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‘’COMPARISION OF SNIFFING POSITION AND MODIFIED RAMPED POSITION FOR ENDOTRACHEAL INTUBATION IN OBESE PATIENTS POSTED FOR ELECTIVE SURGERY UNDER GENERAL ANESTHESIA’’

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ABSTRACT-

Background and Aim: Laryngoscopy is basic necessity for intubation, it becomes difficult in obese patients. Optimal positioning is mandatory to increase the chance of securing the airway. This study aims to compare sniffing and modified ramped position in obese patients.

Aim- aim of the study is ‘comparison of sniffing position and modified ramped position for endotracheal intubation in obese patients posted for elective surgery under general anesthesia’’

Method: Seventy-six obese patients (body mass index above 30 kg/m2), aged 18 to 65years, with American Society of Anesthesiologists class II or III, scheduled for any operation under general anesthesia with endotracheal intubation were randomly allocated to Sniffing Position (SP) and Modified Ramped position (MRP) (n=38 each). Patients with unstable cervical spine, limited neck extension, airway mass were excluded from study. After induction of anesthesia and muscle relaxation patient was positioned in SP or MRP for endotracheal intubation. Number of intubation attempts (primary outcome), time for vocal cord visualization and time for endotracheal tube insertion (secondary outcome) were recorded. Statistical analysis was done using SPSS version 21.0. Quantitative parameters were compared using Student’s t-test, and qualitative parameters were compared using Chi-square test. P value of <0.05 was considered significant.

Results. First attempt success rate was achieved in 38(100%) cases in SP group compared to 26(70%) cases in MRP group (P<0.001). Time till vocal cord visualization(sec) was 12.6±2.3sec in SP group and 40.6±6.5sec in MRP group (P=0.002). Time till endotracheal tube insertion was 36.8±7.5sec in SP group, 68.5±12.1sec in MRP group(P<0.001).

Conclusion: Sniffing position showed lower number ofintubation attempts, less time for vocal cord visualization and less time for endotracheal tube insertion.

Introduction:

Proper positioning of the head and neck is essential for optimal laryngeal visualization during direct laryngoscopy (DL). In 1936, Sir Ivan Magill[1] recommended placing a pillow under the occiput to raise the head and then to extend it to achieve the best laryngeal exposure. Obesity is a growing concern around the world, so anesthesiologists must be prepared to address the entire perioperative care of obese patients. In obese females, laryngoscopy is usually impeded by patients' breasts; therefore, the intubation process could be prolonged leading to serious hypoxia.[2] The tracheas of obese patients may be more difficult to intubate than those of normal-weight patients. Head elevation in the supine obese patient does not alone guarantee a proper sniffing Position.[3] In obese patients the anteroposterior diameter of the chest is increased so that it is almost impossible to obtain a neck flexion angle of 35° unless the shoulders and upper torso are also raised[4].

Sniffing position:

Slight flexion of the neck on the thorax and extension of the head on the neck at the atlanto-occipital joint.[5]

Modified ramped position:

This position was achieved using a special pillow (Hasanin Pillow). The pillow's height and length were 15 cm and 60 cm (Figure 1). The shoulders were elevated, and the head was extended to the most possible range to bring the breasts away from the laryngoscope.[6]

The study hypothesized that a new position, termed modified-ramped position, during induction of anesthesia would facilitate better endotracheal intubation.

The present study was designed to compare sniffing position with modified ramped position for endotracheal intubation in obese patients posted for elective surgery under general anesthesia with primary objective being number of intubation attempts for successful endotracheal tube insertion and the secondary objectives being time taken for vocal cord visualization (seconds) and time taken for endotracheal tube insertion (seconds).

Figure 1: The Special pillow designed for achieving modified ramped position

Aims- the aim of our study is ‘’comparison of sniffing position and modified ramped position for endotracheal intubation in obese patients posted for elective surgery under general anesthesia’’.

