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A Comparative Evaluation Of Efficacy Between Besdata, Ambu Ascope, And Macintosh Laryngoscope For Intubation In Adult General Surgical Patients

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Abstract
Background: *In the context of general surgical operations, patient safety and procedure success are directly tied to the effectiveness of endotracheal intubation equipment. The comparative effectiveness of these devices in actual clinical situations is essential, notwithstanding the many technical breakthroughs that have been made.*
Objective: *The purpose of this research was to compare the performance of three different intubation devices—the Besdata, the Ambu aScope, and the Macintosh Laryngoscope—in adult patients undergoing general surgical procedures.*
Methods: *Between 2019 and 2022, researchers from Jawaharlal Nehru Medical College of AMU in Aligarh's Department of Anaesthesiology and Critical Care gathered data. Ninety patients were recruited, ranging in age from 20 to 70 years and in weight from 40 to 70 kg. After getting participants' consent, they were split into three groups at random. The Ambu aScope was used to intubate patients in Group A, the Besdata was used in Group B, and the Macintosh laryngoscope was used in Group M. Age, gender, height, and weight were recorded, as well as the participant's Mallampati status.*
Results: *There was universal success with intubation using all three devices. Average intubation times were found to be quickest using the Ambu aScope, then the Besdata, and finally the Macintosh Laryngoscope. The incidence of postoperative sore throat was lowest in patients intubated using the Macintosh Laryngoscope and greatest in those intubated with the Besdata. Ambu aScope had the best percentage of success on the first attempt. There were no statistically significant variations between patients in terms of demographic information or Mallampati grade.*
Conclusion: *While each of the three tools was useful, it also had its own set of advantages and disadvantages. It is important to consider the patient's anatomy, the clinician's level of expertise, and the clinical setting before settling on an intubation device.*
Keywords: *Endotracheal intubation, Besdata, Ambu aScope, Macintosh Laryngoscope, General surgical patients, Intubation efficacy, Mallampati grade, Postoperative sore throat, Anaesthesiology, Comparative evaluation.*

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I. Introduction

Endotracheal Intubation: A Primer

Endotracheal intubation continues to be a vital part of the fields of surgery and intensive care. When general anaesthesia is used or when spontaneous breathing is impeded, it serves a crucial role in patient safety by maintaining a patent airway. Mechanical breathing, protection against aspiration, and medicine administration may all be facilitated by introducing a flexible tube into the trachea via the mouth or nose.

Evolution of Intubation Devices

When it comes to intubation, the Macintosh Laryngoscope has always been considered the best option. Sir Robert Macintosh's innovative curved blade design for this tool, debuted in 1943, completely revolutionised intubation. Over time, advancements and improved technologies have been introduced in an effort to lessen problems, improve visualisation of the larynx, and increase success rates, particularly in patients with complex airway architecture.

As the field of anaesthesia and intensive care continues to advance technologically, new tools have been developed to improve the safety and efficacy of endotracheal intubation. These cutting-edge innovations are exemplified by tools like the Ambu aScope and Besdata. These developments are made with the intention of improving laryngeal vision, particularly in cases where anatomical abnormalities or diseases could obstruct the direct line of sight.

Purpose of the Study

Clinicians need to be able to quickly assess whether new equipment and methods will really be useful in their work. Comparative studies may cast light on the relative benefits and limitations of different technologies in real-world contexts, despite the fact that each item possesses its own distinct design, function, and usefulness.

This research aims to compare the classic Macintosh Laryngoscope, the Ambu aScope, and the Besdata, three of the most commonly recognised equipment for intubation. This study seeks to provide thorough understanding of the feasibility, effectiveness, and problems of each device by evaluating a wide range of characteristics, from intubation times to patient outcomes and complications.

Such comparisons are crucial in today's age of rapid medical progress. They help anesthesiologists choose the best course of action for each patient and inspire the development of new technologies and educational programmes. Our research aims to improve patient care and safety by shedding light on the complex dynamics of these intubation tools.

II. Methodology

Study Design and Setting

The Jawaharlal Nehru Medical College at Aligarh Muslim University undertook a prospective, randomised controlled experiment in the field of anesthesiology and intensive care. The purpose of this research, which will take place from November 2019 through September 2021 and include adult patients having elective procedures under general anaesthesia, is to compare the performance of the Besdata, the Ambu aScope, and the Macintosh Laryngoscope.

Ethical Consideration

The procedures for this research were reviewed and approved by the institution's Board of Studies, Department of Anaesthesiology, and Ethical Review Board before they could be implemented. Each participant provided written informed permission in accordance with established study ethical guidelines.

Participants

A total of 90 adult patients were enrolled based on the following criteria:

Inclusion Criteria:

- ASA Grade I & II patients.
- Age ranging between 20-70 years.
- Weight varying between 40-70 kg.
- Patients of either gender.
- Individuals scheduled for elective surgery.
- Cases exhibiting Mallampati Classifications of I, II, and III.

Exclusion Criteria:

- Previous history of multiple or failed intubations.
- Predicted difficulty with laryngoscopy & intubation, exceeding Mallampati Class III.
- Oral pathologies that could obstruct device insertion.
- Restricted mouth opening (less than 2.5 cm).
- Patients with a potentially full stomach (such as trauma patients, the morbidly obese, pregnant women, those with a history of gastric regurgitation or heartburn), or those at risk of esophageal reflux (e.g., hiatus hernia).

Randomization and Grouping

Leveraging computer-generated random number tables, patients were evenly distributed into three groups:

- Group A (n=30): Intubation was executed using the Ambu aScope.
- Group B (n=30): Intubation was conducted via the Besdata device.
- Group M (n=30): Intubation was accomplished with the Macintosh Laryngoscope.

It was not possible to blind the laryngoscopists to the gadget they were using due to the unique characteristics of each.

Learning Curve

Before the research, laryngoscopists used each device on 15 patients to become used to it and reduce the potential for any negative effects of unfamiliarity.

Anesthetic Procedure

A standard premedication regimen was given intravenously to all patients 15 minutes before they were taken into the operation room. This comprised:

- Glycopyrrolate: 0.2 mg
- Midazolam: 0.03 mg/kg
- Dexamethasone: 0.1 mg/kg
- Fentanyl: 1.5 mcg/kg of body weight

Anaesthesia was produced with Propofol (2.0 mg/kg) after a 3-minute pre-oxygenation period. After Succinylcholine (1.5 mg/kg) was administered to relax the patient's muscles, intubation was begun according to the patient's allocated group.

Data Collection

Primary Measures:

- Laryngoscopy & Intubation Time: After a successful intubation, the assistant will time how long it takes to remove the tube from between the patient's incisors.
- Success Rate: Successful intubation rates are correlated with first Mallampati scores obtained during pre-anesthesia evaluation.
- Number of Intubation Attempts: Definable as every time an intubation tube was withdrawn from a patient's mouth.
- Hemodynamic Responses: Checking BP and HR before induction, then at 1, 3, and 5 minutes after intubation to see whether there have been any significant changes.
- Adjusting Maneuvers: Cataloged under three grades based on their frequency.
- Grading Ease of Intubation: Separated into three tiers according on the degree of external manipulation needed.
- Laryngeal Morbidity: Examined by looking for evidence of injury or blood on the removed laryngoscopy blade or stylet.
- Postoperative Sore Throat: Patients were asked in the ER and again 24 hours later whether they were experiencing any new or unusual discomfort in their throats.

