ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 12 | December - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A PROSPECTIVE AUDIT OF PREOPERATIVE ASSESSMENT AND AIRWAY MANAGEMENT PRACTICES IN PATIENTS UNDERGOING THYROID SURGERY

Anaesthesiology

Dr. Govinda Innani MBBS MD Anaesthesia, Seth GSMC and KEM Hospital, Mumbai, Assistant professor, MGIMS, Sewagram

Dr. Shrikanta Oak Additional Professor, Department of Anaesthesiology, Seth GSMC and KEM Hospital, Mumbai.

Dr. Rohit Waghmare Associate Consultant, Ruby Hall Clinic, Pune

Dr. Uma Kamat* Assistant Professor, Department of Anaesthesiology, Seth GSMC and KEM Hospital, Mumbai. *Corresponding Author

Dr Raksha Rathi Junior Resident, Mahatma Gandhi Institute of Medical Science, Sewagram

KEYWORDS

INTRODUCTION:

Securing of the airway is a fundamental aim for the anesthesiologist in the patient undergoing surgery at all times in all circumstances. Endotracheal intubation, one of the techniques to secure the airway is considered to be the gold standard.[1]

Thyroid swelling is considered as one of the factors predisposing to difficult intubation due to enlarged thyroid gland which can cause deviation of the trachea as well as compression mechanically.[2] The literature on the occurrence of difficult endotracheal intubation in thyroid surgery has been limited to a few studies. Moreover, there are conflicting study results about which parameter is the most predictive DTI (Difficult Tracheal Intubation) risk criteria in patients undergoing thyroid surgery.[3]

Identification of the risk criteria for difficult intubation is essential while planning to determine the best way to proceed with anaesthesia.[4] The intubation difficulty scale (IDS) is one of the scales introduced to evaluate the difficulty of intubation based on several validated criteria.[5-6] Pre-operative evaluation of the difficulty of intubation using airway examination can enable the anesthesiologist to be better prepared for a proper management of the airway Various techniques and devices are used for tracheal intubation such as direct laryngoscopes, Video laryngoscopes and Fibre optic bronchoscope. Although many devices and techniques are introduced, none are perfect in every situation. So the selection of techniques in which the anaesthesiologist has the most experience and comfort should be used.

Hence, we have done **a prospective audit** of preoperative assessment & airway management practices in patients undergoing thryroid surgery.

The primary objectives included:

- The incidence of difficult intubation using IDS score,
- The technique of intubation and device used, and
- The duration of successful intubation.

The secondary objectives were to note the complications of endotracheal intubation such as airway trauma, laryngospasm and desaturation at the time of intubation.

MATERIALS AND METHODS:

The study was conducted as a prospective observational audit, in our hospital over a period of one year after obtaining the requisite permission from the Institutional Ethics Committee. Patients who were posted for thyroid surgeries in the surgery and ENT operation theatre at our institute were explained the procedure and written informed consent was taken. Age range was 18-65 years.

After recruiting the participants, detailed pre-operative assessment was done; including the detailed history of patient, airway examination with neck circumference, size of the thyroid swelling, duration of the swelling, retrosternal extension, deviation as well as compression of trachea were noted.

After explaining the procedure to the patient in the language which he / she understands, written informed consent was obtained. The nil by mouth (NBM) status of the patient was confirmed.

All the participants received standard anaesthesia care monitors.Here in our study, we noted

- The intubating device used for intubation ,
- The time for successful intubation (The duration of successful intubation is time taken from laryngoscopic blade insertion at the level of lips till confirmation of endotracheal intubation with 1st capnograph),
- Type and size of endotracheal tube used for intubation,
- The number of attempts for successful intubation, (Failed intubation defined as more than 3 attempts for a single anaesthesiologist, saturation falling to lower than 90% or time for intubation more than 120 sec during attempts),
- The experience of the anaesthesiologist performing the intubation
- Intubation difficulty score
- Complications like airway trauma, laryngospasm and desaturation

Intubation difficulty score (IDS):

Parameter	Points
Number of supplementary attempts	1 point each
Number of supplementary operators	1 point each
Number of alternative techniques	1 point each
Cormack-Lehane grade minus one	0 to 3 points
Lifting force required	Normal = 0 point
	Increase = 1 point
External laryngeal pressure applied	None = 0 point
	Any = 1 point
Vocal cord mobility	Abduction = 0 point
	Adduction = 1 point

Table 1

Intubation difficulty score (IDS)	Degree of difficulty
0	Easy
0 to 5	Slightly difficult
> 5	Moderate to major difficulty
--	Impossible to intubate

Grading of difficulty of intubation according to Intubation Difficulty Score (IDS)

OBSERVATIONS AND RESULTS

Our study includes 96 patients where Mean age of study population is 39.80 ± 12.09 years with maximum number of patients in age group 41 to 50 years.

Mean body mass index was calculated to be 23.35 ± 2.79 kg/m^2 We determined the incidence of difficult intubation using the Intubation Difficulty Score (IDS).