Methods:

This randomized comparative study was conductedafter obtaining institutional ethics committee clearance (vide approval number Med/DNB/2021-166 dated 07/04/2021) and complies with the ethical standards as laid down in the Declaration of Helsinki and its lateramendments. The study was conducted at a tertiary care teaching institute between (September 2020-March 2022). Patients were explained about the study protocol and a written informed consent was obtained for participation in the study and use of the patient data for research and educational purposes and its publication. Seventy six obese patients (body mass index above 30 kg/m2), aged 18 to 65years, with American Society of Anesthesiologists class II or III, scheduled for any operation in Obese patients coming for surgery under General anaesthesia were included. Patients with unstable cervical spine, limited neck extension, airway masses, facial or neck scars, edentulous patients, BMI>40Kg/m2 were excluded from the study.

All patients were kept nil per orally for at least 8 hours. After a thorough pre-anaesthetic check-up, patients were wheeled in the operation theatre, and routine monitors including pulse oximeter, electrocardiograph and non-invasive oscillometric blood pressure were attached, and baseline parameters were recorded. An 18 G intravenous cannula was inserted, and Lactated Ringer’s solution was started. Patients were randomly assigned to one of the two groups based on a computer-generated table of random numbers with allocation concealment done. Patient was preoxygenated with 100% FiO2 for 3 minutes. Anaesthesia was then induced using Fentanyl(2mcg/kg) and propofol (2mg/kg) and adequasy of mask ventilation was checked before giving vecuronium(0.1mg/kg). Patient allocated in SP was positioned in Sniffing position and patient

allocated in MRP was positioned in Modified Ramped position using the special pillow (Hasanin Pillow) (figure 1)[6]. Ventilation was maintained using face mask for 3–4 min, then, the endotracheal tube of appropriate size was inserted by the same anesthesiologist using appropriate sized Macintosh blade. The laryngoscopic view was graded according to the Cormack-Lehane[7] scale without and with cricoid pressure and time till vocal cord visualization and endotracheal tube insertion is noted.If the laryngeal visualization was not sufficient in the Modified-Ramped position group, the head was manually positioned to sniffing position and intubation done. The position of endotracheal tube was confirmed using five point auscultation and capnography. The special pillow was removed after confirming successful intubation. Patients with difficult bag and mask ventilation and difficult laryngoscopy are excluded from the study and difficult airway guidelines are followed further. Anaesthesia was maintained with 33% oxygen in nitrous oxide and sevoflurane. Intermittent doses of i.v. vecuronium were given for continued muscle relaxation. After completion of surgery, neuromuscular blockade was reversed with neostigmine 0.05–0.08 mg/kg and glycopyrrolate 0.008–0.01 mg/kg i.v.; once the patient was awake and breathing spontaneously, the airway maintenance device was removed.

Number of intubation attempts, time for vocal cord visualization, time for endotracheal intubation, Cormack-Lehane view without cricoid pressure, Cormack -Lehane view with cricoid pressure, Laryngoscope handle obstruction were noted. According to a previous study[6] The modified ramped group showed lower incidence of difficult laryngoscopy (3% versus 47%, $p < 0001$), lower incidence of difficult mask ventilation (20% versus 83%, $p < 0.001$), shorter time for glottic visualization (13 ± 3 s versus 17 ± 2 s, $p < 0.001$), and shorter time for endotracheal tube insertion compared to the ramped position.

Data entry was done in a spreadsheet, and statistical analysis was done using IBM SPSS Statistics for Windows version 21.0. One-time-measured quantitative parameters which followed the normal distribution were compared using unpaired Student's t-test, and those which were non-normally distributed were analysed using Mann–Whitney U-test. The qualitative parameters were compared using Chi-square/Fisher's exact test. A P value of <0.05 was considered significant.

