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THE BAILEY MANOEUVRE FOR DEEPEXTUBATION-COMPARISON WITH STANDARD EXTUBATION TECHNIQUE

Anesthesiology

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ABSTRACT

BACKGROUND: Traditional awake extubation leads to various respiratory complications; such as respiratory obstruction,coughing, laryngospasm, bucking and hemodynamic response like increase in arterial pressure, heart rate,intracranial and intraocular pressure which can be detrimental in patients who have undergone intracranial surgery and in patients with coronary artery disease .

SETTINGS AND DESIGN: This prospective randomized study was conducted in a Tertiary Care Centre in 60 ASA grade I and II patients coming for general surgery.

MATERIAL AND METHODS :A prospective randomized observational study was carried out and patients were divided into 2 groups awake endotracheal extubation group (group E)and exchange extubation group (group S).At the end of surgery in traditional group, awake extubation of ETT was done. In exchange group, 0.3 mg/kg propofol was administered, and the ETT was exchanged for I-gel. Awake extubation of I-gel was then performed. Respiratory complications such as bucking, coughing, desaturation and the need for I-gel repositioning and hemodynamic response were noted.

RESULTS: Hemodynamic response measured immediately at extubation in terms of heart rate, systolic blood pressure (BP), diastolic BP and mean arterial pressure were all significantly lesser in exchange group (group S) when compared to traditional extubation group (group E) .Respiratory complications were significantly more in traditional extubation in) comparison to exchange extubation group (P < 0.001).

CONCLUSION : It was concluded that exchange extubation with I-gel decreases hemodynamic stress response and respiratory complications as compared to traditional awake extubation.

KEYWORDS

Endotracheal Tube, Extubation, I-gel, The Bailey Manoeuvre

INTRODUCTION:

Tracheal extubation of patients following anaesthesia is a complex and skilledprocedure that carries potential risk of various complications. These risks range fromminor, such as sore throat to major life threatening complications; such as airwayobstruction. Minimization of these risks is essential for smooth emergence andrecovery from anaesthesia. Respiratory complications after tracheal extubation are three times more common than complications occurring during tracheal intubation and induction of anaesthesia.[1]Extubation under deep anaesthesia decreasescardiovascular stimulation and reduces the incidence of coughing and straining. Tracheal extubation is associated with a 10–30% increase in arterial pressure and heart ratelasting for 5–15 minute which may not be acceptable in patients having cardiac problems or neuro-surgery[2].The Bailey's method overcame these complication by extubating the patientsin deep plane and allowing them to wake up comfortably on LMA. This technique allows extubation under deep anaesthesia by substituting an oralendotracheal tube for an LMA. Extubation under deep anaesthesia prevents haemodynamic and respiratory responses such as hypertension tachycardia, dysarrhythmias, coughing, laryngospasm, bucking, myocardial ischemia, increasedintracranial and intraocular pressure.[3,4] The primary objective of our study was to compare haemodynamic changes in traditional awake extubation of an ETT and that following exchange extubation of ETT by using I-gel.The secondary objectives of our study was to compare any episode of coughing, bucking, post operative sore throat and desaturation< 95%.

MATERIAL AND METHODS

After obtaining approval from Institutional ethics committee, we carried out a randomized prospective study in 60 patients of ASA physical status I and II in the group of age20-60 years posted for elective general surgery under general anaesthesia. Exclusion criteria included age less than 20 and more than 60 years hypertension, morbidobesity, severe Cardiac dysfunction, anticipated difficult airway and refusal by the patient. 60 patients were randomly allotted to group-E awake endotracheal extubation group and group Sex change extubation with I-gel supraglottic airway device. All patients included in the study were kept nil orally for 8 hours preoperatively after thorough preanaesthetic check up and laboratory investigations.

Airway examination of the patients was done. Tablet alprazolam 0.25 mg was given the night before surgery and at 6.00 am on the morning of surgery to all the patients. Tablet Ranitidine 150mg on morning of surgery with sip of water was given. On arrival in operation theatre, routine monitoring (ECG, Pulse Oxymetry, NIBP) was done and baseline vital parameters like HR, MAP, Arterial Oxygen Saturation SPO2 were recorded. An intravenous line was secured with 20 gauge Cannula and Ringer Lactate Infusion was started. Intravenous Glycopyrrolate0.01mg/kg, Intravenous midazolam 0.025mg/kg, Intravenous fentanyl 2 mcg/kg was given prior to start of surgery.

