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A COMPARATIVE STUDY OF SUPINE VERSUS SEMI-FOWLER'S POSITION FOR TRACHEAL EXTUBATION IN LOWER ABDOMINAL SURGERY

Anaesthesiology

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ABSTRACT

Introduction: Semi-fowler's position improves the range of motion of the diaphragm muscle, which aids in lung expansion and promotes gaseous exchange by increasing lung capacity. Early postural interventions in patients after general anesthesia can facilitate pulmonary ventilation and increase blood oxygen content. **Aims and objective:** To compare the patients comfort visual analog scale score (VAS) and wound pain visual analogue score between supine and semi-fowler's groups at different time interval following extubation. **Materials and method:** A total of 180 patients, aged 18–60 years with American Society of Anaesthesiologists(ASA) grade between I - II planned for lower abdominal surgery under general anaesthesia with endotracheal intubation were selected. Anaesthesia is induced with fentanyl and propofol and maintained with atracurium, nitrous oxide and sevoflurane . All the patients were moved to the post-anaesthesia care unit following surgery and then randomly placed into the semi-fowler's (supine with 30° head-up) (n = 90) or supine (n = 90) position while receiving 100% oxygen. All the vital parameters , comfort scores are recorded before and after extubation. **Result:** There was no statistically significant changes in respiratory rate, oxygen saturation , blood pressure from baseline in either positions apart from significant rise in heart rate in semi-fowler's position before extubation (p = 0.011), 1min post-extubation(p = 0.016), at 5 min (p = 0.023), and at 30 min (p = 0.006) compared to baseline. Semi-fowler's position is associated with less coughing , bucking following extubation with decrease wound pain score than supine position. **Conclusion:** Compared to supine position, tracheal extubation in the semi- fowler's position is associated with less coughing, sputum suction, pain and better comfort with decrease stay in post anaesthesia care unit.

KEYWORDS

Supine, Semi-Fowlers, Trachea, Extubation, Lower Abdomen

INTRODUCTION:

A patients emergence from anaesthesia is related to multiple risk of complication like local trauma, breath holding, coughing, desaturation, laryngospasm, bronchospasm, aspiration, hypoxia, hypertension or tachycardia .Successful extubation is defined as an effective airway protection after removing the endotracheal tube and it is characterised by effective cough reflex function and preserved mental status in the absence of airway obstruction. In the semi-Fowler's position, the extension of abdominal muscles decreases, thereby potentially relieving the intension of surgical wound and abdominal pain. In addition, peritoneal effusion is restricted to the lower position, leading to a more adequate drainage. Moreover, studies have shown that the semi-Fowler's position can increase the lung capacity by 10 to 15% and improve the range of motion of diaphragm muscle; this facilitates lung expansion and increases gas exchange . One study revealed that using the semi-Fowler's position within 24h of tracheal intubation significantly reduced ventilator-associated pneumonia. Early postural interventions in patients after general anesthesia can facilitate pulmonary ventilation and increase blood oxygen content.

Postoperative coughing, which is considered to be very helpful for sputum excretion and recovery of pulmonary function, increases abdominal pressure and aggrevates the pain, for which the patients are not willing to cough actively in the supine position. Therefore, we need a better position for extubation after abdominal surgery, should be used postoperatively to achieve less abdominal pain and better patient comfort which will not increase the workload of paramedics.

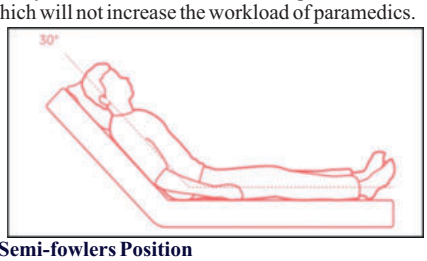


Figure 1- Semi-fowlers Position

AIM AND OBJECTIVE :

To compare the patients comfort visual analog scale score and wound pain visual analogue score between supine and semi-fowler's groups at different time interval following extubation.

