Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/r839bn11

SURVEY OF THE TECHNIQUES OF RAPID SEQUENCE INTUBATION BY PRACTICING ANESTHESIOLOGISTS IN TERTIARY CARE HOSPITALS OF KARACHI - A CROSS-SECTIONAL SURVEY

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ABSTRACT

Introduction: Rapid Sequence Induction (RSI) is a key technique to reduce aspiration risk during emergency surgeries, involving preoxygenation, intravenous anesthesia, cricoid pressure, and rapid intubation without mask ventilation. Debate persists over optimal positioning and cricoid pressure application, with variations in practice. While some believe preoxygenation suffices for low-risk patients, others stress strict protocols for safety. Further research on these discrepancies could help standardize techniques and reduce this preventable complication.

Objective To evaluate the techniques of Rapid Sequence Intubation (RSI) among anesthesiologists in tertiary care hospitals of Karachi and identify variations in practice.

Materials and Method: This cross-sectional investigation, performed from November 2021 until May 2022 across nine tertiary medical centers in Karachi, aimed to assess anesthesia practices among 87 anesthesiologists. Employing a non-random, successive sampling method, the research targeted consultants, specialists, and final-year FCPS residents. Information was collected through self-administered questionnaires regarding demographics and anesthesia practices, such as patient positioning and cricoid pressure utilization. Analysis in SPSS 26.0 involved descriptive and inferential analytics to explore practice patterns and relationships, with statistical significance established at $p<0.05$.

Results: Among respondents, 64% were male and 35.6% female, with most aged 31-40 years (42.5%) and 34.5% having 6-10 years of experience. Only 4.6% of anesthesiologists were trained in using

gastric ultrasound, while 89.7% followed standard RSI procedures. In cases of intestinal obstruction, 62.1% of patients were positioned supine, compared to 77.0% in non-obstruction cases. Cricoid pressure was applied in 94.4% of obstruction cases, and nasogastric tubes were inserted in 56.3% of those patients.

Conclusion: It may be inferred that the majority of practitioners adhered to standardised protocols, including regular cricoid pressure and supine placement, especially in non-obstructed patients. The use of nasogastric tubes and gastric ultrasonography was irregular and uncommon. The inconsistency in procedures underscores the necessity for standardisation and enhanced training in sophisticated techniques such as stomach ultrasonography and patient positioning, hence guaranteeing safer anaesthesia care.

Keywords: Anesthesiology, Intubation, Rapid Sequence Induction, Technique, Ventilation

INTRODUCTION

Rapid sequence induction (RSI) is a life saving anesthetic technique to reduce the risk of aspiration of gastric contents during emergency surgeries for patients at high risk. The RSIs are used to facilitate a 2nd upper respiratory tract intubation by immediately & unruptly induced unconsciousness with cricoid pressure prior to endotracheal intube without pharmacillinulation. It is frequently used to secure airway patency in emergency procedures. Although some suggest that emergent intubation may increase complications, it is still needed in cases with high risk for fast regurgitation [1]. RSI is based on the key components of pre-oxygenation, intravenous induction agents and cricoid pressure application-intubate sequence prior to initiating positive-pressure ventilation [2]. The employment of opioid analgesics is common, and other non-depolarizing neuromuscular blockers with rapid onset offer alternatives to succinylcholine for intubation [3]. Aspiration of gastric contents resulting in chemical pneumonitis is a common preventable cause of anesthesia-related mortality. Aspiration includes the leading cause of death from anesthesia: despite improved airway management techniques (including cricoid pressure technique introduced in the 1960s), aspiration remains number one as shown by England's 2011 National Audit Project [4,5]. The issue of perfect patient position has not been settled, and latest IDSA guideline mentions the potential benefit for using traditional cricoid pressure during RSIs to prevent pulmonary aspiration [6-7]. Frequent positions are head-up, supine and Trendelenburg. The head-elevated post laryngoscopy, while cricoid pressure remains debatable [6-9].