We noted, Easy intubation with an IDS of 0 was seen in 14 cases (14.58%), Mildly difficult intubation with an IDS 1 to 5 was seen in 68 (70.83%) and Moderately to severely difficult intubation with an IDS of > 5 seen in 8 cases (8.33%).

Six patients underwent awake fiberoptic intubation.

Out of a total of 96 intubations, we observed that 79 intubations were performed successfully in the first attempt; while the remaining 17 required two attempts for successful intubation (table 2)

Table 2

Blade	Number of attempts for Successful intubation (%)				Total
	1st attempt successful	1st attempt unsuccessful	Rescue blade	Change of hand with same blade	
CMAC	30 (100%)	0 (0%)	-		30
Macintosh	41 (77%)	12 (23%)	CMAC (8) McCoy (2)	2	53
McCoy	2 (29%)	5 (71%)	CAMC (5)		7
Fiberoptic bronchoscope	6 (100%)	0 (0%)	-		6
Total	79 (82.29)	17 (17.71)			96

We also observed a statistically significant association between the choice of blade and size of the swelling by the Chi-squared test ($p < 0.001$). (Table 3)

Table 3

Size of swelling (cm3)	Type of blade used				Total
	CMAC	Macintosh	McCoy	Fibre- optic	
< 50	13	30	4	2	49
50 – 100	12	11	0	0	23
100 – 150	10	1	0	2	13
150 – 200	3	1	0	0	4
> 200	5	0	0	2	7
Total	43	43	4	6	96

We also observed a statistically significant association between the choice of blade and the neck circumference by the Chi-squared test ($p < 0.001$). (Table 4)

Table 4

Neck circumference (cm)	Type of blade used				Total
	CMAC	Macintosh	McCoy	Fibre-optic	
30 – 35	7	15	3	2	27
35 – 40	16	23	1	0	40
40 – 45	15	5	0	2	22
> 45	5	0	0	2	7
Total	43	43	4	6	96

We also observed a statistically significant association between the choice of blade and the Malampatti grade by the Chi-squared test ($p < 0.001$). (Table 5)

Table 5

Malampatti grade	Macintosh	McCoy	CMAC	Fiberoptic
I (24)	20	2	2	
II (50)	25	2	21	2
III (20)	2		16	2
IV (2)				2

Mean duration of successful intubation with different blades. (Table 6)

Table 6

Type of blade	Sample size (n)	Mean duration of successful intubation In seconds (Mean ± SD)
CMAC	43	33.65 ± 28.65
Macintosh	43	23.19 ± 8.19
McCoy	4	33.00 ± 17.91
Fiberoptic bronchoscope	6	267.75 ± 203.45
Total	96	38.64 ± 64.90

We compared the incidence of complications with IDS score with Chi-squared test. We observed a statistically significant association between the IDS score and the incidence of complications ($p < 0.001$). (Table 7)

Table 7

Type of blade	Overall complications		Total
	Present	Absent	
CMAC	8	35	43
Macintosh	3	40	43
McCoy	1	3	4
Fiberoptic bronchoscope	0	6	6
Total	12	84	96

Overall Complications include airway trauma, laryngospasm and desaturation at the time of intubation.

DISCUSSION:

Thyroid gland enlargement is common reason for difficult intubation, most commonly due to tracheal deviation/ compression. There are many studies which tried to correlate relation between different parameters with difficulty of intubation but very few have significant results.

In our study, We observed that, on the basis of IDS, incidence of moderately to severely difficult intubation was 8.8%, easy intubation was 14.58% and mildly difficult intubation was 75.5%. IDS could not be calculated in 6 patients as Fiberoptic intubation was used in the awake state.

De Cassai et. al. have reported the incidence of difficult intubation as 9.6% in their prospective observational study on 515 adult patients (≥ 18 years of age) undergoing thyroid surgery, very similar to our study.[3]

An almost similar figure of 11.8% was reported as the incidence of difficult intubation by Suo et. al., with these patients having an IDS of ≥5, with the remaining 89% patients experiencing an easy intubation.[7]

With **CMAC blade**, 1st attempt intubations done in 30 patients, all were successful. In 13 patients, CMAC used as a rescue (in the second attempt), all intubations were successfully done.

With **Macintosh blade**, 1st attempt intubations done in 53 patients, out of which 41 were successful. For the remaining 12 unsuccessful attempts, CMAC used for 8 patients successfully; McCoy blade used for two patients; for remaining two, change of person with same Macintosh blade was used.

When **McCoy blade** was used in 7 patients, 2 were successful in 1st attempt. 5 were unsuccessful which was done by CMAC in the next successful intubation. In 2 patients, it was used as a successful rescue. Six successful intubations were done with the **fiberoptic bronchoscope** in the first attempt.

