

INCIDENCE OF POST OPERATIVE PULMONARY COMPLICATIONS AMONG RESPIRATORY CRIPPLES AFTER ABDOMINAL SURGERIES UNDER SEGMENTAL SPINAL ANAESTHESIA – A CASE SERIES

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Abstract

Thoracic Segmental spinal anesthesia has garnered renewed attention in the surgical realm, especially for thoracic and abdominal procedures in patients with respiratory challenges. Preoperative assessments in such patients necessitates meticulous anesthesia planning. This case series explores the rationale behind choosing segmental spinal anesthesia in such high-risk patients and evaluates incidence of pulmonary complications postoperatively namely Hypoxia, Respiratory distress, Reintubation in Post Anaesthesia Care Unit, Exacerbation of symptoms of pre-existing lung disease and Post-operative ventilatory supports requirement.. Five cases with varying significant respiratory comorbidities, who underwent upper abdominal surgeries under segmental spinal anesthesia at the T8-T9 level using hyperbaric bupivacaine and fentanyl, were included in this case series. None of the patients had incidence of postoperative pulmonary complications. Our findings underscore the utility of segmental spinal anesthesia in mitigating postoperative pulmonary complications, particularly in patients with compromised pulmonary function or diaphragm eventration. Despite potential risks, proper technique and patient selection render segmental spinal anesthesia a valuable option in select surgical scenarios.

Keywords: Segmental Spinal Anaesthesia, Hyperbaric Bupivacaine, Upper Abdominal Surgeries, Postoperative Pulmonary Complications.

INTRODUCTION

Segmental spinal has already been in practice, but recently there has been a lot of literature emerging for cervical, thoracic and abdominal surgeries. (Jonnesco T, 1909),(Klein SM,2000),(A.A.J.van Zundert1,2006). In this case series, all patients had risks of developing postoperative pulmonary complications like Hypoxia, Respiratory distress, Reintubation in Post Anaesthesia Care Unit, Exacerbation of symptoms of pre-existing lung disease and Post-operative ventilatory supports requirement. (J. F. NUNN, 1990) and (Hemmes et al). Hence we delve into the rationale behind opting for segmental spinal anaesthesia, meticulously evaluating the incidence of postoperative pulmonary complications.

METHODOLOGY

The study was conducted in a tertiary care hospital in Kanchipuram, Tamil Nadu, during the period of November 2023 to March 2024. Patients scheduled for both elective and emergency upper abdominal surgeries with significant respiratory comorbidities during this period formed the study population.

Our objective was to evaluate the incidence of postoperative pulmonary complications which includes hypoxia, signs of respiratory distress, Re intubation in Post Anaesthesia Care Unit, exacerbation of symptoms of pre-existing lung disease and post-operative ventilatory supports requirement. (Hemmes et al 2014). The presence of hypoxia was defined as saturations less than 90%, not responding to 4 L of oxygen by face mask and non-rebreathing mask with high flow oxygen. The presence of signs of respiratory distress was defined as respiratory rate <8/min or >35/min or use of accessory muscle use or presence of tracheal tug. The incidence of postoperative pulmonary complications was assessed by an independent anaesthesiologist, who was not part of the study.

The Table 1 and Table 2 enumerates the demographic and patient profile respectively.

Table 1: Demographic parameters

Case	1	2	3	4	5
Age(Years)	51	50	65	54	70
Sex	Female	Male	Female	Male	Female
Height(Cm)	149	165	155	160	162
Weight(Kg)	88	68	50	59	73
Bmi(Kg/M2)	27	25	21	23	28
Duration of Surgery(Minutes)	90	75	95	85	80

Table 2: Patient profile

Case	Diagnosis	Surgery Planned	Comorbids	Clinical Examination And Investigations
1	Acute emphysematous cholecystitis	Open cholecystectomy	Bronchial asthma	Active wheeze on both hemithorax was present, Pulmonary Function Tests revealed Severe obstruction with poor reversibility
2	Liver abscess with multiple septations	Laparotomy and abscess drainage	Alcoholic and tobacco chewer for 20years. Known case of chronic kidney disease (on renal replacement therapy)	Restricted mouth opening (due to right sided submucosal fibrosis) Anaemia with leukocytosis
3	Acute Cholelithiasis	Open cholecystectomy	Post tuberculosis sequelae	Reduced breath sounds on right side with absent breath sounds in right upper zones of lung. Computed tomography of chest revealed right upper lobe fibrosis with trachea shifted to right and right middle and lower lobe bronchiectasis changes
4	Acute cholecystitis	Laprosopic cholecystectomy	Chronic obstructive pulmonary disease Smoker	Mild crepetations on Both hemithorax auscultated Blood gases revealed moderate hypoxemia Pulmonary function tests revealed severe obstructive pattern
5	Epigastric hernia	Anatomical mesh repair	No known comorbidities	Reduced movement of right lower zones with diminished breath sounds CT Chest revealed eventration of right diaphragm

All patients were fasted for 6 hours and received standardised premedication. After obtaining informed written consent, patients were shifted to Operation Theatre and all ASA standard monitors were connected.