The collected data was then analysed statistically to determine the benefits and disadvantages of each tool.

Procedure

1. Pre-operative Assessment: Each patient was given a thorough pre-anesthetic evaluation upon arrival. All of their medical records, a physical examination, and any appropriate lab work were reviewed. The airway examination, which included checking for oral cavity pathology and evaluating the patient's ability to open their mouth, was given extra attention.

2. Patient Preparation: Surgeryday meant transferring patients to the OR. The patient was outfitted with standard monitoring equipment such as an electrocardiogram (ECG), pulse oximeter, and a non-invasive blood pressure monitor. Mean arterial blood pressure (MABP) and heart rate (HR) were taken at rest.

3. Pre-medication and Anesthetic Induction: Patients were premedicated 15 minutes before surgery was scheduled to begin by administering intravenous injections of Glycopyrrolate, Midazolam, Dexamethasone, and Fentanyl in the dosages described in the protocol. After 3 minutes of pre-oxygenation, Propofol was administered to induce sleep. Succinylcholine was used to relax the patients' muscles to the point where intubation could be performed.

4. Intubation: Patients were intubated based on their assigned groups:

- Group A: The laryngoscopist could see the glottis via the Ambu aScope and insert the endotracheal tube correctly.
- Group B: The glottis was first seen with the use of a laryngoscope, which was made possible by the Besdata instrument. After that, the endotracheal tube was placed with great care.
- Group M: Direct laryngoscopy was conducted using the standard Macintosh Laryngoscope, and once the vocal cords were visible, the tube was inserted.

After intubation, the amount of time it took to remove the device from between the incisors was recorded for each group.

Head repositioning, external laryngeal manipulation, and jaw thrust were used as necessary as adjusting manoeuvres. There was also proof that a bougie or other assistance were required. If intubation was unsuccessful three times, a supraglottic airway device would be used instead.

5. Maintenance of Anesthesia and Monitoring: Patients were ventilated using the circle circuit after a successful intubation. 60% N2O in oxygen, vecuronium bromide, and isoflurane were used to maintain anaesthesia. Throughout this stage, we kept a close eye on all of our vital signs. Blood and other indicators of trauma on the laryngoscopy blade or stylet were analysed to determine whether an injury had occurred during intubation.

6. Post-operative Assessment: Patients were taken to the recovery area after surgery was complete. Each patient's symptoms of a sore throat were evaluated by a third party who was unaware of the laryngoscopy technique employed. It was noted that there was a new, uncomfortable feeling in the throat. In order to determine the prevalence of laryngeal morbidity, including delayed-onset sore throat, this evaluation was repeated 24 hours after surgery.

The well-being and ease of the patient and the achievement of the best possible clinical results were the primary concerns during the whole treatment. Every detail of the experiment was documented for later examination.

III. Results

Demographic Characteristics

Table 1: Distribution of cases according to sex of the patient in the three groups. (N = 90)

Gender	Group A	Group B	Group M	P value
M:F	0.76	0.67	0.76	0.955

	Group A		Group B		Group M	
	N	%	N	%	N	%
Male	13	43.3	12	40.0	13	43.3
Female	17	56.7	18	60	17	56.7
Total	30	100	30	100	30	100

Table 1 provides a summary of the patient demographics across the three categories. There were a total of 90 adult patients enrolled in the trial; 30 each were assigned to Groups A and B, and 10 were randomly assigned to Group M. Group A had 43.3% men and 56.7% females, Group B had 40.0% males and 60.0% females, and Group M had a similar split of 43.3% males and 56.7% females. There was no statistically significant variation in the gender distribution across the groups (p = 0.955).

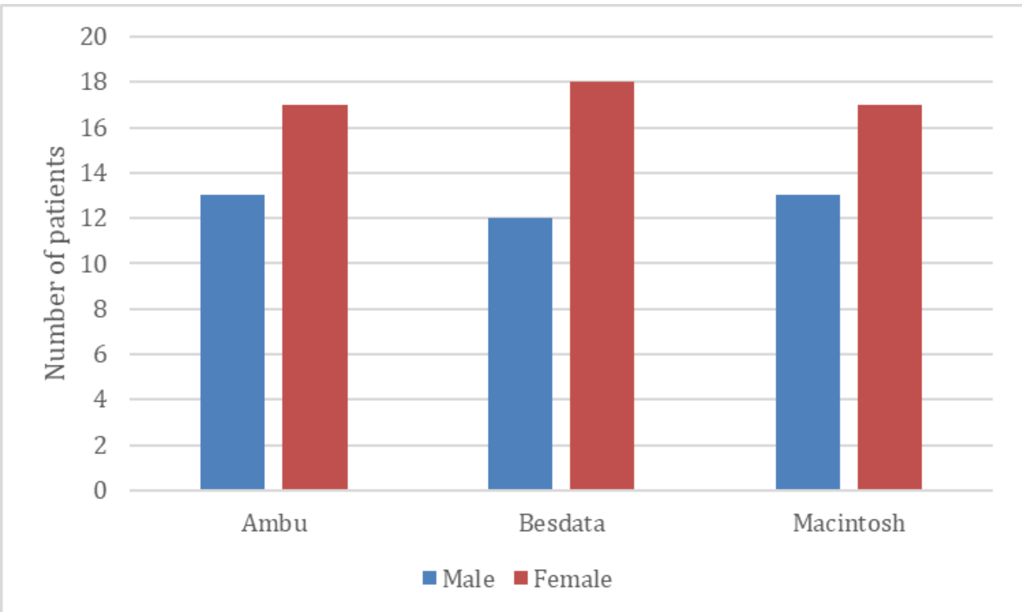

Figure 1: Graphical Representation Of Distribution Of Sex In The Three Groups

Age Distribution

Table 2: Distribution of cases according to age group in the three groups. (N = 90)

Age (Years)	Group A		Group B		Group M		TOTAL	
	N	%	N	%	N	%	N	%
21-30	10	33.3	7	23.3	11	36.7	28	31.1
31-40	4	13.3	9	30.0	10	33.3	23	25.6
41-50	11	26.7	8	26.7	5	16.7	24	26.7
50 & above	5	16.7	6	20.0	4	13.3	15	16.7
Total	30	100	30	100	30	100	90	100

Table 2 shows the breakdown of patients by age range within each group. There were four categories of patients based on age: those aged 21 to 40, those aged 41 to 50, those aged 50 and more. Patients' ages were very evenly distributed across the three categories. The average ages of the groups did not vary significantly from one another (p = 0.226).