A survey in the UK revealed that 68% of anaesthetists monitor end-tidal oxygen during pre-oxygenation, whereas 76% employ head-up tilt during rapid sequence induction (RSI). Sixty-four percent of responders favour propofol as an induction drug, and ninety-two percent employ cricoid pressure, but many do not assess the applied force [10-11]. The technique of RSI is non-standardized world over and poorly defined with some effort towards standardization, but little data about the practice in developing countries like Pakistan (Karachi). This study aims to explore the RSI practice patterns of anesthesiologists working in tertiary care hospitals of Karachi. Such evidence can guide local practice to best international guideline-adherent practices and reduce previous language-specific aggressive antimicrobial use.

MATERIAL & METHODS:

This was a cross-sectional survey aimed to analysed the different aspects of anesthesia practices amongst anesthesiologists who are working in tertiary care hospitals situated at Karachi. Data collection started on November 18, 2021 after the approval of Institutional Review Board (IRB) of The Indus Hospital and ended on May 17, 2022. The study comprised several tertiary care medical centres such as The Indus Hospital, Aga Khan University Hospital, Civil Hospital Karachi, Abbasi Shaheed Hopsital and Patel hospital in addition to SIUT & Jinnah Post Graduate Medical Center (JPMC) Karachi,Liaquat National Hosptial & PNS Shifa. Out of 87 total participants, each medical

center was given a proportionate quota equivalent to the number of anesthesiologists present at that location: The Indus Hospital (13), Aga Khan University hospital (25), Liaquat National Hospital (8), Jinnah postgraduate Medical Centre(4) and Civil Hospital Karachi(11). Non-probability consecutive sampling was used for data collection. This study included anesthesia specialists and consultants, last-year anesthesia FCPS residents of both genders who agreed to participate. Anesthesia residents in the first 3 years of training, and anesthetists practicing exclusively in a primary or auxiliary medical care setting were excluded from the study. Information aggregation commenced with acquiring authorization from the leaders or heads of the anesthesia divisions of the contributing clinics. After confirming assent to lead the study, the primary investigator met eligible anesthesiologists, furnished them with a printed self-administered questionnaire, and obtained verbal consent for participation. The questionnaire gathered demographic details, such as age and qualifications, and questioned preferences and practices regarding anesthesia, including patient positioning, nasogastric tube placement, cricoid pressure application, preoxygenation, pulmonary aspiration, and care during the preoperative, intraoperative, and postoperative phases. All the collected data were entered in SPSS version 26.0. Descriptive statistics were calculated for qualitative and quantitative variables.

RESULTS

Table 1 shows the demographic and professional characteristics of all responding anesthesiologists 64% of the respondents were male, while 35.6% female. Most participants (42.5%) were between 31 and 40 years, followed by the age group of 41–50 with one-third respondents representing this category at a percentage of just under three out of ten people aged in that decade. Below 6% of the respondents were aged over 50 years. However, that is the biggest year group at 34.5%, followed by those with less than five years of experience (29.9%). Only 10.3% of the respondents have more than 20 years of experience. In addition, 39.1% of anesthesiologists were working in public hospitals; for the private institutions this ratio was 26.4%, while both environments summed up to a percentage of 34.5%. The table II presents the techniques of Rapid Sequence Intubation (RSI) practiced by anesthesiologists in tertiary care hospitals. A small percentage of anesthesiologists (4.6%) were trained in using gastric ultrasound (US) for pulmonary aspiration risk assessment, and 9.2% reported that their department uses this method. A majority of anaesthesiologists (89.7%) implemented a standard operating procedure for rapid sequence induction (RSI). In the context of patient placement for rapid sequence intubation in cases of intestinal blockage, the majority (62.1%) were positioned supine, and 14.9% were positioned with the head elevated. Among patients without intestinal blockage, 77.0% were placed in a supine posture. The Sellick maneuver (cricoid pressure) was used by 94.4% for patients with obstruction and 92.0% for those without. Nasogastric tube insertion before RSI was performed in 56.3% of patients with intestinal obstruction, but only in 5.7% of those without obstruction. Preoxygenation before RSI was conducted in 88.5% of patients with intestinal obstruction and 94.3% of patients without obstruction.