Zhu Qiongfang et al. in 2020 conducted a randomized clinical study of supine versus semi-fowler's positions for tracheal extubation in 141 patients of abdominal surgery and concluded that tracheal extubation in the semi-fowler's position is associated with less severe coughing, sputum suction, pain, and more comfort, without any specific adverse effects when compared to the conventional supine position.[1] All the selected patients were anesthetized with propofol, fentanyl, cisatracurium, and sevoflurane. Post-operatively patients were randomly placed into the semi-fowler's (n=70) and supine (n=71) position with 100% oxygen supplementation. The patients were extubated after they opened their eyes and regained consciousness. Vital signs, coughing, pain and comfort scores before and after extubation were recorded. This study has demonstrated that the semi-fowler's position for emergence and extubation was a better choice for patients undergoing abdominal surgery than the traditional supine position.

MATERIAL AND METHODS:

Study design: Hospital based observational study.
Study location: Department of Anaesthesiology, Assam Medical College and Hospital, Dibrugarh.
Study duration: June, 2021 to May, 2022.
Study population:All the patients undergoing lower abdominal surgery under general anaesthesia in Assam Medical College & Hospital
Ethical Clearance: Ethical clearance obtained from the Institutional Ethics Committee (Human) of Assam Medical College & Hospital

Patient selection:
Inclusion criteria
1. Patients who give informed consent.
2. ASA Grade I-II

3. Age between 18-60 years [Female/male]
4. Patients planned for elective abdominal surgery
5. Patients with body mass index [BMI] <30.

Exclusion criteria

1. Patients with cardiovascular, respiratory, hepatic and renal disease.
2. History of allergy.
3. All patients with difficult airway and where difficult endotracheal intubation is anticipated.
4. All patients with neuromuscular disease.
5. Pregnancy

Study variables

1. Noninvasive mean arterial pressure (MAP),
2. Heart rate (HR)
3. Respiratory rate (RR)
4. Peripheral capillary oxygen saturation (SpO2)
5. Sore throat VAS score
6. Wound pain VAS score
7. Bruggeman comfort scale (BCS) score,
8. Nursing staff satisfaction score

Sample size calculation

Considering 95% of confidence interval with a power of 90% and taking the findings of the study by Zhu Qiongfang et al, as reference the sample size of the study is calculated and rounded off to be 180 [90 in each group].

Sampling technique: Simple random sampling

Sampling groups :

The study's participants are assigned to either the semi- fowler's position group (the experimental group; n=90) or the supine position group (the control group; n=90) using a simple number table. Patients in the supine group have their endotracheal tube removed in the supine position without changing positions. During emergence and extubation, patients in the experimental group are positioned in the semi- fowler's position (supine with a 30° head-up). All the baseline data, consisting of noninvasive mean arterial pressure (MAP), heart rate (HR), respiratory rate (RR), peripheral capillary oxygen saturation (SpO2) and temperature, are recorded before anesthesia (T0) and at six points: (1) 10 minute before extubation (T1), (2) immediately after positioning (T2), (3) the moment before extubation (T3), (4) 1min after extubation (T4), (5) 5min after extubation (T5), (6) 30min after extubation (T6), and (7) when leaving the operation theater (T7).

Along with demographic information, the sore throat VAS score, wound pain VAS score, Bruggeman comfort scale (BCS) score, comfort VAS score, and nursing staff satisfaction score are also collected .Statistical significance is tested by using unpaired t-test and p value of <0.05 is considered as statistically significant

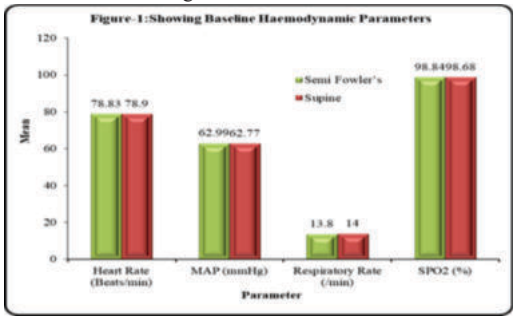
Consent: Written and informed consent was taken from all patients.

