CASE REPORT

Combined Spinal Epidural Anaesthesia Technique with Ketamine Infusion for Emergency Laparotomy of a Known COVID-19 Case at High Altitude of 12000 Feet Above Mean Sea Level

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Abstract

SARS-CoV-2 is a highly infectious virus known to cause severe acute respiratory syndrome in humans known as COVID-19. It is well established that the mode of transmission is through aerosol generation. Since the invasive procedures like endotracheal intubation place the anaesthesiologist and the operating room staff highly exposed to the risk of infection it is prudent to follow regional anaesthesia technique wherever possible. The present case is of a 34-year-old COVID 19 positive male patient who underwent emergency laparotomy in a service hospital of armed forces at 12000 feet above sea level under combined spinal and epidural anaesthesia supplemented with sedation using intravenous infusion of Ketamine. After the attachment of standard ASA monitor and taking in account of baseline readings patient was administered an 18-gauge epidural secured in the T12-L1 level with the catheter was fix at 12 cm on the skin. Sub arachnoid block was administered to the patient using 2.75 ml of 0.5 % Bupivacaine (heavy) and 25 mcg of Fentanyl in L2-L3 space using a 26-gauge spinal needle in sitting position. Once the height of the block was ascertained at T6 level by loss of temperature sensation the surgery commenced. Patient was administered with 3.0 mg of Morphine in epidural space for perioperative analgesia. For allaying intraoperative discomfort patient was sedation infusion of Ketamine of 0.6mg/kg/hr to keep the Ramsay sedation score between 3-4. The intraoperative period was uneventful, and the patient did not require any supplemental analgesia during the surgery. Post operatively the patient was pain free and comfortable with no features of hypopnea, post-operative nausea vomiting and shivering and was shifted to the post-operative care unit in the covid facility of the hospital. .

Keywords: epidural, anaesthesia, ketamine, laparotomy, COVID-19.

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INTRODUCTION

The health care system around the world has been tested by the novel COVID-19 pandemic and it is highly likely to continue soon. This disease has led to development of new approach in dealing with the day-to-day proceedings in any hospital. Though there has been a decline in quantum of elective surgical procedures all over the world the emergency and lifesaving procedures must be conducted while following various modifications in approaching a known positive case or in a patient whose status is unknown. Guidelines have been provided by several international societies in order to reduce the risk of infection to the health care worker while simultaneously conducting the intervention to save lives. The coercions that the disease postures to both health care workers and the patients have shifted the modern anaesthesia towards the use of regional anaesthesia techniques wherever possible. It has been recommended confidently by various societies including the European and American Societies of Regional Anaesthesia that regional anaesthesia should be preferred over general anaesthesia whenever possible¹. The Royal College of Anaesthetists and Association of Anaesthetists also advise using local or regional anaesthesia where practicable and safe in order to preserve key drugs required during the critical care of COVID-19 patients³. Moreover, there are various rational recompenses which indicate in favour to use of regional anaesthesia including but not restricted to reduction in aerosol-generating procedures, preservation of immune function when compared with general anaesthesia, improved postoperative analgesia reducing direct contact with care givers, and earlier discharge.

CASE PRESENTATION

The present case is of a 34-year-old male patient who underwent emergency laparotomy in a service hospital of armed forces at 12000 feet above sea level under combined spinal and epidural anaesthesia using 2 needle technique supplemented with sedation using intravenous infusion of Ketamine @ 0.6 mg/kg/hr to allay intraoperative discomfort. The patient had a history of dry cough and mild fever for last 06 days and pain abdomen for last 3 days. During pre-anaesthetic check-up, the patient was found to have no co-morbidities/allergies. There was a history of laparotomy done under general anaesthesia 18 months back for perforated du-

odenal ulcer apart from which he had no anaesthesia or surgical exposure, the procedure was uneventful, and the patient was discharged after 10 days to home. Presently the patient was not on any medications. An airway examination revealed Mallampati class 1 with BP of 126/84 mm Hg with a heart rate of 76/min at rest in supine position. Apart from temperature of 99.8 degrees Fahrenheit the other parameters were unremarkable with functional capacity of the patient was METS >10 and a respiratory rate of 22/min with saturation of 92 % on room air. The reason to undergo emergency laparotomy was based on the USG abdomen finding which showed small defect in anterior abdominal wall at the cranial end of incision with herniation of omental fat, which was hetero-echoic suggestive of incarcerated incisional hernia (Figure 4). Since it was an emergency surgery the battery of tests involved complete blood count with INR, a 12 lead ECG (Figure 1) and a chest X ray (Figure 2), Rapid Antigen Test for COVID-19 (which was found to be positive). The patient was accepted in ASA III E as a high-risk case and was decided to be conducted in the COVID-19 designated operating room of the hospital.