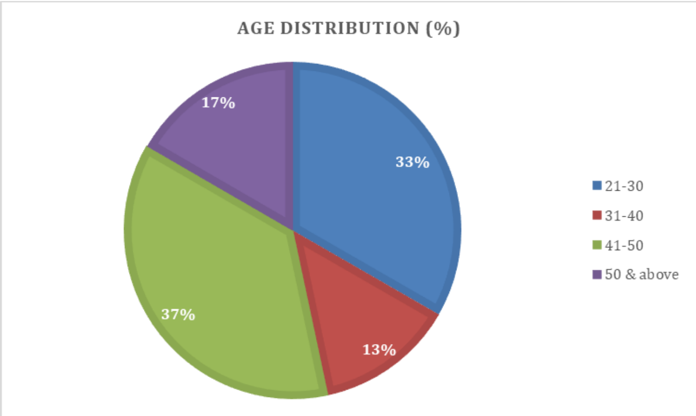

Figure 2: Graphical Representation Of Age Distribution Of Patients In The Ambu Group

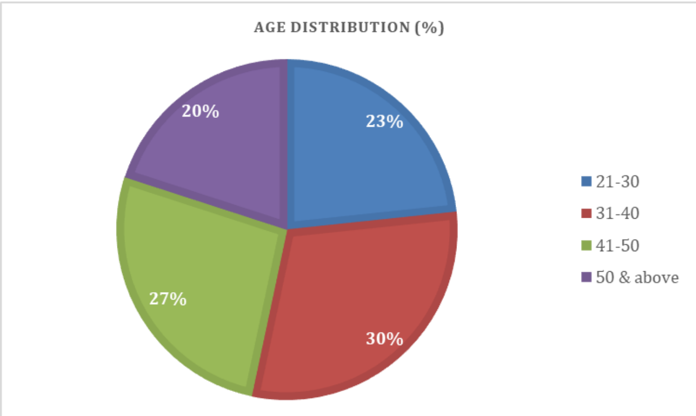

Figure 3: Graphical Representation Of Age Distribution Of Patients In The Besdata Group

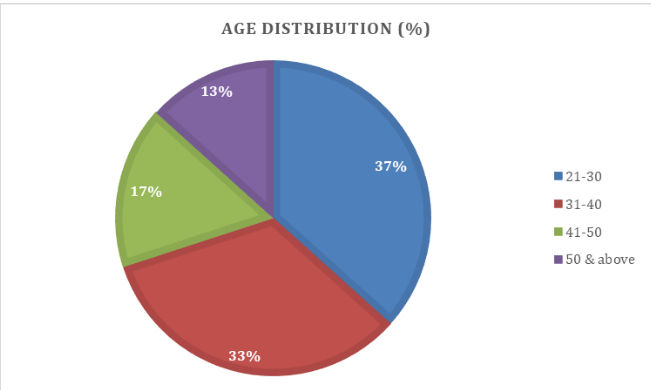

Figure 4: Graphical Representation Of Age Distribution Of Patients In The Macintosh Group

Table 3: Comparison of mean age between the three groups. (N = 90)

	Group A	Group B	Group M	P Value
Mean (Age in years)	40.83	40.27	36.27	0.226
SD	12.82	10.04	10.15	

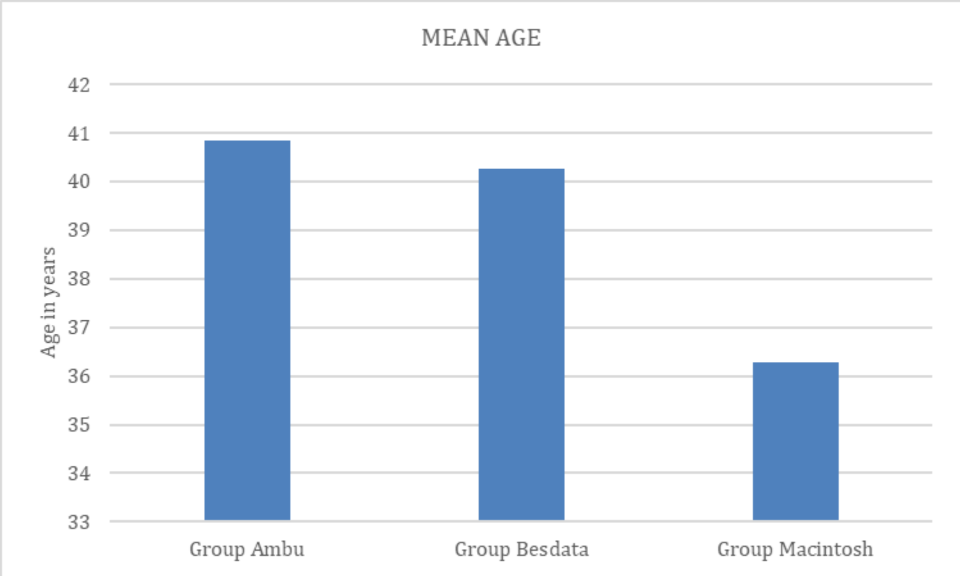

Figure 5: Graphical Representation Mean Age Of Patients In The Three Groups In Years

Body Mass Index (BMI)

Table 4: Distribution of cases according to body mass index in the three groups. (N = 90)

BMI(Kg/m2)	Group A		Group B		Group M		TOTAL		P Value
	N	%	N	%	N	%	N	%	
Underweight (<18.5)	0	0	0	0	0	0	0	0	0.942
Normal (18.5-24.9)	23	76.7	23	76.7	22	73.3	68	75.6	
Overweight (25-29.9)	7	23.3	7	23.3	8	26.7	22	24.4	
Obese (>30.0)	0	0	0	0	0	0	0	0	
Total	30	100	30	100	30	100	90	100	

Table 4 displays the percentage of patients in each category according to their body mass index. Patients were placed into four distinct groups depending on their body mass index (BMI): underweight, normal weight, overweight, and obese. In all three groups, almost the same number of patients fell into each BMI category, and the mean BMI values were also comparable. There was no statistically significant difference in the mean body mass index (BMI) between the three groups, as determined by an analysis of variance (ANOVA) test (p = 0.942).

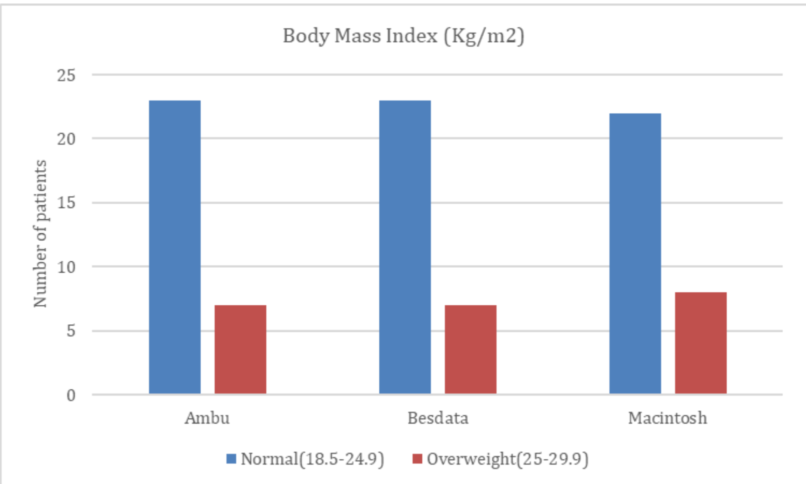

Figure 6: Graphical Representation BMI Of Patients In The Three Groups

Table 5: Comparison of mean Body mass index between the three groups. (N = 90)

	Group A	Group B	Group M	P Value
Mean (BMI)	23.79	23.79	22.88	0.305
SD	2.60	2.60	2.66	

