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RESEARCH ARTICLE

"SNIFFING VERSUS RAMPED POSITION IN THE VIDEO-LARYNGOSCOPY-GUIDED TRACHEAL INTUBATION OF MORBIDLY OBESE PATIENTS: A PROSPECTIVE RANDOMIZED OBSERVATIONAL STUDY"

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Abstract

Sniffing versus Ramped position in the videolaryngoscopy-guided tracheal intubation of morbidly obese patients: a prospective randomized observational study"

Introduction: Ramped positioning is recommended for intubating obese patients undergoing direct laryngoscopy. However, whether the use of the ramped position can provide any benefit in videolaryngoscopy-guided intubation remains unclear. This study assessed intubation time using videolaryngoscopy in morbidly obese patients in the ramped versus sniffing positions.

Materials and Methods: This is a prospective randomized observational study in patients with morbid obesity (n = 82; body mass index [BMI] ? 35 kg/m2). Patients were randomly allocated to either the ramped or the standard sniffing position groups. During the induction of general anesthesia, difficulty in mask ventilation was assessed using the Warters scale. Tracheal intubation was performed using a C-MAC® D-Blade videolaryngoscope, and intubation difficulty was assessed using the intubation difficulty scale (IDS). The primary endpoint was the total intubation time calculated as the sum of the laryngoscopy and tube insertion times.

Conclusion: Compared with the sniffing position, the ramped position reduced intubation time in morbidly obese patients and effectively facilitated both mask.

Introduction:-

- With the worldwide increase in the prevalence of obesity, anaesthesiologists are encountering an increasing number of obese patients in the operating room [1,2]
- For successful intubation under direct laryngoscopy, appropriate positioning is increasingly emphasized in obese patients [3,4]. Collins et al. [5] suggested placing morbidly obese patients in a ramped position rather than in the standard sniffing position.

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- The ramped position is achieved by arranging blankets under the patient's upper body and head to obtain a horizontal alignment between the external auditory meatus and sternal notch [6]. This position produces proper alignment of the oral, pharyngeal, and laryngeal axes (the three axes of intubation) in obese patients, similar to the sniffing position in lean patients. Subsequent studies have demonstrated that the ramped position significantly improved the laryngeal view in morbidly obese patients during direct laryngoscopy [7-9]

Aims and Objectives:-

To assesses intubation time using video laryngoscopy in morbidly obese patients in the sniffing versus ramped positions.

Materials and Methods:-

Source Of Data

The present study will be conducted in department of anaesthesiology at Basaveshwara teaching and general hospital attached to Mahadevappa Rampure Medical College, Kalaburagi.

Methods Of Collection Of Data

Study Design

The present is a Prospective Randomised observational Study.

Place Of Study

Basaveshwara teaching and general hospital, Mahadevappa Rampure Medical college Kalaburagi

Sample Size:

82patients into Group A & Group B (each group 41)

Sampling Procedure:

Study subjects will be selected after applying inclusion andexclusion criteria

Selection criteria for patients

Inclusion criteria

1. Patients with BMI ≥ 35 kg/m2
2. Age 20–80 years,
3. American Society of Anaesthesiologists physical status classification of I–II

Exclusion Criteria

1. Patients with a history of difficult intubation, cervical spine defect
2. Patients with a history of previous head and neck surgery, or risk of pulmonary aspiration
3. American Society of Anaesthesiologists physical status classification of III–IV

Methodology:-

1. Patients were divided into two groups: a sniffing position group and a ramped position group. Position allocation was based on a computer-generated random number list
2. In the sniffing group, the patient was placed in the supine position with a 7-cm-high pillow placed under the occiput.
3. For the ramped group, pillows were placed under the patient's upper body and head such that the external auditory meatus and sternal notch were horizontal.
4. In the operating room, the patient was placed in the assigned position (sniffing or ramped position) with standard monitors, including for electrocardiogram, non-invasive blood pressure, pulse oximetry, and capnography. All patients were preoxygenated with 100% oxygen for 3 min, after which anaesthesia was induced with propofol and fentanyl. After loss of consciousness, repetitive train-of-four (TOF) stimulation was started and rocuronium (0.6–1.0 mg/kg of ideal body weight) was administered.
5. The difficulty in manual mask ventilation was assessed using the **Warters scale**, which assigns points based on escalating levels of intervention to achieve a target tidal volume of 5 ml/kg of ideal body weight (Table 1) [10]