Results:

Eighty patients were screened for eligibility. Two of these patients did not give consent to participate, two had relatively difficult airway (Figure 2)

Demographic profile and size of the airway maintenance device used were comparable among the two groups (Table 1)

In sniffing group all the patients gone through single intubation trial 38 (100%) while in modified ramped 26 patients (70%) had one intubation trial and 12 patients (30%) had gone through two trials ($p<0.0001$) (Table 2)

Table 1: Demographic profile

Characteristics	Sniffing Group (n=40)	Modified Ramped Group (n=40)	P value
Age (years)	46.41± 9.68	40.53 ±5.79	0.44
Gender, n (%)			
Male	14 (35%)	5 (12.5%)	0.89
Female	26 (65%)	35 (87.5%)	0.68
Body mass index (Kg/m^2)	33.9± 2.3	34.9 ±2	0.76
Snoring	26 (65%)	12 (30%)	0.78
MPG I	2 (5%)	3 (7.5%)	0.09
MPG II	20 (50%)	19 (47.5%)	
MPG III	17 (42.5%)	18 (45%)	
MPG IV	1 (2.5%)	0 (0%)	

*Values are expressed as Mean±SD (t-test); †values are expressed as ratio;

MPG: Mallampati, $p<0.05$ significant

Table 2: Number of intubation trials

Number of intubation trials			
	Sniffing Group (n=38)	Modified Ramped Group (n=38)	P value
1	38 (100%)	26 (70%)	<0.0001
2	0 (0%)	12 (30%)	

