

## Case Series

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# Outcome of major abdominal surgeries in COVID-19 positive patients with awake anaesthesia: surgeons' perspective

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## ABSTRACT

In view of the COVID-19 pandemic, the use of locoregional anaesthesia has gained popularity as the greatest number of the major abdominal surgical cases which were usually done under general anaesthesia (GA) is now shifted towards awake anaesthesia due to fear of aerosol generation. In a COVID era, with evolving risk of aerosol generation in surgery under GA and the urge for reserving ICU beds for needy patients, this study was undertaken to assess the adequacy of surgery and other benefits with awake anaesthesia. A retrospective observational study for 8 COVID-19 positive patients, undergoing emergency major abdominal surgeries with locoregional anaesthesia in pre-operatively diagnosed COVID positive from May 2020 to May 2021 was conducted. Low to medium risk patients (ASA 1-2) were considered following assessment by anaesthesiologist. We retrospectively analysed data including perioperative events, post-op follow up. The mean operative time was 103 minutes (minimum 50 minutes; maximum 170 minutes). In one case, conversion to general anaesthesia was necessary. Post-operative pain was always well controlled. None of them required postoperative intensive care support. No perioperative major complications (Clavien Dindo ≥3) occurred. Early readmission after surgery never occurred. In our experience in the COVID-19 era, RA may help to limit the intubation-related risk of contagions inside theatres and could be feasible, safe, and painless alternative to GA in selected cases and this approach could become part of an ICU-preserving strategy.

**Keywords:** Awake surgery, Laparotomy, Locoregional anaesthesia, COVID-19

## INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused the coronavirus disease 2019 (COVID-19) has been declared as a pandemic by the WHO. As of June 2021, India has the second-highest number of confirmed cases in the world with 29.3 million reported cases of COVID-19 infection and has imposed a large burden on global medical systems.<sup>1</sup>

This resulted in great concern and difficulty in managing the surgical patients. The surgeries have been comprehensively limited and most elective surgeries have been postponed in endemic areas, some undeniable emergency cases which still require urgent surgical

interventions were done under strict covid guidelines. In this pandemic situation, the use of regional anaesthesia has gained popularity, as the greatest number of the major abdominal surgical cases which were usually done under GA was now shifted to regional anaesthesia (RA) due to fear of aerosol generation.

Although minimally invasive surgery (MIS) done under GA for a major abdominal procedure was the primary focus in the present era, attention on the potential MIS related risk of contagion was so high in comparison to open surgery and the use of GA in operation theatre had become controversial, also because COVID related pulmonary complication can critically be jeopardized the patient's life, the choice of GA was associated with

increased risk of adverse events and case fatality.<sup>2</sup> Although several guidelines and protocols were surfaced regarding the management of COVID-19 patients, the operation theatres' layout including negative pressure ventilation was beyond immediate arrangement in several institutes.<sup>3</sup> Hence the use of RA gradually gained acceptance in our setup, which was a rural medical college and hospital in Northeast India. In this study, we reported a series of major abdominal surgeries in COVID-19 positive patients done under RA.

## CASE SERIES

In this retrospective observational study, total 8 COVID-19 positive patients, 3 male and 5 female patients with the mean age of  $34.8 \pm 15.16$  (18-70 years) underwent emergency surgeries under RA during the period of May 2020 to 2021 (Table 1).

Each patient always wore an N95 mask inside the hospital, during all the phases of the surgical procedure and after the operation. Each patient filled in a preadmission screening questionnaire to assess the risk of a recent contagion. Each patient requiring surgical intervention underwent the nasopharyngeal swab test for COVID-19 and before surgery, all patients were diagnosed COVID-19 positive through nasopharyngeal swab test.

Pre-operative workup including complete blood count and basic coagulation tests was done for each patient. All patients were preoperatively assessed by the anesthesiologist and considered for surgeries under RA were at low to medium risk (ASA score: >1 or 2). Each patient was preoperatively explained and consent was obtained about the choice of anesthesia and surgical procedures.

All the healthcare personnel involved in management wore PPE kits during all the phases of each surgical procedure. Patients were transferred through established separate pathways to the designated COVID operating areas (COA) which was allocated according to the standard COVID protocols following government guidelines. Once the operation started, all efforts had made to use what was available in the room and minimize the staff transiting in and out of the OR, to minimize infection risk. A distinct area was set up for postoperative recovery and patients were moved to COVID-19 dedicated wards.