Statistical analysis:

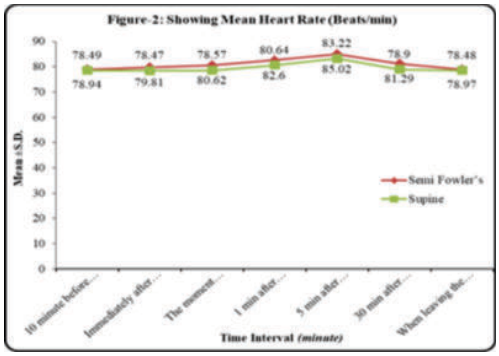
Data are presented in terms of mean ± SD. Statistical significance is tested by using unpaired t-test and p value of <0.05 is considered as statistically significant. Analysis is done by using Microsoft excel.

RESULTS:

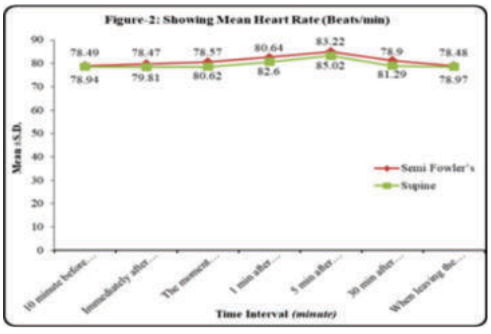
The groups were tested for homogenicity with respect to baseline heart rate, mean arterial pressure, respiratory rate, and SpO2. The groups were found to be homogenous with respect to these hemodynamic parameter at 5% level of significance.

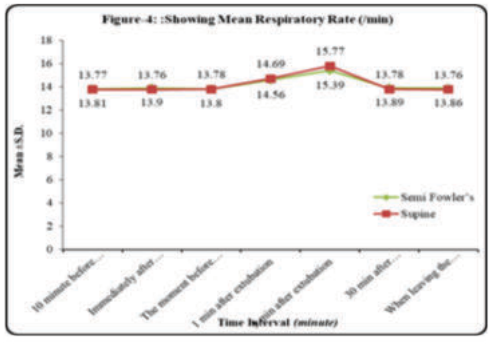


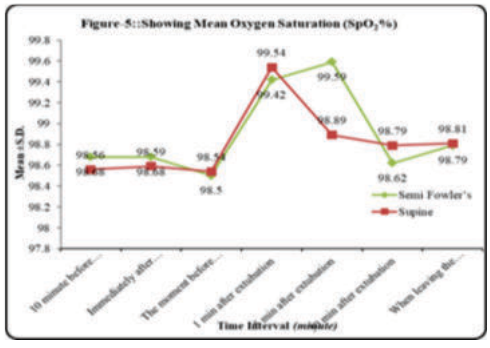
A statistically significant difference ($p < 0.05$) in heart rate seen at the moment before extubation with p value of 0.011, 1 min after extubation with p value of 0.016, 5 min after extubation with p value of 0.023 and 30 min after extubation with p value of 0.006. At 5 min after extubation heart rate rise was maximum seen in both the group with p value of 0.023 and it was highly significant.



On analyzing MAP , SpO2, RR statistically it was found that, there was no significant difference between the two groups at different time interval.



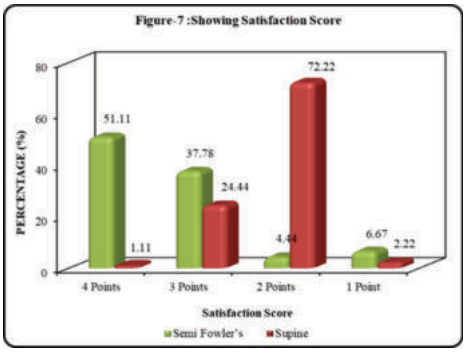




On statistical analysis of BCS score, comfort VAS score, sore throat VAS score, and wound pain VAS score at different time interval in both groups it was found that BCS score of both the groups were comparable, however a statistically significant difference noted in comfort VAS scores at 5 min after extubation and before leaving operation theatre with p value of 0.001 and 0.000 respectively.

