A study of evaluation the of difficult endotracheal intubation in thyroid surgeries

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Abstract
A prospective study to evaluate the incidence of difficult endotracheal intubation in thyroid surgery.

Materials and Methods
Type of study: It is a prospective study
Place of study: Department of Anaesthesiology, Dhanalakshmi Srinivasan Medical College Hospital. 100 adult patients satisfying inclusion criteria were enrolled in this study. General examination included examination for facial anomalies, temporomandibular joint pathology, anomalies of mouth and tongue, pathology of nose, pathology of palate. Height in metre and weight in kilograms were recorded and BMI calculated.

Observation and Result: Evaluation of the incidence of difficult endotracheal intubation in thyroid surgery was done and Body mass index, thyromental distance, interincisor distance were measured. Retragnathia, neck mobility, tracheal deviation and compression were also evaluated. All data were collected and tabulated.

Conclusion: The study concludes that the incidence of difficult endotracheal intubation in thyroid surgery is less. In this study population no specific predictive factors were found to be associated with difficult endotracheal intubation in thyroid swelling.

Keywords: Thyroid surgery, endotracheal intubation, difficult anesthesia

Introduction
This study was conducted in the department of Anaesthesiology, Dhanalakshmi Srinivasan medical college – patients posted for elective thyroid surgery were selected and pre-operative assessment made with measurements BMI, TMD, IID, MMS, Neck mobility. Presence of retractognathia, tracheal deviation and compression were also noted. After induction IDS score was noted. Statistical analysis showed that the incidence of difficult endotracheal intubation in thyroid surgery is less.

Aim of the study
A prospective study to evaluate the incidence of difficult endotracheal intubation in thyroid surgery.

Materials and Methods
It is a prospective study, conducted in Department of Anaesthesiology, Dhanalakshmi Srinivasan Medical College Hospital – GGH. 100 adult patients satisfying inclusion criteria were enrolled in this study.

Inclusion Criteria
1. Elective adult thyroid surgery patients requiring general endotracheal Anaesthesia.
2. Males and Females. Whose ASA physical status 1-2.
3. Age 18 years of age and older.
4. Who have given valid informed consent.

Exclusion Criteria
The patients with following conditions are not included in this study. Patients not satisfying inclusion criteria.
Patients requiring other techniques for intubation such as rapid sequence Induction.
Patients intubated prior to surgery.
Patients with severe cardiovascular, hepatic or renal disease and mental illness.
Are unconscious or very severely ill. Need for nasal intubation.

Materials
Macintosh laryngoscope – current standard device.
Weighing machine calibrated to 1 kg.
Measuring tape calibrated to 0.5 cm

Airway Assessment:
Previous anaesthesia records, H/O previous surgery, Trauma, Burns, Tumour in and around the oral cavity, Neck or cervical spine were asked in the history. H/O of systemic illness like diabetes, ankylosing spondylitis, rheumatoid arthritis were asked and recorded.

General examination included examination for facial anomalies, temporomandibular joint pathology, anomalies of mouth and tongue, pathology of nose, pathology of palate. Height in metre and weight in kilograms were recorded and BMI calculated.

Measurement of airway indices: Individual indices were measured.

Joint movement: Patient was asked to look the ceiling without raising eyebrow and range of movements measured.

Neck flexion
Patient was asked to touch the manubrium sterni with chin and the range of movements measured.

TMJ Function
Patient was asked to open his mouth wide open and the inter incisor distance measured. Examiners index finger was placed over the tragus and the thumb over the mastoid process and the patient was asked to open the jaw and the sliding function of the mandibular condyle was assessed.

Upper lip bite test
The patient was asked to bite the upper lip with the lower incisor and graded as follows:
Class 1: lower incisor can bite the upper lip above the vermilion line.
Class 2: lower incisor can bite the upper lip below the vermilion line.
Class 3: lower incisor cannot bite the upper lip.

Thyromental Distance
Distance between thyroid notch and mental symphysis when the neck was fully extended and mouth closed.

Sternomental Distance
Distance between the sternal notch and mental symphysis when the neck was fully extended and mouth was closed.

Examination of dentures
Abnormalities like cracking, bucking, loose, artificial and absence of incisors were examined and recorded

Neck Circumference
Patients with neck circumference >50 cm had a greater chance of difficulty in intubations than those with < 50 cm.