DISCUSSION

Rapid sequence induction has been performed for many years on patients unfasted or at-risk of aspiration requiring emergency intubation, and robust evidence does not exist regarding its effectiveness and safety. The classic RSI technique attempts to gain access and secure the airway as soon as possible with minimal aspiration risk by providing pre-oxygenation, fast induction of anesthesia followed be paralysis before intubation [13]. Nonetheless, clinical practice variance can introduce risk - as seen in reports associating even classic RSI with hypoxemia and cardiovascular complications. Adding to the confusion, there was no sound evidence supporting this assertion in either of two 1970 descriptions or the extensive uptake of that definition [14]. Although the process intuitively minimized danger, the manipulation procedure itself carried its dangers in view of a lack of international requirements to standardize technique [15]. As the field's foundational intervention for unfasted intubation, RSI demands reexamination through high-quality research establishing its true merits versus less invasive options. Only by interrogating empirical assumptions with data can

we optimize care for those vulnerable to gastric contents entry while upholding the paramount duty to first do no harm. Progress requires moving beyond tradition to evidence-based assurance RSI, and airway management generally, inflict minimum injury given inherent violations of patient autonomy [16]. Despite being introduced nearly five decades ago, this perioperative process has hardly altered to this day. While guidelines on general anesthesia for emergency scenarios published by the Scandinavian Society of Anesthesia and Intensive Care encompass rapid sequence intubation usage, these directives have not been updated since 2010 - containing only comparative studies on intubating conditions in emergency rooms and analyses of various analgesics, hypnotics, and neuromuscular blockers [17]. A handful of clinician-reported surveys on current practice exist yet suffer limitations, especially biased reporting. Debate persists regarding choice of drugs, patient positioning, ventilation during apnea, and applying cricoid pressure during rapid sequence intubation [18]. In recent years, newer techniques of pre-oxygenation, repositioning patients, and oxygen delivery during apnea have emerged. Rocuronium at 1.2 mg per kg produces rapid paralysis akin to succinylcholine, while sugammadex swiftly reverses even profound rocuronium-induced neuromyopathy [19]. To circumvent hypoxemia during apnea, delicate mask ventilation has proven useful in obesity, pediatrics, and critical illness. While cricoid pressure aims to preclude regurgitation, reports document its failures too. Our investigation produced findings comparable to several worldwide studies. A few of these studies warrant discussion. Some staff received training in gastric ultrasound, though few departments regularly perform this technique. Most sites had standardized rapid sequence intubation procedures outlined. However, positioning recommendations for patients with intestinal obstructions varied considerably, with some suggesting head-up and others head-down positions. Supine positioning was most common when obstructions were absent as well. Cricoid pressure during intubation was usually applied in cases involving obstructions but occasionally omitted when not. Nasogastric tubes were often placed for obstructed patients but rarely for unobstructed individuals. Pre-oxygenation prior to intubation also differed based on the presence or absence of an obstruction.