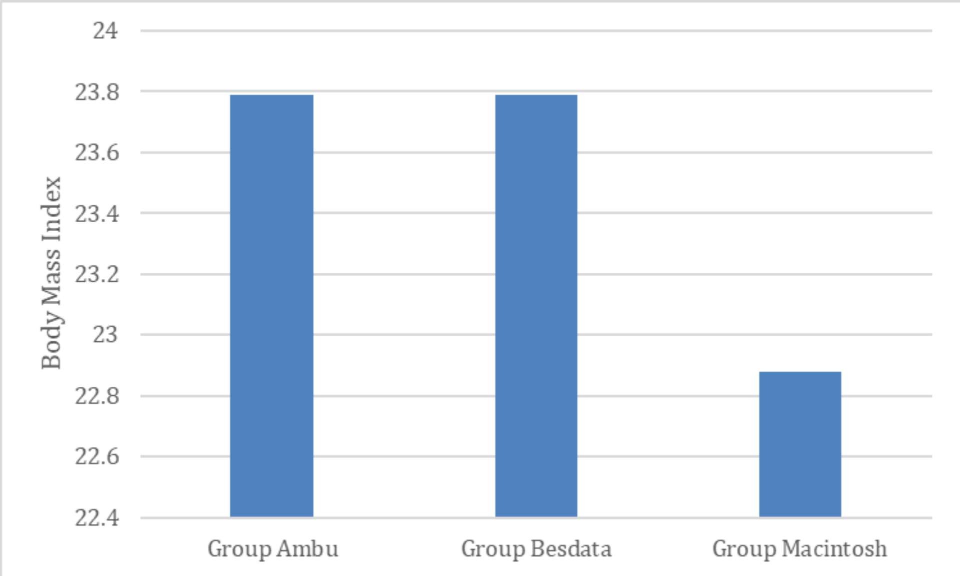

Figure 7: Graphical Representation Mean Bmi Of Patients In The Three Groups In Years

Mallampati Grade Distribution

Table 6: Comparison of Mallampati Grade of patients in the three groups. (N = 90)

Grade	Group A		Group B		Group M		TOTAL		P Value
	N	%	N	%	N	%	N	%	
MP I	14	46.7	15	50.0	17	56.7	46	51.1	0.092
MP II	11	36.7	15	50.0	12	40.0	38	42.2	
MP III	5	16.7	0	0	1	3.3	6	6.7	
Total	30	100.0	30	100.0	30	100.0	90	100	

The distribution of Mallampati scores for each group is shown in Table 6. Patients are classified in the Mallampati grading system depending on how much of their oropharyngeal structures are visible when their mouth is open and their tongue is protruded. There was no statistically significant variation in the distribution of Mallampati grades I, II, and III across the three groups (p = 0.092).

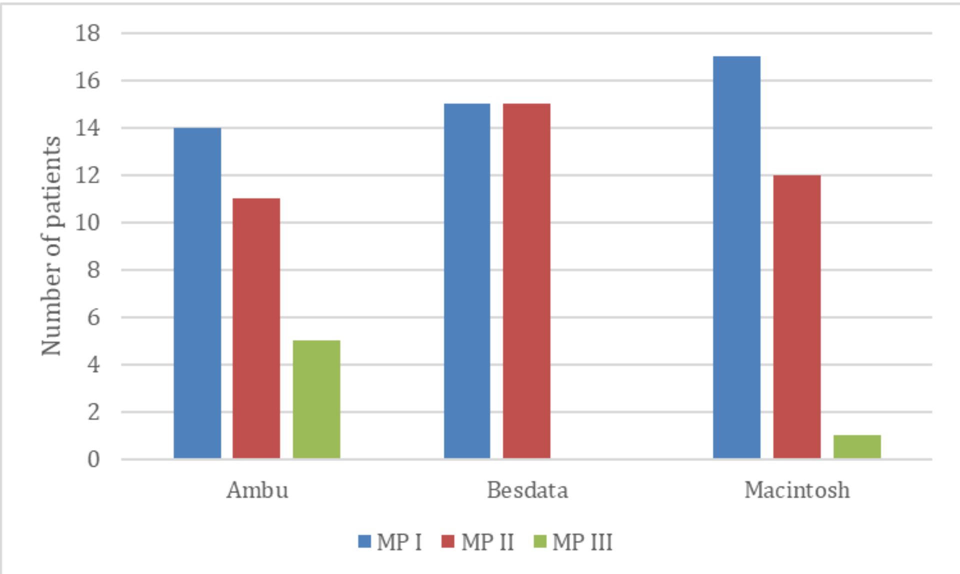

Figure 8: The Distribution Of Mallampati Grades In Various Groups Of Patients

Cormack Lehane Grade Distribution

Table 7: Comparison of Cormack Lehane Grade of patients in the three groups. (N = 90)

Grade	Group A		Group B		Group M		TOTAL		P Value
	N	%	N	%	N	%	N	%	
CL 1	26	86.7	28	93.3	27	90.0	81	90.0	0.914
CL 2A	2	6.7	1	3.3	1	3.3	4	4.4	
CL 2B	2	6.7	1	3.3	2	6.7	5	5.6	
Total	30	100.0	30	100.0	30	100.0	90	100	

Table 7 provides a summary of the distribution of Cormack Lehane grades, which evaluate the laryngeal view during laryngoscopy. Statistics showed no significant difference (p = 0.914) in the distributions of students receiving grades I, 2A, and 2B across the three groups.

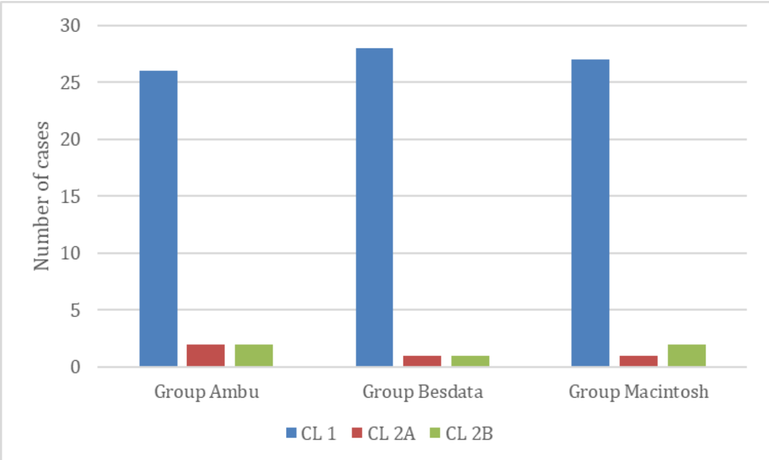

Figure 9: The Distribution Of Cormack Lehane Grades In Various Groups Of Patients

Intubation Time

Table 8: Distribution of laryngoscopy and intubation time in the three groups. (N = 90)

Time (sec)	Group A		Group B		Group M	
	N	%	N	%	N	%
1 – 10	5	16.7%	5	16.7%	3	10.0%
11 – 20	24	80.0%	21	70.0%	23	76.7%
21-30	1	3.3%	4	13.3%	4	13.3%
TOTAL	30	100.00	30	100.00	30	100.0

The range of intubation times is shown in Table 8. There were three groups defined based on how long it took to intubate a patient: 1-10 seconds, 11-20 seconds, and 21-30 seconds. Intubation times were distributed similarly throughout the three groups. In Group A, the average time to intubate was 12.80 seconds, in Group B it was 14.30 seconds, and in Group M it was 15.23 seconds. Group A had a considerably faster mean intubation time than Group M (p = 0.047).