Surgery was performed under combined spinal-epidural (CSE) anaesthesia in 3 cases (needle sizes: 18G and 25G), under spinal anaesthesia (SA) in 2 cases (needle size: 25G) and epidural anaesthesia (EA) in 1 case (18G). At our institution, CSE anaesthesia was the standard neuraxial technique. RA was performed by different anesthesiologists, all having considerable expertise in SA, EA and CSE anaesthesia. During all SA and CSE anaesthesia, the solution injected into the subarachnoid

space had the following composition: bupivacaine hydrochloride 5 mg/ml (minimum dose: 2 ml; maximum dose: 3.5 ml) and fentanyl 25 mcg (0.5 ml). During EA, the solution injected into the epidural space had the following composition: bupivacaine hydrochloride 0.5% till adequate block height was achieved. For post-op pain bupivacaine 0.125% sensory dose for every 8th hourly given with regular monitoring of blood pressure, if NRS (numeric rating scale) value was higher than 3. Intra-operative and post-operative pain intensities have been monitored and regularly assessed through the use of the NRS. Caprini score was used to individualize the risk of venous thromboembolism (VTE) prophylaxis after surgery.<sup>4</sup> Blood test controls were scheduled on PODs 3 and 7.

Adequacy of anaesthesia was assessed by pinprick before surgery started. To avoid aerosolization, cautery utilization was strongly limited, energy devices were used at their absolute lowest settings with adequate functioning and Kelly haemostatic clamps and ties were preferred to control bleeding vessels whenever possible.

At the beginning of May 2021, we retrospectively analysed these data. We considered patients' medical history and operative results: operative time, adequacy of pain relief and relaxation, conversion to GA and its cause, RA-related complications, intra-operative blood loss and transfusion, ICU admission, urinary catheter removal, first bowel movement (flatus and feces) after the operation, early postoperative complications, postoperative length of stay (LOS) and readmission due to post-operative complications that occurred after discharge. The Clavien-Dindo (CD) classification was used to assess postoperative complications.<sup>5</sup> In the case of multiple complications occurring in a single patient, the complication of a higher grade was considered.

The mean operative time was 120 minutes (minimum 30 minutes and maximum 180 minutes). Post-operative pain, regularly assessed through NRS with an 8-hour epidural top-up dose of 0.125% bupivacaine was adequate for pain relief. One patient required intra-operative blood transfusion due to the severe anaemia (Hb <6 mg/dl) caused by blunt abdominal trauma with splenic rupture and conversion to GA was necessary (Table 2).

Meantime for urinary catheter removal was POD 4, meantime for the passage of first flatus was POD 3, meantime for the first defecation was POD 5 and mean LOS was 15.36 days, included a period for negative swab test (Table 3).

All patients shifted to surgery postoperative ward from COVID ward after the swab test became negative. This substantially prolonged the LOS. None of the patients required postoperative intensive care support.

**Table 1: Age and sex distribution.**

Gender	Number	Percentage
Male	3	37.5
Female	5	62.5

**Table 2: Regional anaesthesia and perioperative results.**

S. No.	Type of anaesthesia	Procedure	Operative time (in min)	Conversion to GA	Intraop infusion	Adequacy of procedure	Comorbidities
1.	CSE	Ex.LAP+IR+HT	115	-	-	Yes	-
2.	SA	Open HR (rt)	50	-	-	Yes	T2DM+SHTN
3.	TEA	Open ST	110	Yes	Yes	Yes	-
4.	EA	RA SV+TC	170	-	-	Yes	-
5.	SA	Open appendectomy	30	-	-	Yes	-
6.	CSE	Ex.LAP+RA of sigmoid and upper rectum*+TC	140	-	-	Yes	-
7.	CSE	Hemicolecction (rt)+ICA	180	-	-	Yes	-
8.	CSE	Primary duodenal repair with omental patching	170	-	-	Yes	CAD

Ex.LAP=exploratory laparotomy, IR=ileal primary repair, HR=hernioplasty, ST=splenectomy, RA=resection and anastomosis, SV=sigmoid volvulus, TC=transverse loop colostomy, ICA=ileocolon anastomosis, T2DM=type 2 diabetes mellitus, CAD=coronary artery disease, GA=general anaesthesia, \*multiple perforation following MTP (non institutional).