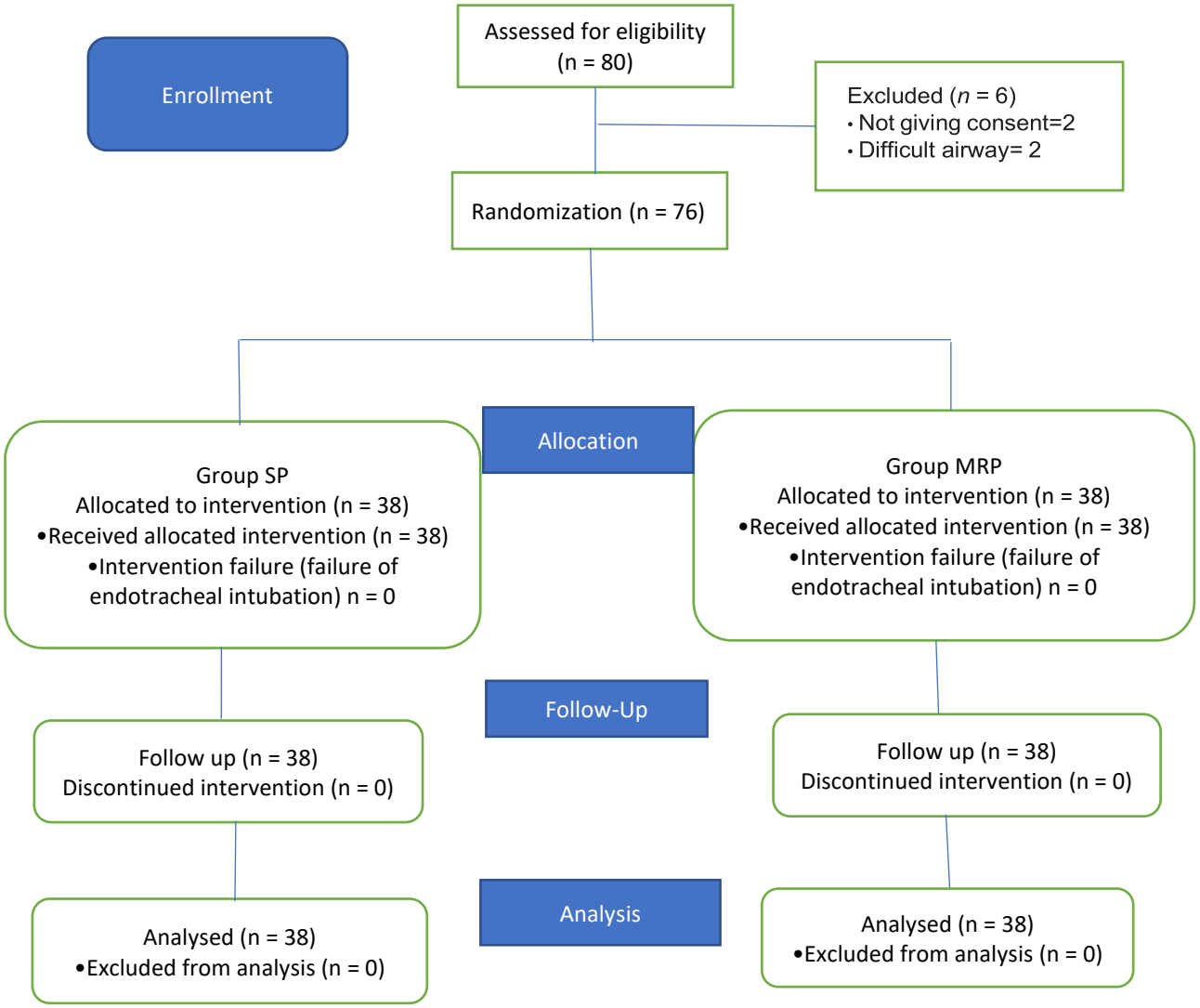


Figure 2: Consolidated standards of reporting trials (CONSORT) chart of patients

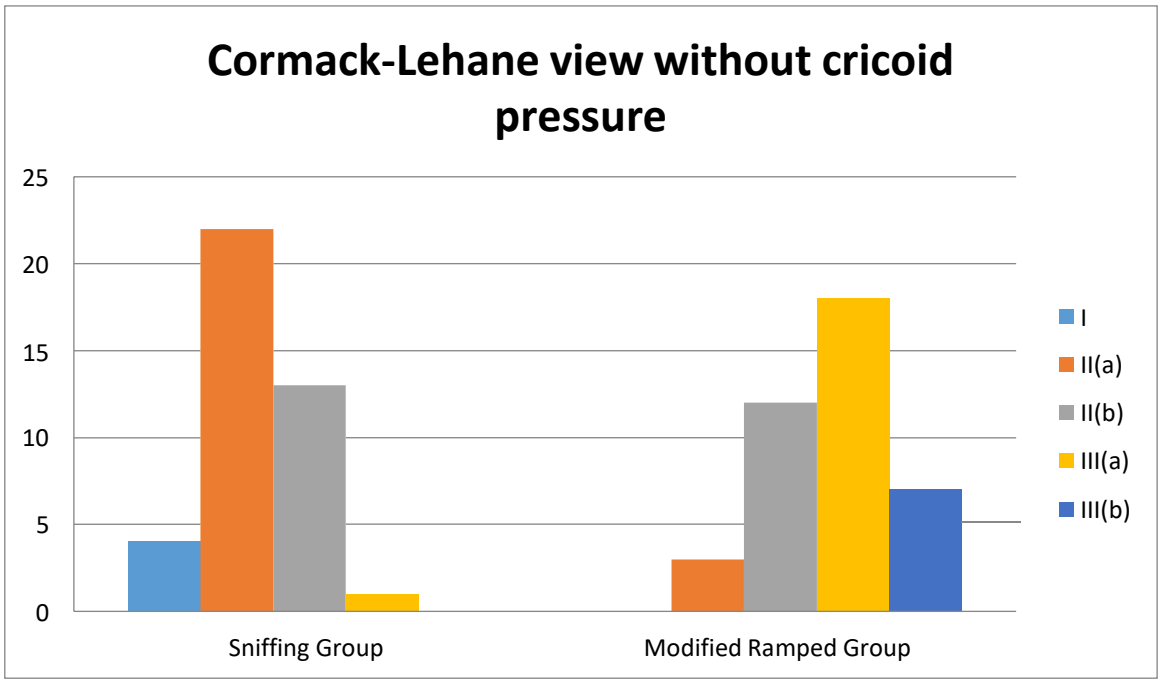
Out of all the successful placements, first attempt success rate was achieved in 38 (100%) cases in SP group compared to 26 (70%)cases in MRP group($p<0.0001$). During vocal cord visualization, the mean time in sniffing group is shorter compared to modified ramped (12.6 s v/s 40.6 s, p= 0.002). In sniffing group shorter mean endotracheal tube insertion time had seen as compared to modified ramped (36.8 s v/s 68.5, $p<0.001$).(Table 3)