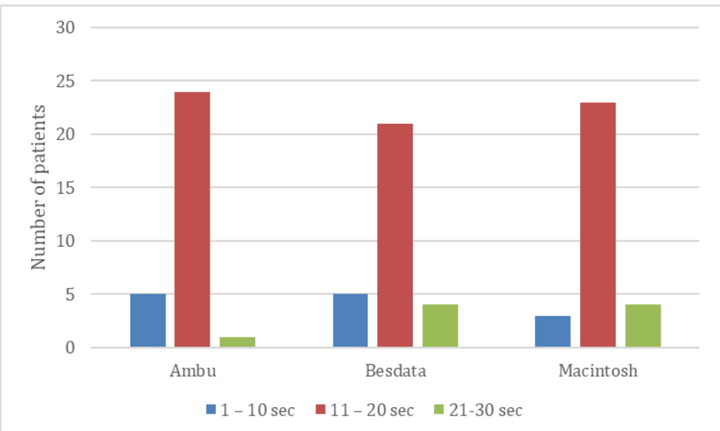

Figure 10: Graphical Representation Of Time Taken By The Three Devices To Intubate

Table 9: Mean time taken to intubate in the three groups. (N = 90)

	Group A	Group B	Group M	P Value
Mean (seconds)	12.80	14.30	15.23	0.047
SD	2.75	4.24	4.15	

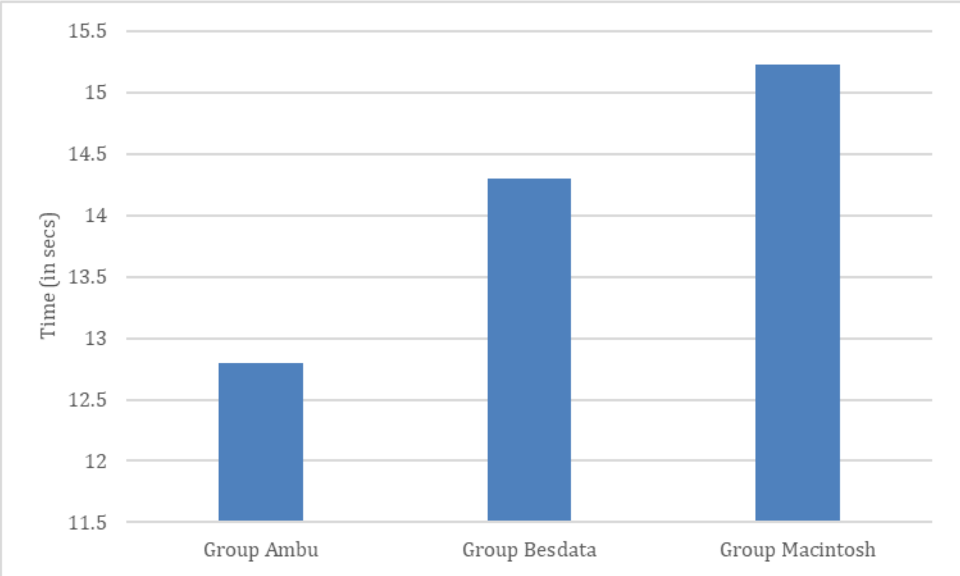

Figure 11: Comparison Of Mean Time Taken By The Three Devices To Intubate
Number Of Attempts

Table 10: Distribution of number of attempts to intubate in three groups

No. of attempts	Group A		Group B		Group M		Total		P Value
	N	%	N	%	N	%	N	%	
1	28	93.3	27	90.0	27	90.0	82	91.1	0.872
2	2	6.7	3	10.0	3	10.0	8	8.9	
TOTAL	30	100	30	100	30	100	90	100	

Table 10 shows the average number of tries needed to perform a successful intubation for each category. Most patients were intubated on the first try across all categories. There was no statistically significant difference in the distribution of tries across the three groups (p = 0.872).

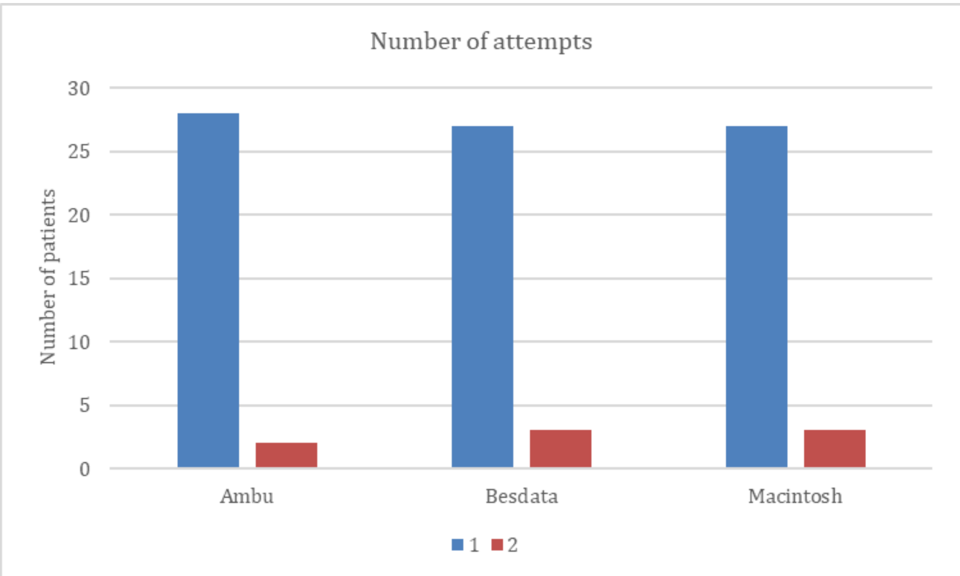

Figure 12: Graphical Presentation Of Number Of Attempts To Intubate In Three Different Groups Of Patients

Adjusting Maneuvers

Table 11: Distribution of adjusting maneuvers in the three groups of patients

No. of adjusting maneuvers	Group A		Group B		Group M		P Value
	N	%	N	%	N	%	
0	0	0	0	0	24	80	**<0.001**
1	27	90.0	26	86.7	5	16.7	
≥2	3	10.0	4	13.3	1	3.3	
TOTAL	30	100	30	100	30	100	

The frequency with which various intubation adjustments must be made is shown in Table 11. The number of corrections performed was coded as 0, 1, or ≥2. Significant differences were seen in the distribution of adjusting manoeuvres among the three groups. Patients in Group M were more likely to need no adjustments than those in Groups A and B.

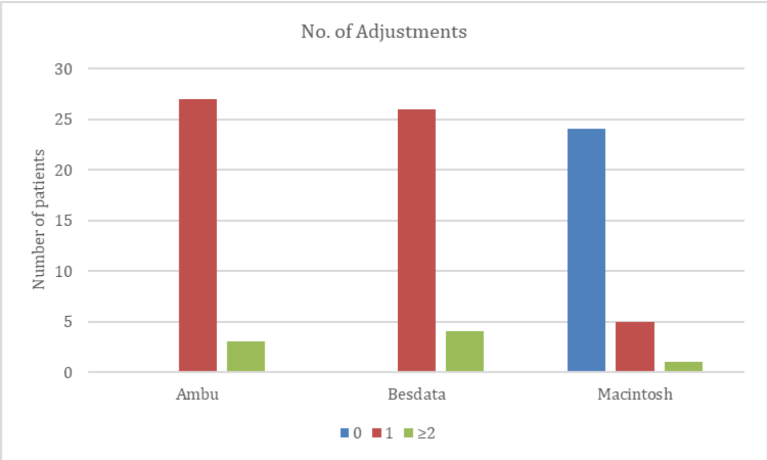

Figure 13: Adjustment Maneuvers Required By The Three Devices To Intubate The Patients

Ease of Intubation

Table 12: Distribution of ease of intubation in the three groups

Ease of Intubation	Group A	Group B	Group M	Total	P Value
Grade 1 % within group	27 90.0%	26 86.7%	24 80.0%	77 85.6%	0.533
Grade 2 % within group	3 10.0%	4 13.3%	6 20.0%	13 14.4%	
Total count % within group	30 100%	30 100%	30 100%	90 100%	

The relative ease of intubation among the study groups is shown in Table 12. The success of an intubation was rated as an I (no external manipulation was necessary), II (manipulation was necessary), or III (intubation failed). There was no statistically significant difference in intubation difficulty between the groups ($p = 0.533$).

