Nasotracheal Intubation for Head and Neck Surgery

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History

- First described in 1902 by Kuhn
- Popularised by Magill in 1920’s
- At one time, popular in ITU for long term ventilation, but risk of sinusitis has stopped this

Anatomy

Nose and Nasal Cavities

- Frontal sinus
- Nasal concha
- Sphenoid sinus
- Middle nasal concha
- Internal naris
- Inferior nasal concha
- Nasopharynx
- External naris
**Anatomy**

- Nasal cavity extends from nares to posterior end of nasal septum.
- Floor of cavity formed by upper surface of hard palate.
- Ceiling of cavity is the narrow cribriform plate of the ethmoid.
- Medial wall is formed by the nasal septum consisting of cartilage anteriorly and bone posteriorly.
- Lateral wall consists of medial wall of orbit superiorly and maxillary sinus inferiorly. Characterized by presence of 3 nasal conchae (turbinates). Inferior turbinates, the largest of them, easily visible on nasendoscopy.

- Lined by respiratory mucosa; ciliated pseudostratified columnar epithelium lying on highly vascular stroma, producing serous secretions for humidification of air and mucous for trapping inspired particles.
- Blood supply: Sphenopalatine Artery. This forms anastomosis with Superior Labial and the Ascending Branch of the Greater Palatine Artery to form Kieselbach’s Plexus within anterior part of nasal septum: Little’s Area. This is the commonest site for epistaxis.
Anatomical Anomalies

- Rarely symmetrical
- Septal deviation is most common variant, most commonly affecting cartilaginous septum. Commonly due to trauma, including delivery and intra-uterine moulding
- More severe structural abnormalities less common and usually occur as a result of more severe trauma or surgery

Indications for Nasotracheal Intubation

Head and Neck Surgery

- Intra-oral and oropharyngeal surgery
- Complex intra-oral procedures involving mandibular reconstructive procedures
- Rigid laryngoscopy and microlaryngeal surgery
- Dental surgery

General Indications

- Intubation of patients with intra-oral pathology, structural abnormalities and trismus
- Intubation of patients with cervical spine instability and cervical spine disease
- Intubation of patients with OSA
**Indications for Nasotracheal Intubation**

- Facilitates insertion of Boyle-Davis gag and other instrumentation
- Enlarged surgical field
- Technique of choice for more complex head and neck procedures involving mandibular osteotomy
- Preferred route for rigid endoscopic procedures, particularly microlaryngoscopy
- Useful in patients in whom laryngoscopy and orotracheal intubation are impeded, e.g., trismus, oropharyngeal infections, decerebrate rigidity or lower facial trauma. Awake fibre-optic intubation may be employed in these cases

**Technique of Nasotracheal Intubation**

**Pre-Operative Assessment**

- Careful assessment (as always!!)
- Selection of the clearer nostril is difficult and ease of breathing does not indicate patency.
- Pre-op anterior rhinoscopy has not been shown to be of benefit
- Pre-op flexible nasendoscopy can identify asymptomatic intranasal abnormalities by an experienced user.
- Note previous surgery, particularly cleft palate surgery and pharyngoplasty
Technique of Nasotracheal Intubation

Preparation of the Nasal Mucosa

- Cocaine 4-10% remains favoured ENT solution, although studies have shown little benefit in reduction of bleeding when compared to topical lidocaine 3-4% with phenylephrine 0.25-1%
- In one study, 10% lidocaine spray, 30mg per naris, 3 minutes prior to induction minimized MAP increase by blind nasal intubation
- Mechanical dilatation with NP airways has been tried, however this has been shown to be detrimental due to repeated trauma of the relatively friable mucosa

Choice of Tube

- Warming the tube makes it more supple, but at the expense of losing the manufacturer’s curve
- Cuffed tubes have high volume, low pressure cuffs which, when deflated, can scratch the naris and cause bleeding
- Nasal tubes are necessarily narrower than oral tubes and are also longer. Range is 5-8 mm ID. This makes the work of breathing harder as per Hagen-Poiseuille equation
- IPPV is essential with a 5mm tube, but spontaneous ventilation in fit adults via a 6 or 6.5mm tube for short periods is practicable
Technique of Nasotracheal Intubation

Method of Insertion

- Well lubricated, deflated cuff. Inserted at right angles to face along floor of nasal cavity.
- Passed into larynx under either direct vision or blind nasal technique.
- Blind nasal technique avoids stimulation of laryngeal instrumentation as well as risk of dental damage. Also decreases pressor response to laryngoscopy per se.
- Aids to blind nasal intubation include listening for breath sounds, inflation of tracheal cuff, the use of stylets/suction catheters and ETCO₂.
- Alternatively, the piriform fossa may be identified as a skin bulge with the tip of the tube. The tube is slightly withdrawn, rotated anti-clockwise 90°, and then advanced towards midline into larynx. Alteration of head flexion/extension may be required to guide tip.

Complications

Epistaxis

- Most common complication due to abrasion of nasal mucosa in Little’s Area. Incidence 17% in one study, with gross haemorrhage incidence of 1.4% (n=71). Overall epistaxis rate would appear to be around 20-47%.
- Bleeding can also occur due to avulsion of polyps, adenoids or tonsils.
- Increased risk with oversized tube, repeated attempts, or excessive force.
- If bleeding occurs and intubation can be completed quickly, then the airway should be secured. The tube will then also act as a tamponade to the bleeding.
- If tracheal intubation not satisfactory and there is brisk bleeding, tube should be withdrawn and cuff inflated so that the balloon is in the post nasal space preventing blood passing into the oropharynx.
- Nasal tampons may also be used to stem bleeding.
Complications

Rare Complications

• Inferior turbinate avulsion - causing tube/bronchial obstruction
• Middle turbinate/nasal polyp/tumour avulsion
• Bacteraemia - 16% incidence in one study, so consider prophylactic antibiotics in appropriate patients
• Retropharyngeal mucosa dissection/laceration - Recommend the use of a broad-spectrum prophylactic antibiotic

Contraindications

• Advanced upper airway obstruction. Require careful inhalational induction or awake tracheostomy under LA.
• Base of Skull Fracture
• Bleeding diathesis
• Cardiac valvular abnormalities or prosthesis
• Blind intubation contraindicated with upper airway foreign body
Conclusions

• Effective and safe technique with low complication rate
• Benefit to head and neck surgeon outweigh potential risks to the patient
• Fibre-optic nasotracheal intubation is a very useful skill for any anaesthetist, however it is expensive in terms of equipment, staffing and time for minor ENT or maxillo-facial lists
• In these minor lists careful nasal intubation, either under direct vision or ‘blind,’ forms a quick and safe alternative for the anaesthetist while providing improved operating conditions

Reference

Hall CEJ and Shutt LE. Nasotracheal Intubation for Head and Neck Surgery. Anaesthesia 2003; 58; 249-256