The plan of Anaesthesia for above cases was chosen as Segmental spinal Anaesthesia based on risk versus benefit analysis. The Spinal space chosen for administration of Segmental spinal was T8-T9 interspace. The drug volume, level of blockade and intraoperative hemodynamics are summarized in Table 3.

Table 3:

Case S No.	Drug	Level Of Sensory Blockade	Level Of Motor Blockade (Modified Bromage Scale) (Dr Graham Hocking 2000)	Intraoperative Hemodynamics
1	1.2ml of 0.5% hyperbaric Bupivacaine and 25mcg Fentanyl	T3 to T12	0	Stable
2	1.5 ml of 0.5% hyperbaric Bupivacaine	T2 to T10	0	Stable
3	1.2ml of 0.5% hyperbaric Bupivacaine and 25mcg Fentanyl	T3 to T12	0	Stable
4	1.5ml of 0.5% hyperbaric Bupivacaine and 25mcg Fentanyl	T2 to L2	1	One episode of hypotension occurred which was managed with injection Ephedrine 6mg IV
5	1.2ml of 0.5% hyperbaric Bupivacaine and 25mcg Fentanyl	T3 to L2	1	Stable

RESULTS

None of the patients in our case series developed post-operative pulmonary complications like hypoxia, respiratory distress, Reintubation in Post Anaesthesia Care Unit, exacerbation of symptoms of pre-existing lung disease and post-operative ventilatory supports requirement.

DISCUSSION

Mark S. Hausman et al (2015) concluded that 43% higher risk of pulmonary infection, 133% higher risk of prolonged ventilator dependence and 44% higher risk of unplanned postoperative intubation was noted in COPD patients undergoing surgery under general anesthesia, compared to regional anaesthesia. This is reemphasized in our study, as none of the patients had incidence of pulmonary complications postoperatively.

In a study by Geresu Gebeyehu et al (2022), they concluded that overall incidence of postoperative pulmonary complications was 33% in patients undergoing both upper and lower abdominal surgeries, among which pneumonia (50%) and atelectasis (24%) were commonly noted. Duration of surgery (>3hr) was strongly associated with development of postoperative pulmonary complications, as seen in this study. In our

study, all surgeries were completed within 90 minutes, which could have possibly helped in preventing pulmonary complications.

Rehman et al (2015), mentioned sudden rupture of the weakened diaphragm may result from any event that leads to an increase in intra-abdominal pressure, such as coughing, straining during light anesthesia or extubation. Hence segmental spinal anesthesia was chosen over general anaesthesia for our case with eventration of diaphragm.

In our study, hemodynamics were always stable throughout the procedure due to low dose of local anaesthetic usage and absence of vasodilation of lower limbs, thereby, maintaining adequate venous return. Similar results were found in a study done by Jahnavi Patel et al, 2023.

Another study reported that there is less hemodynamic instability noted in patients who received thoracic segmental spinal anesthesia when compared with lumbar spinal anaesthesia (Singhal G et al, 2023).

In a study, comparing low doses of isobaric and hyperbaric bupivacaine showed the duration of motor block was greater with isobaric and the duration of sensory block was greater with hyperbaric solution (Imbelloni LE,2020). Similar duration of sensory block was observed in our cases using hyperbaric bupivacaine.

Limitations:

Segmental spinal anaesthesia requires a steep learning curve with theoretical risk of spinal cord puncture. The presence of larger posterior subarachnoid space at mid thoracic level than lumbar and upper thoracic levels, usage of proper needle at desired angulation and skilled persons can avoid this complication.(Jahnavi Patel ,2023)

CONCLUSION

We conclude that successful administration of segmental spinal anaesthesia prevented the development of post-operative pulmonary complications in respiratory cripples undergoing abdominal surgeries. Better hemodynamic profile and decreased need for post-operative analgesia has been added advantages to this anaesthetic technique. More studies with larger study population is warranted to ascertain this fact further.

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