Body Mass Index

| Classification          | BMI: KG.M2 |
|------------------------|------------|
| Normal                 | 18.5 – 24.9|
| Overweight             | >25        |
| Pre obesity            | 25 – 29.9  |
| Obesity Class- I       | 30 – 34.9  |
| Obesity Class- II      | 35 – 39.9  |
| Obesity Class – III    | >40        |

Samson & young modification of Mallampati grading
The patient is kept in sitting position with maximal mouth opening, protruding tongue, without phonation and the observer’s eye in level with patients mouth. The degree to which faucial pillars, uvula, soft palate and hard palate were visible were recorded and classified as follows:
Grade I: faucial pillars, uvula, soft palate and hard palate were visible
Grade II: uvula, soft palate and hard palate are visible
Grade III: base of uvula or none, soft palate and hard palate are visible
Grade IV: only hard palate visible after assessment patient shifted to operating room. Iv line started and monitors connected. Inj glycopyrolate 0.2 mg iv and Inj fentanyl 2ug/kg were given as premedication. Then preoxygenated with 100% oxygen for 3 mins.

Induction done with Inj thiopentone 5mg/kg. Intubation is done following non depolarising blocker Inj atracurium 0.5mg/kg or depolarising blocker Inj suxamethonium 2 mg/kg.
In case of non depolarising blocker, face mask ventilation is done for 3 minutes. Quick look laryngoscopy done with Macintosh laryngoscope and the Cook’s modification of Cormack – Lehane grading and intubation difficult score was noted.

Cook’s modification of cormack lehane grading and intubation difficulty score were noted as follows
Entire vocal cord visualized : Grade – I
Posterior part of vocal cords seen : Grade IIa
Arytenoids only seen : Grade IIb
Epiglottis only seen (liftable) : Grade IIIa
Tip of epiglottis only seen/ adherent : Grade IIIb
No glottis structure seen : Grade IV
### Intubation Difficulty Score

Seven variables are used:

- **N1** – Number of supplementary attempts. An attempt is defined as one advancement of tracheal tube in the direction of glottis during direct laryngoscopy.
- **N2** – The number of supplementary operators directly attempting (not assisting)
- **N3** – The number of alternative techniques used.
- **N4** – Glottic exposure as defined by the Cormack grade minus one.
- **N5** – Subjectively increased lifting force applied during laryngoscopy
- **N6** – The necessity of external laryngeal pressure.
- **N7** – Position of vocal cords. 0 – abduction, 1 – adduction

Apart from Cormack-Lehane and intubation difficulty score the following factor was also noted

Intubation time: Measured from entry of the device into the oral cavity until confirmation of proper placement of tracheal tube. Trauma during intubation is also noted.

### Observation and Result

This is a prospective study to evaluate the incidence of difficult endotracheal intubation in thyroid surgery. Body mass index, thyromental distance, interincisor distance were measured. Retrognathia, neck mobility, tracheal deviation and compression were also evaluated. All data were collected and tabulated. The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data, descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.

### Table 1: Statistics

| Variable       | Age | BMI | TMD | ID |
|----------------|-----|-----|-----|----|
| Valid N Missing| 100 | 100 | 100 | 100|
| Mean           | 39.18 | 24.0115 | 7.035 | 3.921 |
| Median         | 40.00 | 23.9500 | 7.000 | 4.000 |
| Std. Deviation | 9.744 | 3.07052 | .5999 | .5711 |
| Range          | 42 | 16.01 | 2.5 | 3.0 |
| Minimum        | 18 | 16.39 | 6.0 | 3.0 |
| Maximum        | 60 | 32.40 | 8.5 | 6.0 |

Demographic variables:

### Age Distribution

Age group of patients range from 18 yrs to 60 yrs. Majority of study population were in 30 to 40 yrs age group.

### Table 2: Age range

| Age Group       | Count |
|-----------------|-------|
| < 20 yrs        | 1     |
| 20 - 30 yrs     | 21    |
| 30 - 40 yrs     | 35    |
| 40 - 50 yrs     | 32    |
| 50 - 60 yrs     | 11    |
Sex Distribution:
Among the study population 10% were male and 90% were female.

Table 3: Sex Distribution

| Sex    | Count | Percent |
|--------|-------|---------|
| Female | 90    | 90.0    |
| Male   | 10    | 10.0    |
| Total  | 100   | 100.0   |

Body Mass Index
BMI of patients ranges from 18 to 35. Majority ranges from 21 to 25.

Table 4: Body Mass Index

| BMI  | Percent |
|------|---------|
| < 20 | 11      | 11.0    |
| 21 - 25 | 58 | 58.0    |
| 26 - 30 | 28 | 28.0    |
| 31 - 35 | 3  | 3.0     |
| Total | 100   | 100.0   |
Modified mallampati classification
Modified Mallampati score distribution was 29% / 49% / 22%. In most of the study population MMS was II.