Preoxygenation was carried out for 3 minutes with 100% oxygen using afacemask. Induction was done with I/V propofol 1-2mg/kg. Endotracheal Intubationwas facilitated by using muscle relaxant vecuronium bromide in the intubating doseof 0.1 mg/kg. Anaesthesia was maintained with oxygen, nitrous oxide, isoflurane 0.6-1% and Intermittent bolus dose of vecuronium, tidal volume was set at 8 ml/kg and respiratory rate was adjusted to keep end tidal CO2 between 32 and 40 mm Hg.In Group E,at the end of surgical procedure, Isoflurane and N2O was discontinued. Neostigmine 0.05-0.07 mg/kg and glycopyrrolate 0.01 mg/kg I/V were used to reversethe effect of vecuronium. When the patient generated tidal volume of >4ml/kg,ETCO2 <40 mm Hg and responded to verbal command, extubation was performed. Supplementary oxygen was provided with Hudson mask at the rate of 6L/min.In Group S,at the end of surgical procedure, N2O was discontinued and a bolus of 0.3mg/kg propofol was administered. After one minute oropharynx was suctioned and aI-gel was inserted with ETT in situ (Bailey's maneouvre). The ETT was then removedand I-gel was connected to breathing circuit. Position of I-gel was confirmed byauscultation, capnography and exhaled tidal volume. Following successful insertionof I-gel, isoflurane was discontinued and 100% oxygen was administered at 6L/min.

The patient was ventilated until consciousness was regained.

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Neuromuscular blockade wasreversed with neostigmine and glycopyrrolate and the patient was monitored. Whenpatient was able to maintain spontaneous Tidal volume of >4ml/kg, end tidal CO2 of<45mmhg and responded to verbal commands I-gel was removed.Patients were observed from the end of surgery (EOS) up to 1 h in the postanaesthesia care unit. The occurrence of straining, bucking, coughing,sore throat I-gel repositioning and desaturation to <95% was noted The occurrence of any one of the above incidents were considered as respiratory complication.Theheart rate (HR), systolic BP (SBP), diastolic BP (DBP) and mean arterial pressure (MAP) were recorded at thebaseline ,before induction, end of surgery, just after exchange, just after extubation, 5 min after extubation, 10 min after extubation , and 15 min after extubation.

STATISTICALANALYSIS

The data from the present study was systematically collected, compiled and statistically analyzed using software IBM SPSS 26 to draw relevant conclusions. Sample size was calculated in consultation with the statistician taking mainly the haemodynamic parameters and based on previous studies to get the power of study more than 85%.The continuous data were presented as mean with standard deviation(mean ± SD). Number of patients and/or percentage of cases expressed discretecategorical data. Categorical variables were analysed using chi-square test. Normally distributed continuous variables were analysed using independent sample t-test. The p value was determined finally to evaluate the levels of significance. The p value of>0.05 was considered non-significant, p value of 0.01 to 0.05 was considered significant and p value <0.001 was considered highly significant. The results were then analysed and compared to previous studies.

RESULTS

While comparing the distribution of sex, age, weight, and ASA grade between the two groups was statistically non significant Heart rate, Systolic blood pressure, diastolic blood pressure and mean arterial pressure in the baseline and at the end of surgery was statistically non significant between the two groups.

Immediately after extubation Group E had a significantly higher mean heart rate, systolic blood pressure, Diastolic blood pressure and mean arterial blood pressure as compared to Group S with p value <0.001. Values are shown in Figure 1,Table1, table 2, and figure 2 ..