Our study aimed to assess the RSI techniques employed by anesthesiologists in tertiary care hospitals in Karachi. The data reveal notable trends, with the vast majority of practitioners using cricoid pressure during RSI (94.4% in patients with intestinal obstruction and 92% in those without). Supine positioning was preferred for patients with no intestinal obstruction (77%), while 62.1% used this position in cases of obstruction. The use of nasogastric tubes varied significantly, with 56.3% inserting them in patients with intestinal obstruction, but only 5.7% doing so in those without. These findings align with global practices, though there are notable distinctions. A survey conducted in the United Kingdom revealed that most respondents, 68 percent, pre-oxygenated by monitoring end tidal oxygen concentration. Meanwhile, 76 percent of anesthesiologists employ a 20–25-degree head-up tilt for all rapid sequence intubations [20]. Propofol remains the most utilized induction agent, selected by 64 percent of participants. Although 92 percent of anesthetists utilize cricoid pressure during intubation, a sizable 83 percent fail to reliably quantify the applied force. Sajayan et al found that three-quarters of doctors positioned patients with their head elevated 20-25 degrees, while 11 percent utilized a sitting, 45-degree head-up tilt. Nearly all, 92 percent, consistently apply cricoid pressure during rapid sequence induction, with just 8 percent restricting its use to select cases [21]. Separate research determined that the preferred adult induction positioning was head-up, chosen by 60.1 percent of anesthesiologists. Comparatively little data from our domestic setting explores contemporary rapid sequence intubation practices.

CONCLUSION

It may be inferred that the majority of practitioners adhered to standardised protocols, including regular cricoid pressure and supine placement, especially in non-obstructed patients. The use of nasogastric tubes and gastric ultrasonography was irregular and uncommon. The inconsistency in procedures underscores the necessity for standardisation and enhanced training in sophisticated

techniques such as stomach ultrasonography and patient positioning, hence guaranteeing safer anaesthesia care.

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Table 1: Demographic Characteristics of the Patients (n=87)	
Variable	**Frequency (%)**
Gender	
Male	57 (65.5)
Female	30 (34.5)
Age, Mean ± SD= 39.64 ± 12.78 Years	
27-40 Years	54 (62.1)
>40 Years	33 (37.9)
Duration of Experience, Mean ± SD= 10.48 ± 11.29 Years	
1-10 Years	60 (69.0)
>10 Years	27 (31.0)
Type of Institute	
Private	61 (70.1)
Government	26 (29.9)
Highest Qualification	
FCPS consultant OR equivalent	42 (48.3)
MCPS consultant	5 (5.7)
FCPS trainee year (min-2 years)	40 (46.0)

Table 2: Techniques of Rapid Sequence Intubation by Practicing Anesthesiologists (n=87)			
Variables		**Frequency**	**Percentage**
Are you trained in using gastric US (ultrasound) for pulmonary aspiration risk assessment?	Yes	4	(4.6%)
	No	81	(93.1%)
	Don't Know	2	(2.3%)
Does anyone at your department perform gastric US for aspiration risk assessment?	Yes	8	(9.2%)
	No	79	(90.8%)
Does your department have a standard operating procedure for Rapid Sequence Induction – Intubation (RSII)?	Yes	78	(89.7%)
	No	9	(10.3%)
What is the intestinal obstruction patient's positioning during RSII?	Not specified	14	(16.1%)
	Head up	13	(14.9%)
	Head down	6	(6.9%)
	Supine	54	(62.1%)
What is the patient's positioning having no intestinal obstruction during RSII?	Not specified	13	(14.9%)
	Head up	5	(5.7%)
	Head down	1	(1.1%)

	Supine	67	(77.0%)
	Other	1	(1.1%)
Do you use selick maneuver (cricoid pressure) in an intestinal obstruction patient during RSII?	Yes	83	(94.4%)
	No	4	(4.6%)
Do you use selick maneuver (cricoid pressure) without intestinal obstruction during RSII?	Yes	80	(92.0%)
	No	7	(8.0%)
Do you insert nasogastric tube in a patient with an intestinal obstruction before RSII?	Yes	49	(56.3%)
	No	38	(43.7%)
Do you insert nasogastric tube in a patient without an intestinal obstruction before RSII?	Yes	5	(5.7%)
	No	82	(94.3%)
Do you preoxygenate the patient with an intestinal obstruction before RSII?	Yes	77	(88.5%)
	No	10	(11.5%)
Do you preoxygenate the patient without an intestinal obstruction before RSII?	Yes	82	(94.3%)
	No	5	(5.7%)