The overall first attempt success rate for CMAC was 100%, Macintosh was 77.35%, McCoy was used in only few cases as a primary device with less success rate but not clinically significant, fiberoptic intubation was done with 100% success rate in anticipated difficult intubation.

We measured the duration of successful intubation among the study population and found that the mean duration of successful intubation was 23.19 ± 8.19 seconds for Macintosh blade, 33.00 ± 17.91 sec for McCoy blade, 33.65 ± 28.65 sec for CMAC blade, 267.75 ± 203.45 sec for fiberoptic .

Intubation was faster with the Macintosh blade compared with CMAC blade.

Amathieu et. al. have reported a mean time to successful intubation of 58 ± 5 s; and the longest time required for intubation was 20 min.64 The mean value in this study of 327 patients undergoing thyroid

surgery is longer than what we have found in our study.[8]

The duration of successful intubation increased with the Malampatti grade of the airway; Grade I (24.17 ± 11.41sec) ; Grade II (26.38 ± 11.79 sec); Grade III (45.30 ± 42.04 sec) ; with Malampatti grade IV associated with the longest time to successful intubation i.e. 452.00 ± 39.60 sec.

There were significant associations between IDS score and BMI, Mallampati score and volume of the thyroid gland. We found neck circumference was not significantly associated with difficult intubation statistically. **Anaesthesiologists preferred** Fiberoptic and CMAC blade for neck circumference >40cm.

We compared the first attempt success rate with different techniques with parameters like BMI, Mallampati score, and volume of the gland.

For patients with BMI more than 25 kg/m2, thyroid gland volume >150 cm3, Mallampati grade III and IV, **anaesthesiologists preferred CMAC blade over Macintosh as a primary blade** and **success rate was 100% with CMAC** in our study group.

For patients with BMI less than 25kg/m2, thyroid gland volume < 150cm3, Mallampati Grade I and II, **anaesthesiologists preferred Macintosh blade over other techniques** but **success rate was less compared to CMAC blade.**

In few cases we found trauma to upper teeth and incidence of desaturation which were not statistically significant. The limitations of our study were small sample size, nasal oxygenation not used in all the techniques during intubation except fiberoptic which would have helped to decrease rate of desaturation during intubation.

CONCLUSION:

The Prospective observational audit of 96 patients of thyroid surgery in tertiary care centre concluded that, most of the patients with thyroid swelling have come up with mild to moderate difficult intubation (IDS 1-5).

In our study it is observed, as BMI and the size of the thyroid swelling increase, IDS score increases.

For patients with higher BMI, bigger thyroid gland volume, Mallampati Grade III and IV, CMAC blade is the choice by many anaesthesiologist over Macintosh as a primary blade and success rate was 100% with CMAC in our study group.

For patients with less BMI , small volume thyroid gland , Mallampati Grade I and II, choice of anaesthesiologist shifts to Macintosh blade over the other techniques but success rate was less compared to CMAC blade.

Overall 1st attempt success rate for CMAC was 100%, Macintosh was 77.35%.

At the same time, time needed for intubation with Macintosh was less i.e. faster intubation compare to CMAC in the same study group.

We suggest CMAC to be routinely used to increase success rate of intubation and decrease time needed for intubation in all patients.

REFERENCES:

1) Serocki G, Bein B, Scholz J, Dorges V. Management of the predicted difficult airway: a comparison of conventional blade laryngoscopy with video-assisted blade laryngoscopy and the GlideScope. *Eur J Anaesthesiol*. 2010;27:24-30
2) Tripathi M: Goiter and airway control. *World J Endocr Surg*. 2010;2:9–16
3) De Cassai A, Papaccio F, Betteto G, Schiavolin C, Iacobone M, Carron M. Prediction of difficult tracheal intubations in thyroid surgery. Predictive value of neck circumference to thyromental distance ratio. *PLoS ONE*. 2019;14(2):e0212976.
4) Langeron O, Cuvillon P, Ibanez-Esteve C, Lenfant F, Riou B, Le Manach Y. Prediction of difficult tracheal intubation: time for a paradigm change. *Anesthesiology*. 2012; 117:1223–1233.
5) Adnet F, Racine SX, Borron SW, Clemessy JL, Fournier JL, Lapostolle F, et. al. A survey of tracheal intubation difficulty in the operating room: a prospective observational study. *Acta Anaesthesiol Scand.* 2001;45:327–32.
6) Juvin P, Lavaut E, Dupont H, et al. Difficult tracheal intubation is more common in obese than in lean patients. *Anesth Analg*. 2003;97:595– 600
7) Seo S, Lee J, Yu S, Kim D, Ryu S, Kim K. Predictors of difficult intubation defined by the intubation difficulty scale (IDS): predictive value of 7 airway assessment factors. *Korean J Anesthesiol*. 2012;63(6):491-7.
8) Amathieu R, Smail N, Catineau J, Poloujadoff MP, Samii, Adnet F. Difficult intubation in thyroid surgery: myth or reality? *Anesth Analg*. 2006; 103:965–8