Tracheal intubation

Presented by
Nadeen hadidi
OBJECTIVES:

- Assessment of patients airway including 1-2-3-Test
- The technique of tracheal intubation
to assess several factors that may affect decisions concerning the patient’s airway management.

‘1-2-3’ TEST COMPONENTS:

1. TMJ MOBILITY
2. MOUTH OPENING
3. THYROMENTAL DISTANCE
1-2-3 TEST

- TMJ mobility
- Mouth Opening
- Thyromental Distance
1) **First component:**

- **Temporomandibular joint (TMJ) mobility**

  to identify any restricted mobility of the temporomandibular joint (TMJ)

1. Ask the patient to sit up with his head in the neutral position
2. open his mouth as wide as possible.

- The condyle should rotate forward freely such that the space created between the tragus of the ear and the mandibular condyle is approximately **one fingerbreadth** in width.
Diagnosing TMJ
‘1-2-3’ Test

2) Second Component:
Mouth Opening and Tongue Protrusion

1. Ask the patient to open mouth maximally

- The aperture of the patient’s mouth should admit at least 2 fingers between his teeth. On the other hand, it will be difficult to insert the laryngoscope blade on less than 2 fingers.

- Note any loose, missing teeth or any bridges work on teeth.
2. Ask the patient to protrude the tongue maximally. The structures visualized should include:

1) The pharyngeal arches.
2) Uvula.
3) Soft palate.
4) Hard palate.
5) Tonsillar beds.
6) Posterior pharyngeal wall.

Technical difficulties with intubation should be anticipated when only the tongue and soft palate are visualized in a patient during this above maneuver.
ORAL CAVITY ANATOMY

( FAUCES )

- Anterior Pillar
- Posterior Pharyngeal Wall
- Tongue
- Hard Palate
- Soft Palate
- Uvula
- Posterior Pillar
- Tonsil
Mallampati Classification

THE VISUALIZED STRUCTURES
CLASS I: SOFT PALATE, FAUCES (THROAT), UVULA, PILLARS
CLASS II: SOFT PALATE, FAUCES, PORTION OF UVULA
CLASS III: SOFT PALATE, BASE OF UVULA
CLASS IV: HARD PALATE ONLY
3) **Third component:**

**The thyromental distance**

Measure from the lower border of the chin.

Adults who have less than 3 fingerbreadths between their **mentum and thyroid notch** may have either an anterior larynx "caudal larynx" or a small mandible, which will make intubation difficult.
**Thyromental distance**

Tip of thyroid cartilage to the tip of the chin (mentum)
<table>
<thead>
<tr>
<th>Airway parameter</th>
<th>Method of assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Modified Mallampati Classification</td>
<td>Class 1: Uvula, faucial pillars and pharyngeal wall seen</td>
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<tr>
<td></td>
<td>Class 2: Soft palate &amp; base of the uvula seen</td>
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<tr>
<td></td>
<td>Class 3: Only soft palate seen</td>
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<tr>
<td></td>
<td>Class 4: Soft palate not seen</td>
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<tr>
<td>2. Indirect Laryngoscopy</td>
<td>Grade 1: Most of glottis seen</td>
</tr>
<tr>
<td></td>
<td>Grade 2: Posterior commissure seen</td>
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<tr>
<td></td>
<td>Grade 3: Only epiglottis seen</td>
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<tr>
<td></td>
<td>Grade 4: Not even epiglottis seen</td>
</tr>
<tr>
<td>3. Degree of head extension</td>
<td>Grade 1: Adequate (≥ 90°)</td>
</tr>
<tr>
<td></td>
<td>Grade 2: Mild restriction (= 90°)</td>
</tr>
<tr>
<td></td>
<td>Grade 3: Moderate to severe restriction (&lt;90°)</td>
</tr>
<tr>
<td>4. Jaw protrusion (SLUX)</td>
<td>Grade 1: Lower incisors beyond the upper incisors</td>
</tr>
<tr>
<td></td>
<td>Grade 2: Lower incisors at the level of upper incisors</td>
</tr>
<tr>
<td></td>
<td>Grade 3: Lower incisors behind the upper incisors</td>
</tr>
<tr>
<td>5. Inter-incisor gap</td>
<td>Distance between upper and lower incisors (cms)</td>
</tr>
<tr>
<td>6. Mento-hyoid distance</td>
<td>Distance between body of hyoid and tip of chin in the midline, with head fully extended (cms)</td>
</tr>
<tr>
<td>7. Thyromental distance</td>
<td>Distance between tip of thyroid cartilage and tip of chin, with head fully extended (cms)</td>
</tr>
</tbody>
</table>
Condition that associated with difficult intubation

