non-essential items may be kept outside the OR. 5. Better to avoid the use of high energy device. 6. Less technically demanding procedures are advocated.
Post-operative management	1. Extubation to be considered outside OR 2. Discard all the used breathing circuit including soda-lime container. 3. OR should be kept vacant for at least 12 h to consider fumigation and disinfection. 4. Doffing should be done in dedicated area.

OR—operating room; RT-PCR—Reverse Transcriptase polymerase chain reaction.

4. Conclusion

Usually patients with perioperative COVID-19 infections have poor outcome and management of such critical patients poses a challenge to the attending surgeon. All surgical emergencies should be operated at earliest with adequate personal protection irrespective of COVID 19 RT PCR results, considering all such patient as COVID positive in this pandemic situation. However multidisciplinary approach with defined guidelines for the management of COVID-19 infection along with good post-operative care may result in positive outcome.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

There is no ethical approval was obtained as it's a case report.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author's contribution

Dr Rohit Gupta: Writing the paper.
 Dr Hariprasad C P: Study concept.
 Dr Anil Kumar: Operated, revised and edited the manuscript.
 Dr Shiv Kishor: Operated.
 Dr Deepak Kumar: Review of the literature.
 Dr Shiv Shankar Paswan: Critically analysed.

Registration of research studies

Our paper is a case report, no registration was done for it.

Guarantor

Dr Anil Kumar.

Provenance and peer review

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Patient's perspective

I am so grateful to the trauma and surgical team for operating on me even in this tough situation of COVID 19 pandemic. I am so grateful for the entire team for their excellent team work in there successful attempt to save my life.

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