6. If the target tidal volume was not achieved, an airway device, increased inspiratory pressure, and two-person ventilation were used. The mask ventilation score was recorded when the TOF count reached zero. Difficult mask ventilation was defined as a score ≥ 4 on the Warters scale [11]
7. Tracheal intubation was performed using a C-MAC® D-Blade video laryngoscope. tracheal intubation procedures were performed by a single faculty anaesthesiologist who had experience in anaesthesia for more than 10 years.
8. The difficulty in tracheal intubation was assessed using the **Intubation Difficulty Scale (IDS)**. The IDS score was derived from the sum of seven variables:

- The number of intubation attempts
- Number of additional operators,
- Number of alternative intubation techniques used,
-Cormack grade of laryngeal view
- Use of increased lifting force during laryngoscopy,
- Application of external laryngeal pressure,
-Position position of the vocal cord under laryngoscopicview.

The degree of difficulty was categorized as :

- Easy (IDS = 0),
- Slightly difficult (IDS = 1 to 5)
-Moderate to major difficulty (IDS > 5),
-Impossible intubation (IDS = infinity) according totheIDSscore.

The total intubation time was calculated as the sum of the laryngoscopy and tube insertion times. Laryngoscopy and tube insertion times were measured separately to distinguish between difficult laryngoscopy and difficult tube insertion.

Laryngoscopy time was measured from the time when the blade tip touched the patient's lip until the best glottic view was achieved on the video laryngoscope monitor.

Tube insertion time was measured from the time the endotracheal tube was inserted into the patient's mouth until the passage of the tube.

A total sample size of 82 patients was calculated.
Categorical variables were compared using the chi-square test or Fisher's exact test. Data are presented as the number of patients, mean ± SD, or median (Q1, Q3). Statistical significance was set at $P < 0.05$.

