International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Awake Fiberoptic Intubation in Patients with a Difficult Airway: Comparison of Ivory North Pole and PVC Portex Tubes

Susmitha B[1], Sneha Telange[2], Rajendra D Patel[3]

[1]Resident, Department of Anaesthesiology, Seth GS Medical College & Kem Hospital, Mumbai, 400012, Maharashtra, India
sushmithavbhat95[at]gmail.com

[2]Resident, Department of Anaesthesiology, Seth GS Medical College & Kem Hospital, Mumbai, 400012, Maharashtra, India
Snehatelange066[at]gmail.com

[3]Professor, Department of Anaesthesiology, Seth GS Medical College & Kem Hospital, Mumbai, 400012 Maharashtra, India
drkrd59[at]yahoo.co.in

Abstract: ***Awake fibreoptic intubation (AFOI) is one of the recent advances in the field of airway management. Various types of endotracheal tubes have been used for the fibreoptic technique. We have compared ivory North Pole (NP) and portexpvc tubes with regard to ease of intubation in terms of intubation time, number of attempts, haemodynamic parameters and incidence of complications, in 34 patients of anticipated difficult intubation posted for elective surgeries. Incidence of successful intubation in first attempt was 47% with NP and 29% with PVC tube. Mean duration of intubation was 7.12min and 7.53min in NP and PVC group respectively. Complications like bleeding and secretions were significantly more in PVC group. We conclude that the ivory North Pole tube is better than the PVC portex tube, probably due to its texture and increased flexibility.***

Keywords: Awake fiberoptic intubation (AFOI), Ivory North Pole tube, Portex PVC tube

1. Introduction

Although not widely utilized, fibreoptic techniques represent a dramatic advance in the management of the difficult airway. Awake fibreoptic intubation is one of the safest non-invasive means of securing a critical airway. It reduces the number of complicated intubations and the incidence of airway trauma. The term “awake” reflects a fully conscious state wherein the patient is able to follow commands. However various studies claimed to be under AFOI were actually done under sedation [1]-[3]. This increases patient comfort but in a difficult airway the safety of the patient is the greater priority. Giving no sedation at all provides a wide margin of safety with minimal patient discomfort.

The need for awake intubation arises from several factors including maintenance of oxygenation and ventilation, preservation of anatomy and muscle tone, airway protection, phonation as a guide to intubation, absence of side effects of sedation and the fact that sedation itself could be a cause of failed intubation. The two types of endotracheal tubes compared in our study were the ivory North Pole tube and the portexpvc tube. Advantages of the ivory North Pole tubes include the fact that is softer and less traumatic, provides better visualization because there is no glow and it has an anatomical preformed shape. The disadvantage however is that smaller sizes are not yet available and suctioning through these tubes is difficult. The advantage of portex tubes on the other hand is that all sizes are available and fog can confirm intubation. The disadvantages include rigidity which can increase the chances of trauma and bleeding, and transparency leading to poor vision as light is reflected.

2. Materials and Methods

After taking the Institutional Ethics committee approval and informed consent, 34 patients of either sex, aged 8-30 years, of ASA physical status I or II were enrolled for this prospective randomized controlled study. The time period of the study was one year. These patients were scheduled for elective surgery and had an anticipated difficult airway. They were allocated to either the ivory North Pole or PVC portex groups (FIGURE 1) as per computer generated random numbers.

Figure 1: Ivory North Pole Tube (TOP), PORTEX PVC Tube (Bottom)

Patients with nasal pathology, coagulation disorders, hypertension ischaemic heart disease and allergy to lignocaine were excluded from the study. The common indications for surgery included temporomandibular joint ankylosis, panfacialfracture, mandibular fracture and mento sternal contracture.

All patients were kept fasting for a period of six hours prior to surgery. Full range of resuscitative equipment including the difficult airway cart was kept accessible. Topical anaesthesia and fibreoptic intubation was explained to the patients in detail in order to allay anxiety. Standard monitors included pulse oximetry, noninvasive arterial blood pressure, electrocardiography and capnography. Intravenous access was obtained and supplementary oxygen was given throughout the procedure. All patients were premedicated with inj. Glycopyrrolate 4mcgs/kg and nebulisation was given with 4% lignocaine 1 ml diluted to 4ml in normal saline, thirty minutes prior to the procedure. Xylometazoline drops were instilled intranasally. The patients were instructed to gargle with lignocaine viscous 2% (10ml).40 mg (2cc) of Lignocaine Jelly 2% was applied in both nostrils. Superior laryngeal nerve block was given with 2ml of injection lignocaine 2%. A Transtracheal block with 2ml injection lignocaine 4% was also given. Lignocaine 10% spray was used, one spray in each nostril. After 5mins nasal suction was done before inserting the tube. Total dose of lignocaine used was 300-500mg. Maximum dose up to 6-9mg/kg Lignocaine was not crossed.