Table 5: Modified mallampati classification

| MMS | Percent |
|-----|---------|
| I   | 29      | 29.0   |
| II  | 49      | 49.0   |
| III | 22      | 22.0   |
| IV  | 0       | 0.0    |
| Total | 100 | 100.0 |

Fig 4: BMI

Fig 5: MMS
Retrognathia was present in 1% of population and absent in 99% of population.

### Table 6: Retrognathia

| Retrognathia | No of persons | Percent |
|--------------|---------------|---------|
| NIL          | 99            | 99.0    |
| Present      | 1             | 1.0     |
| Total        | 100           | 100.0   |

Diagnosis

Regarding diagnosis of the study population, Solitary nodular goitre was present in 48% of population. Multinodular goitre was present in 25% of population. Toxic multinodular goitre was present in 11% of population. Follicular carcinoma thyroid was present in 9% of population. Papillary carcinoma thyroid was present in 2% population. Medullary carcinoma thyroid was present in 2% population. MNG with retrosternal extension was present in 1% population. Graves disease was present in 1% population. Goitres disease was present in 1% population.
Table 7: Diagnosis

| Diagnosis                  | Percentage | No of persons |
|----------------------------|------------|---------------|
| Medullary ca               | 2.0        | 1             |
| Mng with retrosternal extension | 1.0        | 1             |
| Pap ca                     | 2.0        | 2             |
| Goitres disease            | 2.0        | 2             |
| Follicular ca              | 9.0        | 9             |
| Toxic mng                  | 11.0       | 11            |
| Mng                        | 25.0       | 25            |
| Sng                        | 48.0       | 48            |
| Graves disease             | 1.0        | 1             |

Fig 8: Diagnosis

Surgery
Total thyroidectomy was the surgery done in the study population.

Table 8: Surgery

| TT  | Frequency | Percent |
|-----|-----------|---------|
| TT  | 100       | 100.0   |

Fig 9: Surgery
Tracheal Deviation

Trachea was in midline in 96% of population. It is deviated to left in 1% of population and to right in 3% of population.

Table 10: Tracheal Deviation

| Tracheal  | Percent |
|-----------|---------|
| NIL       | 96      | 96.0    |
| To left   | 1       | 1.0     |
| To right  | 3       | 3.0     |
| Total     | 100     | 100.0   |

Tracheal Compression

Tracheal compression was absent in 97% population and present in 3% of population.

Table 11: Tracheal Compression

| Compression | Percent |
|-------------|---------|
| NIL         | 97      | 97.0    |
| Present     | 3       | 3.0     |
| Total       | 100     | 100.0   |
Duration of Intubation
Regarding duration of intubation, 67% of population was intubated within 10–15 seconds, 29% of population was intubated within 16 – 20 seconds, and in 4% of population intubation duration was more than 20 seconds.

Table 12: Duration of Intubation

| Duration | %  |
|----------|----|
| 10 to 15 sec | 67 |
| 16 to 20 sec | 29 |
| >20 sec | 4 |

Fig 12: Duration

Trauma during Intubation
Regarding trauma during intubation, trauma to pharynx was present in 2% of population and trauma to lips was present in 1% of population.

Table 13: Trauma during Intubation

| Trauma   |  |
|-----------|---|
| Pharynx  | 2 |
| Lips     | 1 |
| Dentures | 0 |
| Tongue   | 0 |
| Palate   | 0 |
| Epiglottis | 0 |
| Larynx   | 0 |

Fig 13: Trauma
IDS
Regarding IDS score, easy intubation was found in 62% of the population, slight difficulty in 35% of population and moderate difficulty in 3% of population.

Table 14: IDS

| IDS Score          | Percent |
|--------------------|---------|
| Easy               | 62      | 62.0   |
| Slight             | 35      | 35.0   |
| Moderate - severe  | 3       | 3.0    |
| Total              | 100     | 100.0  |

Fig 14: IDS Score

CL Grading
Regarding CL grading 59% of population had grade 1, 19% of population had grade 2A, 18% of population had grade 2B, 4% of the population had grade 3A

Table 15: CL Grading

| CL grading |      |
|------------|------|
| 1          | 59   |
| 2A         | 19   |
| 2B         | 18   |
| 3A         | 4    |
| 4          | 0    |

Fig 15: CL grading
Conclusion
It is concluded that the incidence of difficult endotracheal intubation in thyroid surgery is less. In this study population no specific predictive factors were found to be associated with difficult endotracheal intubation in thyroid swelling.

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