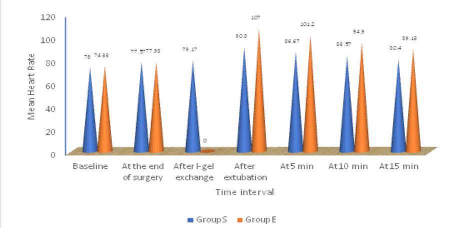

Figure1:mean Heart Rate (per Minute) At Different Time Intervals During Intraoperative Period

Table 1: Mean Systolic Blood Pressure (mmhg) At Different Time Intervals During Intraoperative Period

Timeinterval	GroupS		GroupE		t-value	p-value
	Mean	SD	Mean	SD		
Baseline	122.67	8.51	121.33	7.71	0.67	0.26
At the end of surgery	122.93	6.27	121.97	6.69	0.65	0.28
After I-gel exchange	131.70	5.89	-	-	-	-
After extubation	148.87	6.66	167.80	6.20	-12.71	0.00
At5min	143.45	6.40	161.83	6.21	-12.53	0.00
At10min	139.67	5.82	156.47	6.46	-12.53	0.00
At15min	136.33	5.40	152.83	6.52	-14.88	0.00

Table 2: Mean Diastolic Blood Pressure (mmhg) At Different Time Intervals During Intraoperative Period

Timeinterval	GroupS		GroupE		t-value	p-value
	Mean	SD	Mean	SD		
Baseline	75.20	6.16	74.97	6.87	0.14	0.45
At the end of surgery	74.90	5.20	76.63	5.70	-1.43	0.11
After I-gel exchange	79.87	5.07	-	-	-	-
After extubation	89.63	5.10	101.87	5.66	-10.56	0.00
At5min	86.90	5.20	97.13	6.24	-7.87	0.00
At10min	84.83	5.36	93.17	5.99	-6.22	0.00
At15min	82.77	5.26	89.37	5.80	-5.01	0.00

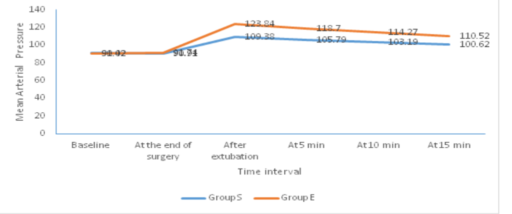

Fig 2: Mean Arterial Pressure

All thesehaemodynamic parameters immediately after extubation ,at 5 min ,at 10 min and at 15 minute post extubation significantly remained high in group E as compared to group S On comparing the respiratory complications between the two groups the incidence of cough,bucking (p value < 0.001) and sore throat (p value <0.05) was significantly more in group E as compared to group S (Table 3, Figure 3). The incidence of I gel repositioning in group S was 23%.Incidence of desaturation in group S was3.33% and incidence of desaturation in group E was 6.67%. Difference in the incidence of desaturation in two groups was nonsignificant with p value >0.05.

Table 3: Respiratory Complications

RESPIRATORY COMPLICATIONS	GROUP S TOTAL 30 (%)	GROUP E TOTAL 30 (%)	P VALUE
BUCKING	2 (6.67%)	24 (80%)	0.001
COUGH	5 (16.67%)	22 (77.33%)	0.001
SORE THROAT	5 (16.67%)	12 (40%)	0.045
DESATURATION<95%	1 (3.33%)	2 (6.66%)	0.552

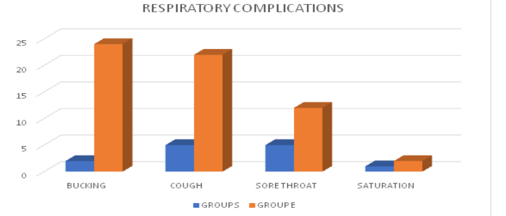

Figure 3

DISCUSSION

The hemodynamic responses and respiratory complications associated with extubation are often overlooked during the conduct of general anesthesia (GA).[5,6,7]. Minimization of these risks is essential for smooth emergence and recovery from anesthesia. Tracheal extubation is associated with rise in arterial pressure, heart rate which may not be acceptable in patients having coronary artery disease and intracranial surgery.Extubation of trachea in deeper planes of anaesthesia is a common method to avoid this stress response. Thiscan be achieved by the use of inhalational agents or opioids, but they may cause lossof the airway and prolonged sedation.[8,9]

Pharmacological agents such as lidocaine, beta blockers, calcium channelblockers, and dexmedetomidine are effective in controlling the haemodynamicresponse during extubation.[10,11,12]But they do not prevent coughing, bucking during extubation of endotracheal tube .The Bailey's method overcame this by extubating the patients in deep and allowing them to wake up comfortably on LMA.[13]This technique allows extubation under deep anaesthesia by substituting an oral endotracheal tube for a supraglottic airway device.Many studies have approved the benefits of supraglottic airway exchange in deep anaesthesia before extubation and to attain these benefits in whom raised haemodynamic parameters are detrimental. So we decided to opt for this manoeuvre. Guedel airway, Ambu laryngeal mask airway and laryngeal mask airway have commonly been used in exchange extubation. I-gel has a soft get like, non-inflatable cuff designed to provide an anatomical impression fit over the laryngeal inlet.Insertion of I-gel is significantly easier and more rapid than insertion of LMA.

