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ORIGINAL RESEARCH

The Knowledge of Health Professionals About the Application of Cricoid Pressure in a Low-Income Country: A Single-Center Survey Study

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Background: The application of cricoid pressure requires good knowledge and practice of health professionals who are working in operation theatres to prevent pulmonary aspiration. This study aims to assess the application of cricoid pressure knowledge and practice in health professionals who are working in the operation theatres.

Methods: This survey-based study was conducted in health care professionals who are working in the operation theatre of Debre Tabor Comprehensive Specialized Hospital from November 1 to December 1, 2020. A structured checklist was used to collect data regarding the knowledge and practice of the application of cricoid pressure.

Results: A total of 43 health professionals who are working in the operation theaters were involved in this study with a response rate of 81%. The correct anatomic position of cricoid cartilage was not identified in 67% of nurses. We found that 78% of anesthetists did not use the nasogastric tube for decompression, and 83% of them complain of difficult intubation during the application of cricoid pressure.

Conclusion: Health care professionals who are working in operation theatres had poor knowledge and practice in the application of cricoid pressure.

Keywords: knowledge, practice, health professionals, cricoid pressure

Introduction

Cricoid pressure is the application of pressure on the cricoid cartilage for patients who undergo surgery under general anesthesia.[1–4] Applying cricoid pressure is an essential skill of health care professionals who are working in operation theatres, especially anesthetists.[5,6]

The safe practice of cricoid pressure might require good knowledge of its anatomy, technique of application, and complications.[7,8] The application of cricoid pressure during rapid sequence induction might protect the pulmonary aspiration of gastric contents.[9,10] The cricoid pressure can result in the rupture of the esophagus when it is applied during vomiting.[4,9,11,12] An application of cricoid pressure needs an assistant who can locate the cricoid cartilage; apply and release; apply force in the correct direction; apply the correct force, and be able to maintain the force for as long as needed.[5,6,13]

The force applied during cricoid pressure revealed that most assistants used inadequate force,[14,15] and cricoid pressure may rupture when it is applied during vomiting,[16] and some assistants may apply too much force that distorts the patient's

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anatomy and might intubation more difficult.[17–19] An inappropriately applied cricoid pressure warrants evaluation of the cognitive knowledge and application technique of it.[6,20–23] There were controversies regarding the application of cricoid pressure in preventing pulmonary aspiration.[4,24,25] The purpose of this study is to assess the application of cricoid pressure knowledge in health professionals who are working in the operation theatres in a low-income country.

Methods

Study Design, Setting, and Period

This survey-based study was conducted in Debre Tabor Comprehensive Specialized Hospital which is found in the north-central part of Ethiopia. It is located in the Debub Gondar Zone of the Amhara Region of Ethiopia, about 100 kilometers northeast of Bahir Dar city and 50 kilometers east of Lake Tana, with a latitude and longitude of 11°51′N 38°1′E and an elevation of 2706 meters (8878 feet) above sea level.[26] The Hospital has 23 anesthetists, 17 physicians (Surgeons, Gynecologists and Orthopedicians), and 13 nurses who are working in four operation theatres. It provides more than 2000 surgical cases annually. The study was conducted from November 1 to December 1, 2020.

Sampling Technique

All health care workers who are working in the operation theatres of Debre Tabor Comprehensive Specialized Hospital.

Data Collection Technique

A structured checklist regarding the knowledge and practice of health care workers who work in the operation theatres of Debre Tabor Comprehensive Specialized Hospital. The checklist for data collection was adopted from different studies.[7,27–29] The checklist consists of two sections as follows: Section 1: Assessment of knowledge of health care professionals on cricoid pressure application; Some of the questions were: where did you learn to apply cricoid pressure, where does cricoid cartilage lie, and use of cricoid pressure, etc. Section 2: Assessment of the practice of cricoid pressure in anesthetists; Some of the questions were: do you routinely mask ventilate during rapid sequence induction, do you decompress the stomach by nasogastric tube before rapid sequence induction, do you remove the nasogastric tube before rapid sequence induction, have you witnessed regurgitation during application of cricoid pressure, and have you experienced difficulty to intubate during application of cricoid pressure. After taking oral and written informed consent, study participants were asked to fill up the English version checklist about their routine practice and knowledge regarding cricoid pressure application.

Data Analysis

Data were checked manually for completeness, coded and entered into SPSS version 23 computer program for analysis. Descriptive statistics were employed to summarize the results by frequencies and percentages.

Data Quality Control

The investigators cross-checked for the completeness, and consistency of the data before data analysis.

Results

Knowledge of Cricoid Pressure Application

A total of 43 out of 53 health professionals who are working in the operation theater (18 anesthetists, 13 physicians, and 12 nurses) were involved in the study, which yielded a response rate of 81%. The correct anatomic position of cricoid cartilage was identified by 94%, 100%, and 33% of anesthetists, physicians, and nurses, respectively. Sixty-seven percent of nurses replied cricoid pressure is applied to prevent pulmonary aspiration during induction of anesthesia (Table 1).

The Practice of Cricoid Pressure Application

The majority (83%) of anesthetists complain of difficulty to intubate during the application of cricoid pressure and 72%, of the respondents, have witnessed regurgitation during application of cricoid pressure (Table 2).