After the attachment of standard ASA monitor and taking in account of baseline readings patient was administered i.v. 0.2 mg of Glycopyrrolate, 4 mg of Ondansetron to attenuate the Bezold-Jarisch reflex and prevent any hypotension or Brady arrhythmia. An 18-gauge epidural through LOR technique was secured in the T12-L1 level with the catheter fix done at 10 cm on the skin. Post giving the test dose in epidural space a sub arachnoid block was administered to the patient using a combination of 2.75 ml of 0.5 % Bupivacaine (heavy) and 25 mcg of Fentanyl in L2-L3 space using a 26-gauge spinal needle in sitting position. Post the procedure the patient was immediately made supine and was monitored for any hypotension/Brady arrhythmias. Once the height of the block was ascertained at T6 level by loss of temperature sensation the surgery commenced which revealed a small defect in the rectal sheath and herniation of gangrenous omental fat. Omental necrosectomy was performed and the defect was repaired. Patient was administered with 3.0 mg of Morphine diluted in 10 ml normal saline in epidural space for perioperative analgesia. In order to allay intraoperative discomfort patient was sedated using infusion of Ketamine of 0.6mg/kg/hr to keep the Ramsay sedation score between 3-4. The intraoperative period was uneventful and the patient did not require

Figure 1. Pre operative ECG

Figure 2. Chest X ray

Figure 3. Old healed scar tissue

Figure 4. Indicative of defect in rectus

any supplemental analgesia or conversion to general anaesthesia during the surgery. Post operatively the patient was pain free and comfortable with no features of hypopnea, post-operative nausea vomiting and shivering and was shifted to the post-operative care unit in the COVID-19 facility of the hospital.

DISCUSSION

Aerosol generating procedures including but not restricted to such as endotracheal intubations and extubations are known to be associated with some of the highest rates of coronavirus transmission ². This puts the anaesthesiologist and the operating room staff at high risk of contracting the disease. Since in a successful regional anaesthesia technique there is no requirement of airway manipulation, logically it should lower the risk of severe acute respiratory syndrome related coronavirus-2 (SARS-CoV-2) transmission from patient to health care workers. It has already been established in literature that SARS-CoV-2 is primarily spread via respiratory droplets and fomite transmission ⁴. Other factors that may contribute to the risk of infection including but not restricted to duration of exposure, number of air changes, proximity of health care

worker with the known positive cases are all important considerations in addition to droplet, fomite, or aerosol spread.

Although traditionally laparotomy is preferred to be performed under general anaesthesia with epidural catheter for adequate perioperative pain relief in the present-day scenario of COVID-19 epidemic an alternative approach which removes the hazard of airway instrumentation and reduces the risk of disease transmission to the health care provider may be considered. Usage of regional anaesthesia technique (spinal/epidural) has already been established in literature. More recently, Kateregga et al. in their prospective study demonstrated that laparotomy performed under lumbar SA was safe and effective, and no complications were observed in their study ⁵. Furthermore, endotracheal intubation and general anaesthesia although provides the advantage of secured airway, it is also an established fact that it can lead to dependency on mechanical ventilation and effects such as bronchospasm, V/Q mismatch and atelectasis, and residual anaesthetic or muscle relaxant effects. Moreover, general anaesthesia has the highest postoperative pulmonary morbidity and mortality in upper abdominal operations due to reduced functional pulmonary residual capacity in the

early postoperative period. In contrast, these effects are reduced in RA as it improves diaphragmatic function and chest wall compliance by decreasing chest wall muscle tone⁶. Rodgers et al. showed in a meta-analysis that overall mortality and other serious complications were reduced in neuraxial blockade⁷. Evidence shows that RA has minimal respiratory effects even at higher level blocks, and emergency laparotomy can be safely done under SA, especially in high-risk patients⁸. Laparoscopic procedures, including laparoscopic cholecystectomy, can also be safely performed under RA, with benefits such as reduced emesis and postoperative pain, as reported by Collins et al. Advantages of SA include no risk of intubation-related airway complications, little risk of unrecognized hypoglycemia in a diabetic patient, excellent muscle relaxation, decreased surgical bed oozing, and a more rapid return of bowel function, especially in old patients or those suffering from systemic diseases⁹⁻¹¹. Unlike GA, RA does not require aerosol generating procedures such as intubation, and thus minimizes the transmission risk of airborne infections to anaesthesia and operating teams, especially in low-income countries, where proper and adequate protection is not often available. In addition, use of SA in mildly symptomatic COVID-19 patients so far is demonstrated to be safe.

CONCLUSION

Apart from airway manipulations there are several other benefits associated with the use of regional anaesthesia technique including superior analgesia, environmental benefits, reduced polypharmacy, reduced postoperative complications, bypassing or reducing time in recovery, earlier hospital discharge and minimal haemodynamic disturbance which may be of greatest benefit particularly while handling a known COVID-19 positive case. Further with evidence accumulating that volatile anaesthesia may contribute to decreased perioperative immunity, this is a potentially significant benefit of regional anaesthesia. We strongly recommend the technique of combined spinal epidural anaesthesia with sedation in a while performing upper abdominal surgeries in a known or suspected COVID-19 positive patient.

Compliance with ethics requirements: The authors declare no conflict of interest regarding this article. The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law. Informed consent was obtained from all the patients included in the study.

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