Table 1. The Warters Grading Scale for Mask Ventilation

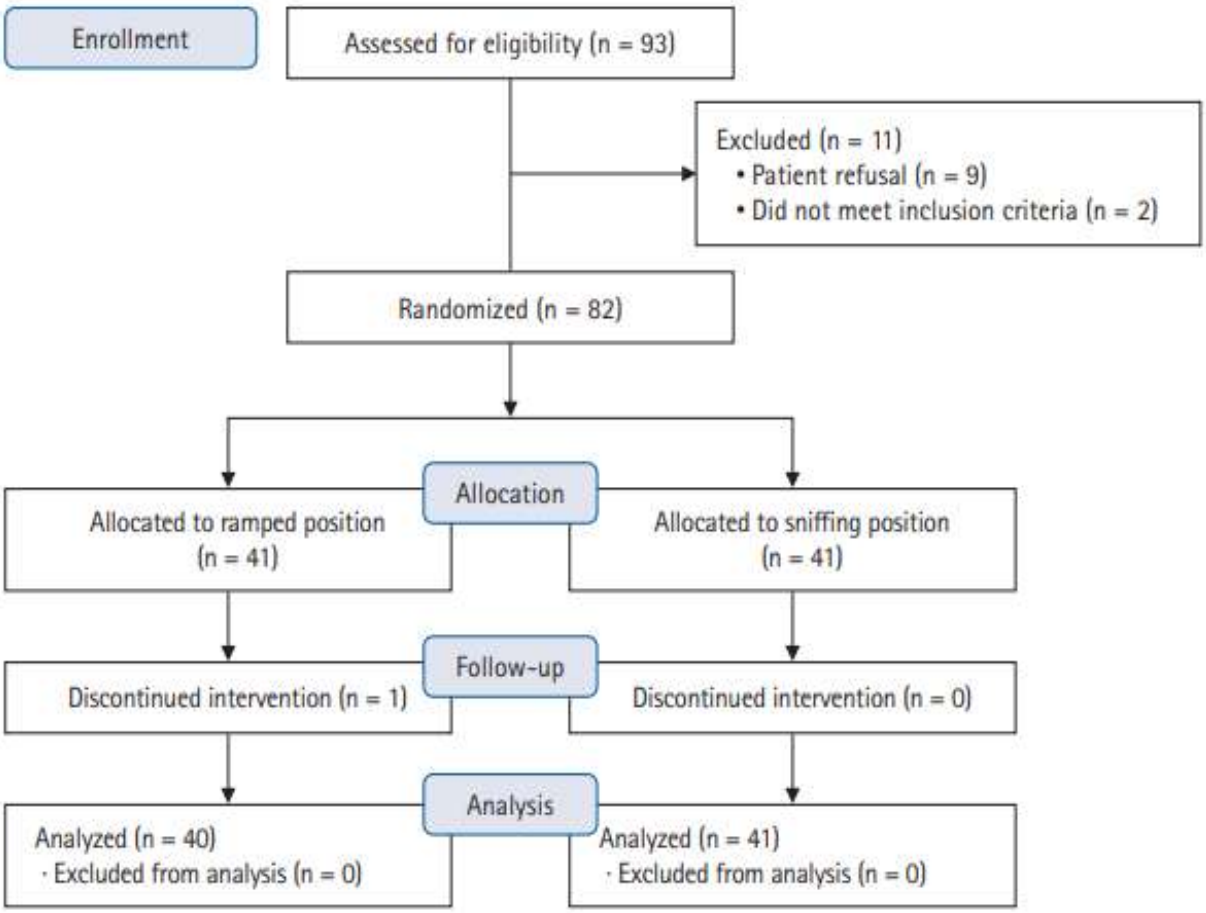
Description/definition	Points
Oral or nasal airway	1
PIP 20–25 cmH_2O	1
PIP 26–30 cmH_2O	2
PIP > 30 cmH_2O	3
Unable to generate PIP > 30 cmH_2O	3
Two-person ventilation	2
Tidal volume 2–5 ml/kg	2
Unable to ventilate	4

The point system is based on the ability to achieve a target volume of 5 ml/kg (ideal body weight). PIP: peak inspiratory pressure.