Discussion

Even though the efficacy of cricoid pressure in preventing pulmonary aspiration had controversial results,[2,25] it is better to at least try to prevent aspiration with cricoid pressure in a low-income country to prevent serious postoperative sequelae and it may be of huge importance for a low-income setting where intensive care beds are very scarce.

Table 1 Assessment of Knowledge of Health Care Professionals on Cricoid Pressure Application at Debre Tabor Comprehensive Specialized Hospital, 2020 (n=43)

Knowledge on Cricoid Pressure		Anesthetists		Physician		Nurse	
		Number	%	Number	%	Number	%
Where did you learn to apply cricoid pressure?	Shown on a patient during clinical practice or student attachment	10	56	13	100	9	75
	By reading only	0	0	0	0	2	17
	By practicing on a model or manikin	8	44	0	0	1	
	I have never been taught about it	0	0	0	0	0	8
Where does cricoid cartilage lie	In front of the thyroid cartilage	1	6	0	0	1	9
	Behind the thyroid cartilage	0	0	0	0	4	33
	Below the thyroid cartilage	17	94	13	100	4	33
	Behind the esophagus	0	0	0	0	3	25
Use of cricoid pressure	Prevent aspiration of stomach contents during induction of anesthesia	18	100	13	100	8	67
	Prevent patient breathing during anesthesia	0	0	0	0	4	33
	Prevent patient vomiting during anesthesia	0	0	0	0	0	0
	Prevent gastric gas insufflation during bag mask ventilation	0	0	0	0	0	0
cricoid pressure in awake patient	10 N	10	56	0	0	1	8.5
	20 N	6	33	0	0	1	8.5
	30 N	2	11	0	0	0	0
	50 N	0	0	0	0	0	0
	Do not know	0	0	13	100	10	83
cricoid pressure in anesthetized	10 N	2	11	0	0	0	0
	20 N	0	0	0	0	0	0
	30 N	10	56	0	0	2	17
	50 N	6	33	0	0	0	0
	Do not know	0	0	0	0	10	83
Correct measure if a patient vomit during cricoid pressure Application	Maintain the same force and suction the patient's pharynx	2	11	8	62	3	25
	Increase the force and suction the patient's pharynx	2	11	3	23	3	25
	Decrease the force and suction the pharynx	2	11	0	0	5	42
	Release the force and suction the patient's pharynx	12	67	2	15	1	8

(*Continued*)

Table 1 (Continued).

Knowledge on Cricoid Pressure		Anesthetists		Physician		Nurse	
		Number	%	Number	%	Number	%
When to release cricoid pressure	After intubation	0	0	5	38.5	5	42
	After inflation of the cuff	2	11	3	23	2	17
	After confirmation the position of endotracheal tube	16	89	5	38.5	4	33
	I do not know	0	0	0	0	1	8

Note: N, Newton.

Table 2 Assessment of the Practice of Cricoid Pressure in Anesthetists Who are Working at Debre Tabor Comprehensive Specialized Hospital, 2020 (n=18)

Practice of Cricoid Pressure		Number of Anesthetists	%
Do you routinely mask ventilate during rapid sequence induction	Yes No	5 13	28 72
Do you decompress the stomach by nasogastric tube before rapid sequence induction	yes no	4 14	22 78
Do you remove nasogastric tube before rapid sequence induction?	Yes No	3 15	17 83
Have you witnessed regurgitation during application of cricoid pressure?	Yes No	5 13	28 72
Have you experienced difficulty to intubate during application of cricoid pressure?	Yes No	15 9	83 17

The lack of knowledge regarding the application of cricoid pressure in health care professionals who are working in operation theatres may increase the risk of aspiration of gastric contents, rupture of the esophagus, aggravation of cervical spine injury, makes difficult tracheal intubation, and complete airway obstruction.[3,30–33]

This study revealed that the knowledge on the anatomical structure of cricoid cartilage was insufficient in nurses (33%), whereas anesthetists (94%) and physicians (100%) had good knowledge in identifying it. Our study showed that there was a significant knowledge gap in the identification of the cricoid cartilage. In line with our finding some studies reported that health care professionals had poor knowledge in identifying the cricoid cartilage, the amount of cricoid pressure force required, and the correct application of cricoid pressure.[2,34,35] Most of our study participants had poor knowledge and skill regarding when cricoid pressure is released. Similarly, research conducted by Krishnan et al health professionals had inadequate knowledge when cricoid pressure is released.[28]

We found that 72% of anesthetists did not mask ventilate during rapid sequence induction and 78% of them did not use the nasogastric tube for decompression, 28% of the anesthetists witnessed regurgitation during application of cricoid pressure, and 83% of anesthetists complain of difficult intubation during application of cricoid pressure. Similarly to our finding, a study done by Etanaa et al reported that 90% of the respondents do not mask ventilate during rapid sequence induction. Ninety-three percent of anesthetists did not remove the nasogastric tube before rapid sequence induction, and 70% complain of difficult intubation during the application of cricoid pressure.[7]

Conclusion

All health care professionals who are working in operation theatres had deficient knowledge in the application of cricoid pressure. Educational interventions are needed to improve knowledge and hence the practice of cricoid pressure application.

Ethical Consideration

Ethical clearance was obtained from Debre Tabor University Ethical Review Committee. Written informed consent was secured from each study participant after the aim of the study is disclosed.

This study was conducted in accordance with the Declaration of Helsinki.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest for this work.

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