**Table 3: Postoperative characteristics.**

S. No.	ICU admission	Flatus passed (POD)	Feces passed (POD)	Post-op loss	Post-op complication	SpO <sub>2</sub> l/min (% RA)
1.	-	3	7	16	-	90-95
2.	-	1	3	15	-	90-95
3.	-	1	2	17	CD2	90-95
4.	-	4	7	18	-	90-95
5.	-	1	2	8	-	90-95
6.	-	3	6	16	-	90-95
7.	-	4	7	16	-	90-95
8.	-	3	7	18	-	90-95

POD=post operative day, LOS=length of stay, Clavien-Dindo classification (CD-2).

No patient developed a postoperative infection. One patient was categorised as CD-2 as postop blood transfusion was needed.

We did not register any cases of early readmission after surgery (within 72 hours of discharge) and no post COVID complication.

## DISCUSSION

Generally, most of the major abdominal surgeries were carried out with MIS (laparoscopy, robotic surgery). Besides this, technical advances and new drugs led to a progressive standardization of GA for major surgeries. Since pneumoperitoneum creation/desufflation and intubation were aerosol-generating procedures so when

the COVID-19 outbreak began, they became under great debate as they may contribute to spreading contamination inside operating theatres and reports were advised against their use.<sup>6-9</sup> Keeping all this into account, despite the well-known benefits of MIS and GA, we had to consider the higher contagion risk and balance pros and cons.

RA was used in surgeries like hernioplasty or other minor surgical procedures belonging to day-care surgery protocols. Although this, RA was progressively regaining popularity in multiple surgical disciplines and especially encouraging its use during this pandemic.<sup>10</sup> Neurosurgical procedures were rediscovering the benefits of RA during awake craniotomies in oncological surgeries, using the electrical stimulation intraoperative mapping of brain functions.<sup>11</sup> In urological procedures like open radical cystectomies and right open nephrectomy done under

RA, reporting that in their experience this anaesthetic approach gave significant advantages to the patients by avoiding intubation, mechanical ventilation, curare and opioids administration.<sup>12,13</sup>

Besides this, GA can be associated with delayed recovery after anaesthesia and can lead to the admission of the patient to the ICU. During this pandemic, this was still prohibitive.

The novel infectious disease caused by SARS-CoV-2 overwhelmed ICU networks. During the pandemic, hospitals drastically limited elective surgery not only to limit spreading contagions but also to preserve ICU beds, personnel and equipment for critically ill COVID-19 patients.<sup>14</sup>

In our experience, when non-operative management was not applicable, emergency surgical cases were done through the association of RA and open surgery without resorting to ICU admission. Conversion to GA occurred in one single case. This concluded that, with our previous experience on this awake approach, we were able to consider and perform the surgical treatment even when no ICU beds were available.

Our study showed that RA did not require any significant modifications of the surgical technique apart from the limited use of energy devices. Nevertheless, although RA did not entail a relevant elongation of the operative time, it did not cause any discomfort. In this series, the observed long LOS was to be related to COVID-19 infection status. The longest postoperative LOSs was observed in severely infected patients. The postoperative period was uneventful. No readmissions after surgery.

Postoperative pain was always well controlled. The use of EA limits the administration of opioids and resulted in short-lasting paralytic ileus and less nausea and vomiting. EA associated early recovery of intestinal peristalsis had been supposed to be a risk factor for anastomotic leakage.<sup>15</sup> In our experience, this never occurred.

Although MIS under GA was frequently advocated for surgery, we strongly deem that open surgery under RA should be taken into consideration whenever surgery was planned for any patient who posed an infection risk.

This study was based on a retrospective single centre experience, carried out on a small group of patients due to the peculiar social and historical background. At the moment, this precluded any statistical analyses. Considering all these limitations, our results were supportive but not conclusive. Further data derived from randomized controlled trials including a larger number of patients were needed to examine this approach in-depth. Unfortunately, only a few case reports and even fewer case series deepening the influence of RA on the outcomes after acute care surgery were available.<sup>16-18</sup>

## CONCLUSION

Our present study suggests that in support to open surgery in emergency COVID-19 patients. RA may help to limit the intubation-related risk of contagions inside theatres. In the COVID-19 era, locoregional anaesthesia for awake surgery should always be considered as a functional option, for selected patients. Especially in this covid era for the future congestions of the ICU, we believe this approach could become part of an ICU-preserving strategy allowing surgeons to carry out undeferrable emergency surgeries.

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