Table 2. Demographic Data

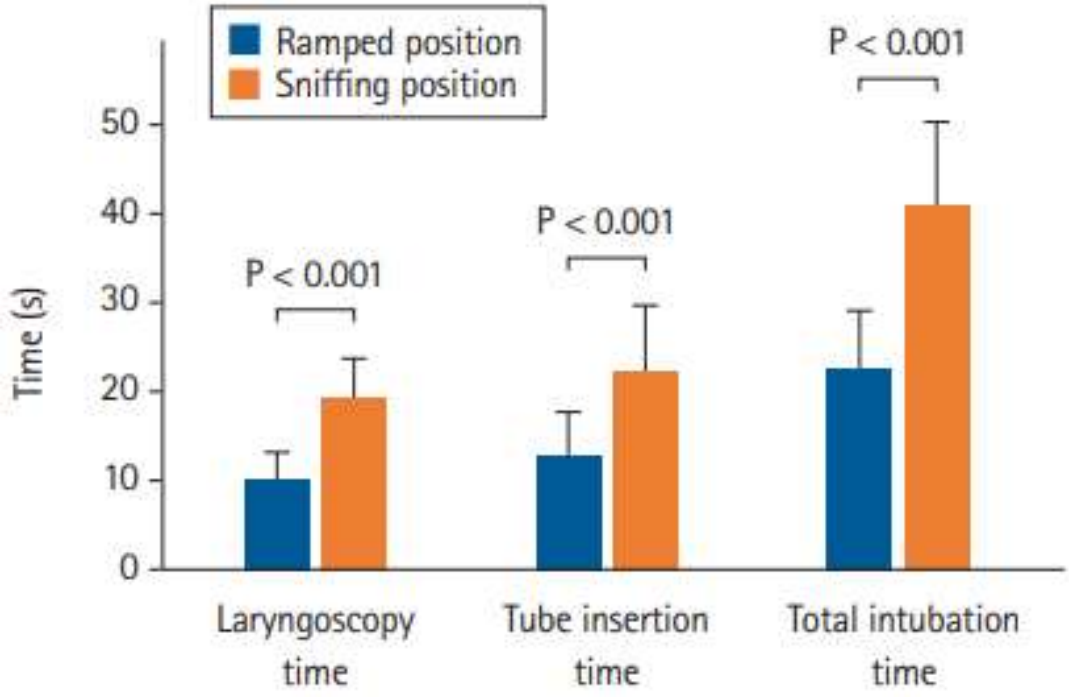
Variable	Ramped group (n = 40)	Sniffing group (n = 41)	P value
Sex (M/F)	19/21	20/21	0.908
Age (yr)	40.7 ± 15.7	46.5 ± 14.0	0.085
Height (cm)	162.1 ± 11.9	164.4 ± 10.3	0.350
Weight (kg)	101.6 ± 18.3	100.7 ± 14.2	0.800
BMI (kg/m^2)	36.8 (35.6, 40.9)	35.7 (35.2, 38.0)	0.058
ASA physical status (I/II/III)	0/24/16	0/21/20	0.505
Airway parameters			
Mallampati score (I/II/III)	23/14/3	21/20/0	0.128
Neck circumference (cm)	45.1 ± 5.6	45.2 ± 5.0	0.918
Sternomental distance (cm)	16.0 (14.9, 17.0)	15.2 (14.5, 16.8)	0.435
Thyromental distance (cm)	8.1 (6.8, 9.0)	8.2 (7.0, 8.8)	0.527
Inter-incisor distance (cm)	4.9 (4.5, 5.0)	5.0 (4.4, 5.2)	0.895

Values are presented as number of patients or mean ± SD or median (Q1, Q3). BMI: body mass index, ASA: American Society of Anesthesiologists.



Results:-

1. Eighty-two patients were randomized in the study, but one patient in the ramped group was excluded because the operation was cancelled. Thus, the study population comprised of 81 patients (40 patients for the ramped group and 41 patients for the sniffing group). There were no significant differences in the demographic data and airway parameters between the two groups.
2. The incidence of difficult mask ventilation was significantly lower in the ramped than in the sniffing group (2.5% vs. 34.1%, $P < 0.001$) (Table 3).
3. The rate of easy intubation was significantly higher in the ramped than in the sniffing group (70.0% vs. 7.3%, $P < 0.001$).
4. The rate of Cormack grade I was higher in the ramped than in the sniffing group (95.0% vs. 63.4%, $P = 0.001$)
5. although poor visualization of the glottis (Cormack grade ≥ 3) under videolaryngoscopy was not observed in either group.
6. Increased lifting force to expose the glottis during videolaryngoscopy was less frequent in the ramped than in the sniffing group (5.0% vs. 80.5%, $P < 0.001$)
7. The total intubation time, which was the primary outcome of the study was significantly shorter in the ramped than in the sniffing group (22.5 ± 6.2 vs. 40.9 ± 9.0 s; mean difference [95% CI] 18.4 [15.0, 21.8], $P < 0.001$) (Fig. 3)
8. Two components of the total intubation time were also significantly shorter in the ramped than in the sniffing group, respectively (10.0 ± 2.7 vs. 18.9 ± 4.5 s for laryngoscopy time, $P < 0.001$; 12.5 ± 4.9 vs. 22.0 ± 7.3 s for tube insertion time, $P < 0.001$).