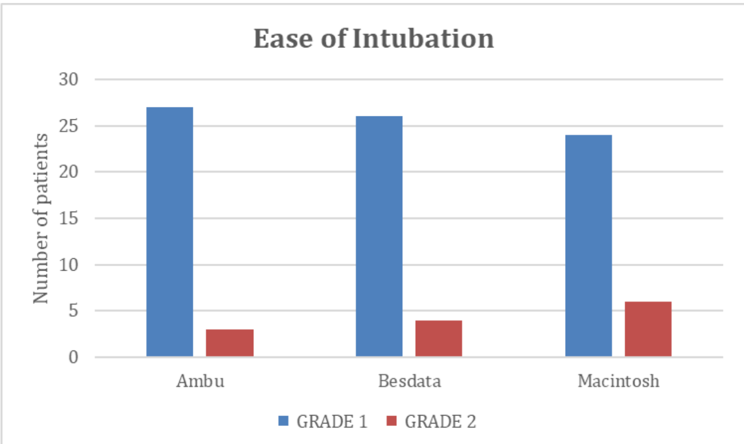

Figure 14: Graphical Representation Of The Relative Grading Of Ease Of Intubation In The Three Groups

Heart Rate and Mean Arterial Pressure

Table 13: Distribution of Heart rate during laryngoscopy and intubation between Group Ambu and Besdata.

Heart Rate (per minute)	Group A (N=30) MEAN±SD	Group B (N=30) MEAN±SD	P Value (Unpaired T Test)
Pre-Intubation	80.50 ± 9.6	79.50 ± 9.2	0.682
After 1min	89.96 ± 9.67	91.03 ± 10.42	0.683
After 3 min	87.03 ± 8.83	86.43 ± 9.41	0.800
After 5 min	82.93 ± 8.66	80.36 ± 9.61	0.282

Table 14: Distribution of Heart rate during laryngoscopy and intubation between Group Besdata and Macintosh

Heart Rate (per minute)	Group B (N=30) MEAN±SD	Group M (N=30) MEAN±SD	P Value (Unpaired T Test)
Pre-Intubation	79.50 ± 9.2	79.96 ± 9.26	0.846
After 1 min	91.03 ± 10.42	93.8 ± 9.71	0.292
After 3 min	86.43 ± 9.41	88.43 ± 7.65	0.370
After 5 min	80.36 ± 9.61	83.1 ± 8.09	0.238

Table 15: Distribution of Heart rate during laryngoscopy and intubation between Group Ambu and Macintosh

Heart Rate (per minute)	Group A (N=30) MEAN±SD	Group M (N=30) MEAN±SD	P Value (Unpaired T Test)
Pre-Intubation	80.50 ± 9.6	79.96 ± 9.26	0.827
After 1 min	89.96 ± 9.67	93.8 ± 9.71	0.131
After 3 min	87.03 ± 8.83	88.43 ± 7.65	0.514
After 5 min	82.93 ± 8.66	83.1 ± 8.09	0.939

Table 16: Distribution of Heart rate during laryngoscopy and intubation between three groups

Heart Rate (per minute)	Group A (N=30) MEAN±SD	Group B (N=30) MEAN±SD	Group M (N=30) MEAN±SD	P Value (ANOVA)
Pre-Intubation	80.50 ± 9.6	79.50 ± 9.2	79.96 ± 9.26	0.918
After 1 min	89.96 ± 9.67	91.03 ± 10.42	93.8 ± 9.71	0.310
After 3 min	87.03 ± 8.83	86.43 ± 9.41	88.43 ± 7.65	0.658
After 5 min	82.93 ± 8.66	80.36 ± 9.61	83.1 ± 8.09	0.408

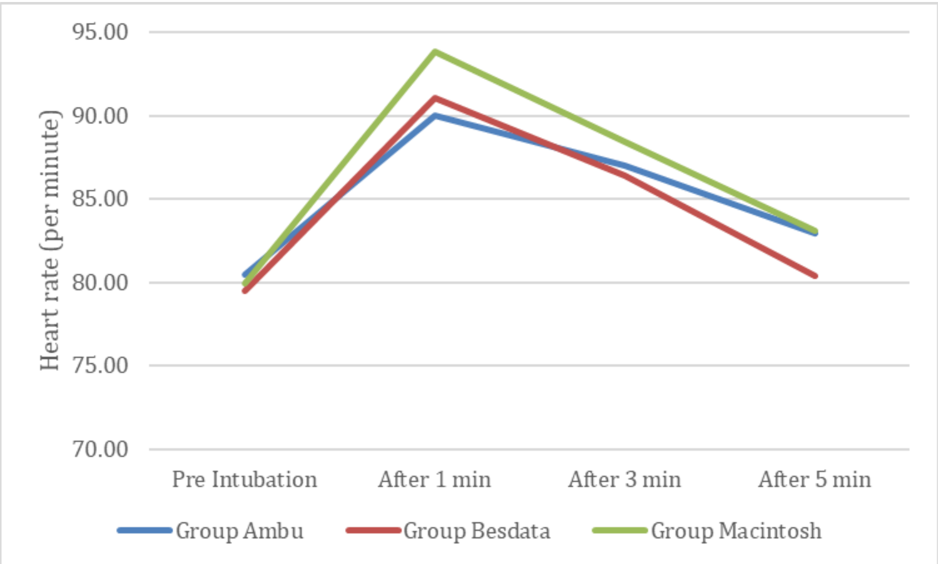

Figure 15: Graphical Representation Of Changes In Heart Rate At Various Time Intervals In The Three Groups

Table 17: Distribution of mean arterial pressure during laryngoscopy and intubation between Group Ambu and Besdata.