However there are limited studies where I-gel was used in such situation. Therefore we did a plan to conduct a study of respiratory and haemodynamic outcomes following exchange extubation with I-gel as compared to standard awake extubation. The patients were divided into two groups one with standard extubation group (group E) and in the other bailey's manoeuvre was used (group S). On comparing the haemodynamic parameters, the present study demonstrated that hemodynamic response in terms ofheart rate,systolic blood pressure, diastolic blood pressure and mean arterial pressurewere significantly lesser in exchange extubation group when compared to awake endotracheal extubation. The result of our study are supported by a similar study conducted by Ma HN et al[14] who compared haemodynamicchanges in elderly hypertensive patients during extubation after surgery. In their study in one group endotracheal tube was extubated when being awake(group TT) and inother group endotracheal tube was exchanged for LMA under deep anaesthesia before extubation (group LM).Compared with group LM, systolic blood pressure, diastolicblood pressure, mean arterial blood pressure and heart rate were significantly higherat in group TT ($P < 0.05$). Similar results were also notedin a study by Suppiah RK et al[15]group and by Ping H et al[16]. Although there was increase in the hemodynamic parameters at the time of removal and insertion of I-gel in group s as compared to the baseline .But even these values were significantly lesser than the values noted at the time of awake extubation in Group E. Thus , bailey's manoeuvre can prove extremely beneficial in scenerios where adverse hemodynamic outcomes are uncalled for. On comparing the respiratory complications that is oxygenation desaturation ,coughing and bucking in both the groups, it was found that one patient in group S reported oxygenation desaturation <95% while the two patients were observed to desaturation in group E . The incidence of desaturation was 3.33% and 6.66% in group S and group E respectively. However ,the p value was non significant (p =0.552).

Similar results were reported by suppiah RK et al in their study where the incidence of desaturation in ETT group and LMA group was similar and statistically non significant. On observing coughing and bucking episodes in both the groups statistically significant difference was found. Where only five patients had coughing and 2 patients had bucking in the supraglottic airway device group ,22 patients out of 30 patients had coughing and 24 out of 30 had bucking episodes in ETT group amounting to an 77.33% incidence of coughing 80% incidence of bucking in group E (P=0.001).Similarly,90% patients reported bucking during extubation in another study conducted by Koga K et al . In a study by Suppiah RK et al, the incidence of cough was 83.3% for the ETT group and 20% for the LMA group.Our results are thus in concordance with the study mentioned above . On comparing the incidence of sore throat in both groups the incidence of sore throat in group S was observed in 12 patients (40%) out of 30 patients. In the study by jain et al [17],the incidence of sore throat in both the cLMA exchange group and the Ambu laryngeal mask exchange grouprecorded 1 h after surgery was 16%.On comparing the success rate of I-gel placement in our study ,we were able to place the I-gel successfully in the first attempt in 76.67% of cases. However, the overall successful insertion was noted in 100% cases after minor manipulation. Repositioning of I-gel was required only seven out of thirty patients in group S . A previous study conducted by stix et al ,had also shown that LMA placement was successful in the first attempt in 95% of the cases [18.] Another study conducted by Suppiah RK et al also reported that only 9 out of 30 patients in their study . Modir H et al also found that overall I-gel insertion during endotracheal exchange was 100 % successful .[19] The above findings can be attributed to the streamlined structure of the I-gel that lines efficiently along the pharyngeal airway and its ease of insertion . Thus bailey's manoeuvre can be superior to the standard awake extubation, especially in elective neurological and cardiac patients.

CONCLUSION

We concluded that exchange extubation of ETT with supraglottic airway device I-gel decreases respiratory complications and haemodynamicstress response when compared to traditional awake extubation So exchange extubation with I-gel supraglottic airway device can be considered as a safe option for the patients having coronary artery disease, neurosurgery in whom hemodynamic stress response of extubation is to be blunted.

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