- Congenital anomalies ---> Pierre Robin syndrome (glossoptosis, OSA), Down’s syndrome
- Infection in airway ---> Retropharyngeal abscess
- Tumor in oral cavity or larynx
  - Enlarge thyroid gland, trachea shift to lateral or compressed tracheal lumen
  - Maxillofacial, cervical or laryngeal trauma
  - Temperomandibular joint dysfunction
- Burn scar at face and neck (scar retraction)
- Morbidly obese or pregnancy (redundant pharyngeal tissue)
- Interincisor gap: normal -> more than 3 cms (2 fingers)
- Mallampati classification: Class 3, 4 -> may be difficult intubation
- Laryngoscopic view grade 3, 4 -> risk for difficult intubation
- Thyromental distance less than 6 cms (3 fingers)
- Difficulty in Flexion and extension of neck
Tracheal intubation, usually simply referred to as intubation, is the placement of a flexible plastic tube into the trachea (windpipe) to maintain an open airway or to serve as a conduit through which to administer certain drug.
Indication for Tracheal Intubation

1. When muscle relaxants are used to facilitate the surgery
2. In patients with a full stomach/ increase abd. pressure
3. Where the position of the patient would make airway maintenance difficult (prone position)
4. Where controlled ventilation is utilized to improve surgical access
5. In those patients in whom the airway cannot be satisfactorily maintained by any other technique
6. During cardiopulmonary resuscitation
Technique of Tracheal Intubation

(5 Steps)
(1) Positioning the patient

**Sniffing position**

The patient’s head is placed on a small pillow with the neck flexed and the head extended at the atlanto-occipital joint.

This position enables to align the axes of mouth, pharynx and larynx for direct visualization during laryngoscopy.
• **Atlanto-occipital extension** alone increases the angle between the axes of the pharynx and the larynx

WHILE

• The combination of **cervical flexion (C5,C6) of the neck with atlanto(C1)-occipital extension** result in the alignment of the axes of the pharynx, larynx and oral to allow proper visualization from mouth through glottis.
(2) Opening the patient’s mouth

- Position of anesthesiologist is behind the patient’s head
- Left hand for holding laryngoscope
- Right hand for opening the mouth and insertion of tube
The patient’s mouth is fully opened using the index/middle finger and thumb of the right hand.

- Index/middle finger: pull the upper right incisors towards the operator
- Thumb: depress the lower mandible
- This serves to open the mouth, extends the AO joint, and protects the teeth and lips

Fig. 6.11: Scissors technique.
(3) Performing Laryngoscopy

- For visualization of mouth, pharynx, and epiglottis.
- The blade introduced into the mouth along the right side of the tongue, displacing it to the left.
- The blade is advanced until the tip lies at the base of tongue.
- Force is then applied in the direction in which the handle of the laryngoscope is pointing (forward and upward, 45° from horizontal line) “backward, upward, rightward, pressure” (BURP)
- Don’t approach your face to the patient to allow the arms to exert traction on the laryngoscope rather than attempting to lift the laryngoscope with the wrist (use arm, not wrist)
1) TONGUE AND UVULA
2) Epiglottis
3) Posterior cartilages and interarytenoid notch
4) Glottic opening and vocal cords
Tongue pushed to left

Tip of laryngoscope in vallecula

False cords — aryepiglottic folds

True cords

Laryngeal opening (tracheal rings just to left)
Laryngeal visualization and grading during direct laryngoscopy

Grade 1
full view of glottis

Grade 2
only posterior extremity of the glottis is visible

Grade 3
only the epiglottis is seen

Grade 4
no epiglottis or glottis structure visible
(4) Insertion of the ETT through the vocal cords and removing the laryngoscope

- Left hand controlling the laryngoscope blade while the right hand opens the mouth and then passes the ETT tip through the laryngeal inlet.
- The tube is then held firmly and the laryngoscope is carefully removed, and the cuff is inflated to prevent any leak during ventilation.
- Tip of ETT should be located at the midpoint of trachea, at least 2 cm above carina, and proximal end of cuff should be placed at least 2 cm below vocal cords (18-22 cm mark for adult from lips).
- The tube is then secured to the face or neck and connected to a T-piece, anesthesia breathing circuit, bag valve mask device, or a mechanical ventilator.
(5) Confirmation of correct ETT placement

(immediate absolute proof)

- Observing the tube passing through the vocal cords
- Measuring the carbon dioxide in expired gas (capnography), less than 0.2% indicates oesophageal intubation
- Visualizing the tracheal lumen using fiberoptic scope
(indirect confirmation)

1. Listening over the epigastrium (absence of breath sounds with ventilation)
2. Observing the chest to raise and fall with positive pressure ventilation
3. Listening to the apex of each lung for breath sounds with ventilation
4. CXR

- If auscultation of breath sounds is positive equally in both side (or there is chest expansion) and auscultation of gastric sounds is negative, that mean it inserted truly in the trachea continue to ventilate

- If auscultation of breath sounds is positive and only in rt side (that mean it is in the rt bronchus because it more alignment and wide than the left) so deflate it and slightly withdraw it up then reassess by auscultation

- If auscultation of breath sounds is negative and gastric insufflation is positive then remove it and reinsert it
(video)
Thank You