Mean Arterial Blood Pressure (mm Hg)	Group A (N=30) MEAN±SD	Group B (N=30) MEAN±SD	P Value (Unpaired T Test)
Pre-intubation	83.13 ± 6.55	82.83 ± 5.55	0.849
After 1 min	90.33 ± 6.43	91.7 ± 6.85	0.429
After 3 min	87.9 ± 6.7	87.73 ± 6.07	0.920
After 5 min	84.8 ± 6.72	84.43 ± 5.43	0.817

Table 18: Distribution of mean arterial pressure during laryngoscopy and intubation between Group Besdata and Macintosh

Mean Arterial Blood Pressure (mm Hg)	Group B (N=30) MEAN±SD	Group M (N=30) MEAN±SD	P Value (Unpaired T Test)
Pre-Intubation	82.83 ± 5.55	83.06 ± 5.81	0.874
After 1 min	91.7 ± 6.85	93.3 ± 7.61	0.396
After 3 min	87.73 ± 6.07	88.83 ± 6.05	0.485
After 5 min	84.43 ± 5.43	84.66 ± 5.7	0.872

Table 19: Distribution of mean arterial pressure during laryngoscopy and intubation between Group Ambu and Macintosh

Mean Arterial Blood Pressure (mm Hg)	Group A (N=30) MEAN±SD	Group M (N=30) MEAN±SD	P Value (Unpaired T Test)
Pre-Intubation	83.13 ± 6.55	83.06 ± 5.81	0.967
After 1 min	90.33 ± 6.43	93.3 ± 7.61	0.108
After 3 min	87.9 ± 6.7	88.83 ± 6.05	0.574
After 5 min	84.8 ± 6.72	84.66 ± 5.7	0.934

Table 20: Distribution of mean arterial blood pressure during laryngoscopy and intubation between the three groups

Mean Arterial Blood Pressure (mm Hg)	Group A (N=30) MEAN±SD	Group B (N=30) MEAN±SD	Group M (N=30) MEAN±SD	P Value (ANOVA)
Pre-Intubation	83.13 ± 6.55	82.83 ± 5.55	83.06 ± 5.81	0.979
After 1 min	90.33 ± 6.43	91.7 ± 6.85	93.3 ± 7.61	0.263
After 3 min	87.9 ± 6.7	87.73 ± 6.07	88.83 ± 6.05	0.766
After 5 min	84.8 ± 6.72	84.43 ± 5.43	84.66 ± 5.7	0.972

Changes in heart rate and mean arterial pressure during laryngoscopy and intubation are seen in Tables 13 and 20, respectively. There were no statistically significant changes in heart rate or mean arterial pressure (all $p > 0.05$) between the groups at any of the measured intervals.

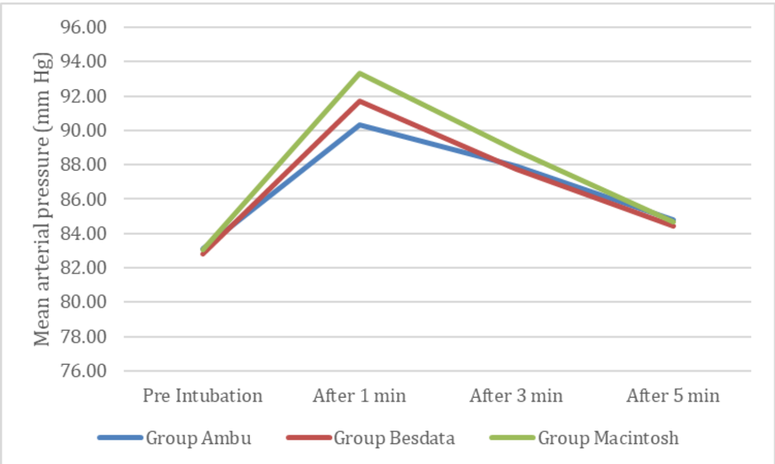

Figure 16: Graphical Presentation Of Changes In Mean Arterial Blood Pressure At Various Time Intervals In Different Groups Of Patients

Blood Staining and Sore Throat

Table 21: Distribution of blood staining of device in the three groups

Blood Staining	Group A		Group B		Group M		P Value
	N	%	N	%	N	%	
No	29	97.6	26	86.7	24	80.0	0.901
Yes	1	3.3	4	13.3	6	20.0	
TOTAL	30	100.0%	30	100.0%	30	100.0%	

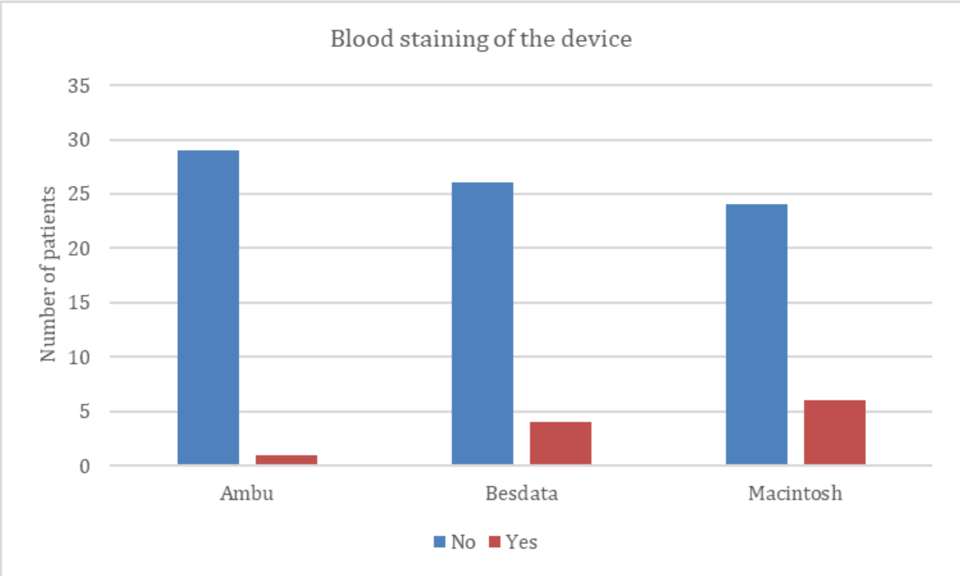

Figure 17: Blood Staining Of The Device In The Three Groups.

Table 22: Distribution of sore throat in three groups of patients

Sore Throat	Group A		Group B		Group M		P Value
	N	%	N	%	N	%	
No	26	86.7	27	90.0	30	100.0	0.901
Yes	4	13.3	3	10.0	0	0	
TOTAL	30	100.0%	30	100.0%	30	100.0%	

As can be shown in Tables 21 and 22, the rates of blood stains on the device and postoperative sore throat were similar across the three groups (all $p > 0.05$).

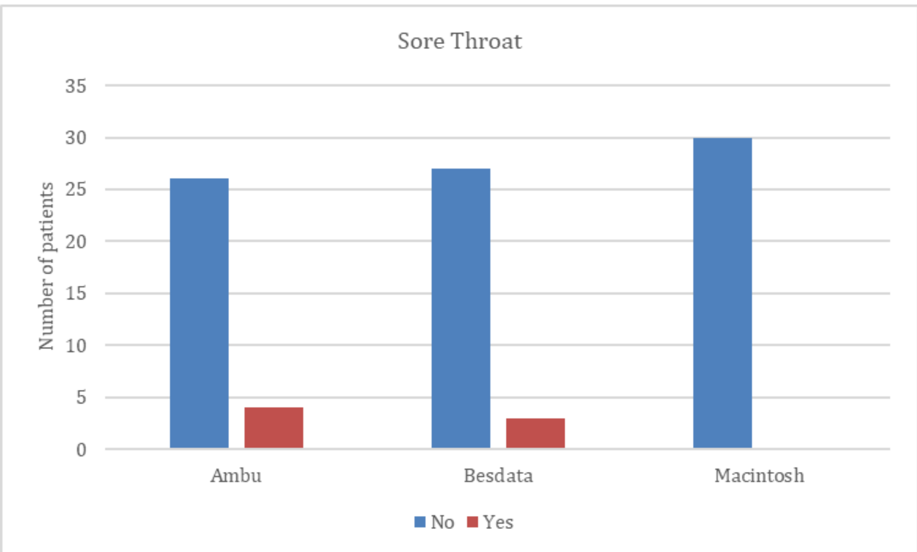

Figure 18: Sore Throat Of The Device In The Three Groups

Success and ASA Grade

Table 23: Distribution of cases according to success in three groups of patients

	Group A		**Group B**		**Group M**		**P Value**
	N	%	N	%	N	%	
Success	30	100.0	30	100.0	30	100.0	1.000
Failure	0	0	0	0	0	0	
TOTAL	30	100.0	30	100.0	30	100.0	