	Sniffing Group (n=40)	Modified Ramped Group (n=40)	P Value
Relatively difficult mask ventilation	2 (5%)	2 (5%)	0.87
Difficult laryngoscopy	1 (2.5%)	1 (2.5%)	0.74
Time till vocal cord visualization (seconds)	12.6 (2.3)	40.6 (6.5)	0.002
Time till endotracheal tube insertion (seconds)	36.8 (7.5)	68.5 (12.1)	<0.001

Table 3: Outcomes

The Cormack-Lehane grade of laryngeal view was better in the sniffing group position as most of the patients in sniffing group Cormack- lehane grade < II while in modified ramped group more than half of the patients had Cormack- lehane grade > III (Figure 3).

Figure 3: Cormack-Lehane view without cricoid pressure



The Cormack-Lehane grade with cricoid pressure, most of the patients had adequate laryngeal visualization in sniffing position group (Cormack- lehane grade < II). In our study, 15 patients had obstruction in handling in sniffing position while no patients had obstruction in modified ramped position.

Discussion

The study found out that during vocal cord visualization, the mean time in sniffing group is significantly shorter as compared to modified ramped group (12.6 s v/s 40.6 s, p= 0.002). The study also found out that the mean time in endotracheal tube insertion was significantly shorter in sniffing group as compared to modified ramped group (36.8 s v/s 68.5, p<0.001)

In a study Lee et al., (2015)[8] reported that ramped group showed a higher rate of successful endotracheal intubation and better laryngeal view than sniffing group (P<0.05). The rate of successful endotracheal intubation was higher in ramped group than in sniffing group. Laryngeal view was not different between the two groups and within each group when the two heights of the operating table were used. In contrast to this, the present study has reported thatthe Cormack-Lehane[9] grade of laryngeal view was better in the sniffing group position as most of the patients in sniffing group. The results have signified that Cormack- lehane[31]

grade IIa was found in majority of patients in sniffing group while in modified ramped group more than half of the patients had Cormack- lehane grade III. The study found out that most of the patientshad adequate laryngeal visualization in sniffing group (Cormack- lehane[9] view with cricoid grade < II) as compared to modified ramped group. Semler et al., (2017)[10] in their study reported that the ramped position may worsen glottic view and increase the number of laryngoscopy attempts required for successful intubation. The study hasreported significant difference between sniffing group and modified ramped group for obstruction handling ($p<0.001$).

The results of the present study has signified that in sniffing group all the patients gone through single intubation trials while in modified ramped group there were 70% patients who had only one intubation trial while there were 30% patients who had gone through two trials. The study has found highly significant association between both the groups regarding number of intubation trials.

There is scarcity of studies that have compared modified ramped position with sniffing position.Some studies have reported that modified ramped position is superior to the original ramped position. In a study, Modified-ramped position showed lower incidence of difficult mask ventilation, shorter time for glottic visualization, and shorter time for endotracheal tube insertion compared to the ramped position. The Cormack-Lehane[9] grade was also better in the modified-ramped position[6].However, this study involves the use of a relatively newer position which can prove to be a valuable addition to the armamentarium of the anaesthesiologist as it can be used as a conduit for intubation.

Conclusion

We conclude that the present study has found that sniffing position showed lower number of intubation attempts, less time for vocal cord visualization (seconds) and less time for endotracheal tube insertion (seconds). The sniffing position has also showed better laryngeal view, as compared to the modified ramped position. Modified Ramped position showed less obstruction during handling laryngoscope. To our knowledge, this is the firststudy that has compared modified ramped position and sniffing position for endotracheal intubation in obese patients. There is scarcity of relevant studies that would support the findings of present study. Therefore, further research had been suggested to compare the two positions and to reach the proper intubating position.

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