Discussion:-

1. In the present study, intubation time using a video laryngoscope was compared between morbidly obese patients placed in the ramped versus the sniffing position. All intubations were completed successfully in both positions. However, the total intubation time was significantly shorter in the ramped than in the sniffing group. Laryngoscopy and tube insertion times were also shorter in the ramped group.
2. Mask ventilation and tracheal intubation were easier in the ramped than in the sniffing group
3. The long laryngoscopy time of the patients in the sniffing position can be explained by the difficult insertion of the laryngoscope blade. During laryngoscope insertion into the oral cavity, the tip of the laryngoscope handle moves towards the patient's chest. For morbidly obese patients in the sniffing position, laryngoscope insertion and manipulation are often impeded by the anterior expansion of the chest cavity, which results from increased fat deposition (Fig. 4)

4. The tube insertion time was also significantly shorter in the ramped than in the sniffing group, although videolaryngoscopy provided adequate exposure of the glottis (Cormack grade 1 or 2) for all patients. This finding demonstrated that the tube tip movement toward the glottic opening and tube advancement into the trachea are easier when obese patients are placed in the ramped position. One possible explanation for this finding is that the oropharyngeal airway may widen in the ramped position. Obese patients have a smaller upper airway cavity, which tends to collapse as fat accumulates in the upper respiratory tract and tongue [12-14]. A large amount of soft tissue around the neck may also affect upper-airway patency [15]. The head is more elevated in the ramped position than in the sniffing position, which increases the distance between the mentum and the cervical column. Thus, the ramped position may provide wider space for tube advancement to the glottic opening.
5. Prolonged intubation time with difficult mask ventilation is expected to be more problematic in morbidly obese patients because the altered respiratory mechanics of these patients can lead to arterial desaturation even r a brief period of apnoea, despite adequate preoxygenation [16-18]. Therefore, the present study suggests that morbidly obese patients need to be placed in the ramped position during the induction of anaesthesia.

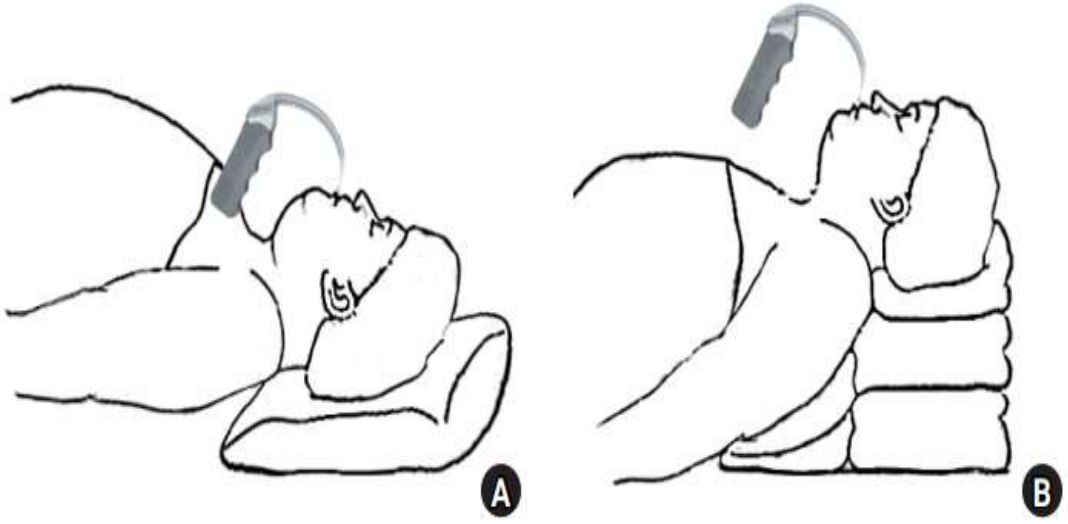


Fig. 4. Comparison of the difficulty of the videolaryngoscope blade insertion between the sniffing position (A) and the ramped position (B). In the sniffing position, laryngoscope insertion could be impeded by anterior expansion of the chest cavity in morbidly obese patients. In the ramped position, there might be more space for laryngoscope insertion and manipulation.

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