Figure 19: Prevalence Of Success Of The Device In The Three Groups

Table 24: Distribution of cases according to ASA grade in three groups of patients

ASA Grade	**Group A**		**Group B**		**Group M**		**P Value**
	N	%	N	%	N	%	
Grade 1	17	56.7	25	83.3	25	83.3	**0.024**
Grade 2	13	43.3	5	16.7	5	16.7	
TOTAL	30	100.0	30	100.0	30	100.0	

There was a 100% success rate for intubating patients across all groups. Patients with ASA Grade 1 were overrepresented in Group B compared to the other groups (p = 0.024), indicating a significant difference in the distribution of ASA grades across the groups.

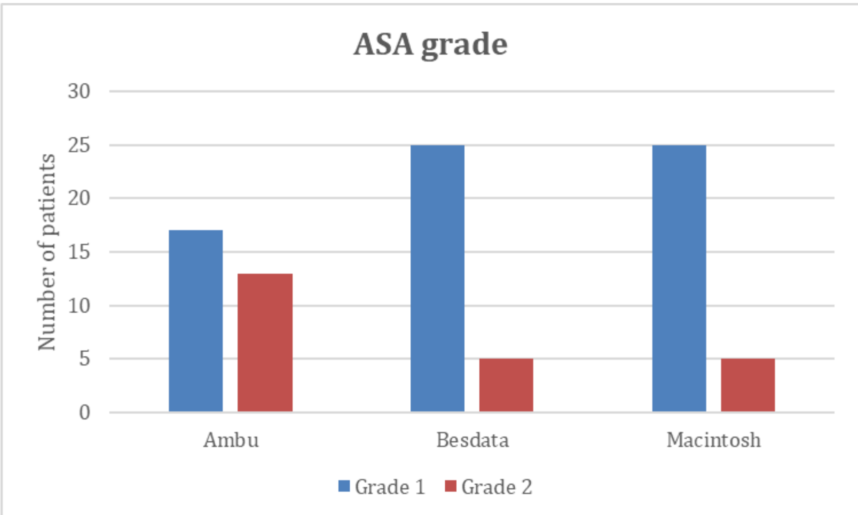

Figure 20: Distribution Of Patients According To Asa Grade In The Three Groups

IV. Discussion

This research aims to evaluate three intubating devices commonly used on adult general surgical patients having elective surgery: the Macintosh laryngoscope, the Ambu aScope, and the Besdata Video Intubating Stylet. Time to intubation success, number of intubation attempts, intubation difficulty, intubation ease, adjustment manoeuvres, hemodynamic changes during intubation, and postoperative complications were all measured. The results and their consequences are discussed below.

Patients in all three groups had comparable ages, body mass indexes, and sex distributions. Furthermore, there was no significant difference in the distribution of Mallampati (MP) or Cormack-Lehane (CL) scores across the groups. There was less room for bias in the results since the research groups were typical of the general population

When comparing the Ambu aScope to the Macintosh laryngoscope and the Besdata Video Intubating Stylet, intubation time was shown to be substantially shorter using the Ambu aScope. This finding provides more evidence that the Ambu aScope facilitates a more rapid and successful intubation procedure. The Ambu aScope may be superior since it allows for more precise stylet control, has a bigger display with higher-quality images, and has a functioning channel for oxygenation.

In terms of first-attempt intubation success, the three devices were comparable. Cases with a history of intubation failure or those projected to be challenging were ruled out, which may explain the high success rate. The increased frequency of adjusting manoeuvres in the Ambu aScope and Besdata groups underscores the need of using correct technique and making any necessary adjustments before proceeding with intubation. In keeping with earlier research showing its advantages, a jaw-thrust manoeuvre was shown to be useful in aiding intubation.

Intubation difficulty, as measured by the amount of external laryngeal manipulation required, was similar across the three groups. The intubation procedure was made quite simple by all of the available instruments. This result is in line with the observation that intubation may be done with less difficulty using current video laryngoscopes such as the Ambu aScope and the Besdata.

While all three groups had some degree of hemodynamic shift during intubation, there was no discernible difference between them. It is well-known that intubation causes an increase in heart rate and mean arterial blood pressure, which may be linked to sympathetic stimulation and the force exerted when the endotracheal tube is passed through the glottis. Better visualisation and less manipulation during intubation may explain why video laryngoscopes, and especially the Ambu aScope, are linked with less changes in hemodynamic status.

V. Complications:

In all three groups, problems were rare and statistically similar, including little blood stains on airway devices and postoperative sore throat. According to these results, none of the three devices substantially increased the risk of postoperative problems.

Limitations:

It is important to note that there are certain caveats to the study's findings, despite the fact that they give important insights into the relative effectiveness of the three intubating devices. Results may have been different for patients in various age ranges or ASA categories since the research targeted a particular patient population. The research also ignored potentially influential elements like operator experience. The results might be more broadly applicable if they were confirmed in other research with bigger samples, wider patient groups, and consideration of operator experience.

VI. Conclusion:

In conclusion, this research showed that the Ambu aScope is superior than the Macintosh laryngoscope and the Besdata Video Intubating Stylet in terms of reducing intubation time. First-attempt intubation success rates were high across the board for all three devices. Similar hemodynamic changes were seen during intubation regardless of equipment. Minimal complications occurred, and the rates were about the same throughout the boards. This research helps advise the choice of intubating devices for adult surgery patients' airway care. However, in order to confirm these results and offer a complete picture of the effectiveness of various intubating devices, further study is needed with bigger and more varied patient populations.

Several major takeaways resulted from this research that compared the Besdata, Ambu aScope, and Macintosh laryngoscopes for intubation in adult general surgery patients. Ninety patients with ASA I and II status who fell within a certain age and weight range were randomly assigned to one of three groups. The demographic profile, including age, sex, and BMI, was similar across the groups. Patients were not considered who had problems that would have made intubation impossible.

In a statistically significant comparison between the three devices, the Ambu aScope showed the quickest mean intubation time. The success rates for intubation on the first try were equal across devices, although the

Macintosh laryngoscope group needed fewer adjustment manoeuvres, probably because the other groups relied on the more traditional jaw thrust technique. The devices have similar levels of intubation simplicity.

Variations in haematological parameters were seen during intubation, however there was no statistically significant difference between the groups. There were few adverse effects with any of the three devices, including blood stains and postoperative sore throat.

The results of the research indicate that the Ambu aScope and the Besdata are two potential intubation tools, especially in difficult airway circumstances. Particularly in cases when hypoxia risk is a concern, the Ambu aScope showed a significant benefit in terms of intubation time. The portability and low price of Besdata make it a good option.

The research concludes that these cutting-edge intubating devices are both effective and safe for use in adult general surgery patients. Larger clinical investigations are needed to confirm these results and learn more about how the devices function in a wide range of patient groups and settings. This study provides important new information that may be used to enhance airway management techniques and better meet the needs of surgical patients.

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