There is no statistically significant changes seen in Sore throat VAS score of both the groups at different time interval. The wound pain VAS scores of the semi-fowler's position group were significantly lower than those of the supine position group at all intervals after extubation .

On analysis of satisfaction score given by nursing personnels it was found that the nurses have given more score to the patients of semi-fowler's group as compared to supine group with a p value of 0.001 which is highly significant.



DISCUSSION:

In our study, the semi-fowler's posture 5 minutes after extubation and upon leaving the PACU had considerably higher comfort VAS values. At all time points following extubation, the wound pain VAS scores were lower in the semi- fowler's position indicating that easing abdominal wall strain may have contributed to the reduction of wound pain and improved patient comfort in this position. On the other hand, the two groups BCS scores based on the evaluation of wound pain were comparable. The inconsistent results can be explained by the different standards for the evaluation and precision of these scales. These results also suggested that the disparity in patient comfort between the two groups may be due to variables other than wound pain.

Patients in the semi-fowler's position had significantly fewer severe coughing after extubation and fewer episodes of immediate bucking after extubation and also semi-fowler's position group received full satisfaction scores from nurses.

Nurses have given higher score of 3, 4 to the majority of patient in the semi- fowler's position, and lesser score like 2, 3 to the patients in supine position, suggesting that they were more happier with the semi-fowler's position. Patients in the semi-fowler's position were more likely to manage their sputum excretion on their own, also they complained less for the abdominal pain or discomfort. Hence the semi-fowler's position achieved higher satisfaction from both patients and nurses.

In 1996**, Brimacombe JR et al**. reported that severe coughing and gagging at the end of anaesthesia due to ETT results in acute hemodynamic changes, rise in intraocular and intracranial pressure and hypoxia.[2] As semi-fowler's position is associated with less severe coughing and bucking with stable haemodyanics it supports our study that semi-fowler's position is better than supine for tracheal extubation in patients of lower abdominal surgery.

Chaudhary AK et al. discovered in 2005 that keeping a patient's head elevated to at least 30 degrees or higher at all times, as clinically tolerated, reduces the risk of aspirating contaminated oropharyngeal secretions, which prevents the development of ventilator-associated pneumonia and lowers patient mortality in intensive care units.[3] This is in accordance with our study as patients is semi-fowler's position were more comfortable in tolerating their secretions than supine position hence, there is decrease incidence of aspiration pneumonia in semi-fowler's position.

Limitations Of The Study

(1) It was carried out in a single hospital with an insufficient sample size.
(2) This study found no benefits for respiration or oxygenation, despite the semi-fowler position being beneficial for respiratory recovery.
(3) Implementing the semi-fowler's position for various surgical procedures and in patients with comorbid conditions would give further information about the effectiveness of this technique.
(4) Effective analgesia play an important role in post operative pain but in our study amount of analgesia administered is not recorded.
(5) Post operative follow up is done for a period of 24 hrs only, however pain persisting thereafter is not recorded.
(6) Only clinical observations served as a gauge for adequate anaesthesia depth and neuromuscular blockade. It could have been wiser to use bispectral index and neuromuscular monitoring as a guidance.

CONCLUSION:

Our study has showed that the semi-fowler's position dramatically reduces the postoperative wound pain in patients of lower abdominal surgery, severe coughing and bucking after extubation, improving patient comfort and nursing staff satisfaction without raising the risk of peri-extubation complications in the PACU and also maintain stable hemodynamics.

The haemodynamic parameters like heart rate, systolic blood pressure, diastolic blood pressure and mean blood pressure, SPO2, RR all are well controlled which further increases patients compliance.

The use semi-fowler's position in mechanically ventilated patients, unless contraindicated, should be considered as standard practice in the ICU and operation theatre, and supine positioning should be avoided where as possible. Further research work is required to examine clinical correlation of semi fowler'sposition to the wider ICU population and surgical patients and its long-term effects on oxygenation, ventilation, ICU and hospital stay.

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