Appropriate sized endotracheal tube either ivory north pole or pvc (portex) was cut such that there was atleast 10cm margin on fiberscope for manipulation. The fiberscope was marked with a tape up to the length of the tube and by palpating the tape we could confirm that the scope has reached the tip of the tube. Tube smeared with lignocaine jelly was first passed through the patent nostril until posterior nares were crossed. Later the fiberscope smeared with jelly was passed through the tube. Blue line was traced till tip Scope was then negotiated through the glottis till carina and tube was threaded over it. In between 2 attempts of intubation supplemental oxygen was given through the same endotracheal tube that was already in pharynx. Confirmation with fiberscope (seeing carina and light glow) and capnography. Also, Fog and cotton wisp movement were used as additional indicators of successful tracheal placement of the tube during intubation, most patients tolerated insertion of tube and some had slight coughing which resolved spontaneously. Patients were then sedated with Midazolam (0.03mg/kg) and Buprenorphine (2ug/kg) and induced with Propofol (2mg/kg) and Rocuronium (1/kg) and a stitch was taken to fix the tube to the nasal septum.

3. Statistical Analysis

The variables tested were intubation time, number of attempts, haemodynamic parameters andcomplications. We considered a 20% increase in heart rate and systolic blood pressure significant. The data was analysed using Chi square test Significance was taken as $P<0.05$.

4. Results

The patient characteristics including age, gender and airway assessment data including mouth opening, mentohyoid, mentothyroid and mentosternal distances were comparable in both groups.

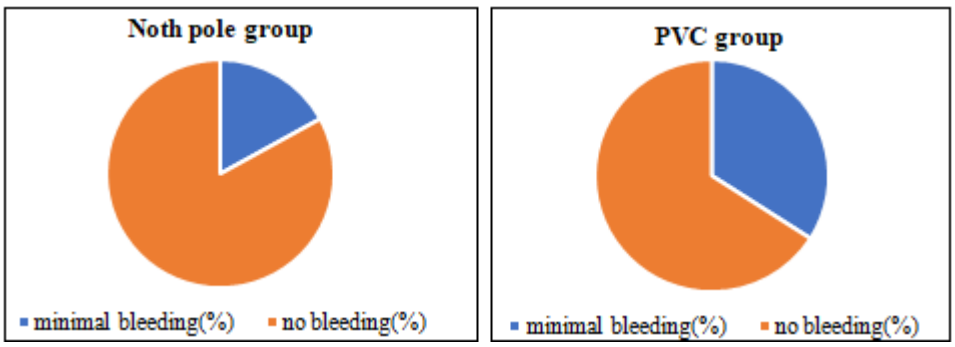
Table 1: Intubation parameters, * P value <0.05-Significant

Intubation parameter	North pole group	PVC group	P value
Duration of intubation (min)	7.12	7.53	>0.05
First Attempt success rate (%)	46.4	29	<0.05*

There was a difference between the intubation time in the two groups but this was not statistically significant. There was a statistically significant difference ($P<0.05$) between the two groups with respect to the number of attempts required with the Ivory north pole group exhibiting higher number of successful tracheal intubations in the first attempt (46.4%), as compared to the portexpvc group (29%) [table 1]. Mean duration of intubation was 7.12min and 7.53min in NP and PVC group respectively [table 1].

Table 2: Incidence of Bleeding (%)

Bleeding	North pole group	PVC group
Minimal Bleeding (%)	17	34
No Bleeding (%)	83	66



Graph 1 &2: Incidence of bleeding in North Pole and pvc groups respectively

There were no cases of hypoxia, airway obstruction, gastric inflation or local anaesthetic toxicity. Incidence of bleeding and excessive secretions was more in the portexpvc group as compared to the ivory North Pole group.

5. Discussion

The use of awake intubation for the care of patients with difficult airways is still extensively described in the literature, despite the development of new airway devices and procedures. Awake intubation with a flexible intubation scope, as demonstrated by Jaime B. Hyman et al, is

successful in 98-99% of cases and is still a reliable strategy for managing airways in situations of trismus, oropharyngeal tumours, and neck immobility. [4]

We found the ivory North Pole tubes are better as compared to the portexpvc tubes probably due to a variety of reasons including texture and increased flexibility. With regard to posture, Andranik Ovassapian et al, attempted intubations in sitting position, Fowler's position, and supine with head-up position and recommends supine position for AFOI [5]. M. R. Neal, et al reported a case of severe facial trauma and respiratory distress where adoption of the semi prone position improved his airway during AFOI [6]. In our study we used supine position in all cases. As far as premedication of the patient's isconcerned, N. M. Woodall et al, increased Glycopyrrolate administration from 3 to 4 mcg/kg in order to reduce secretions and improve the quality of analgesia [7]. Crosby ET et al, mentioned that Antisialogogues must be given at least 30mins before airway manipulation to permit adequate drying of the mucous membranes [8]. In our study we used 4mcg/kg inj. Glyco 30mins prior to the procedure. Various studies have used sedation including Hwan S Joo et al, who suggested that Midazolam and Fentanylare most widely used sedative agents for AFOI [1]. Scher C et al, used Dexmedetomidine and low-dose Ketamine to patients with previous failed AFOI [9]. NM Woodall, used no sedation but in200 healthy volunteers for AFOI [7]. As mentioned earlier, in our study no sedation was used.

For topical airway anaesthesia, NM Woodall, observed no overt signs of Lidocaine toxicity using a maximal dose of 9 mg/kg, with mean peak plasma Lidocaine concentration of 2.5 mg/l [7]. Foldes et al, measured blood Lidocaine concentrations during iv infusions of Lidocaine and observed signs of toxicity, when blood concentrations reached a mean of 5.29 mg/l [10]. In our study with maximum 6-9mg/kg clinical signs of Lidocaine toxicity were not seen.

Syal R, Parvez M et al, suggested that for the technique of intubation, tube first and then fiberscope was better than the usual scope first followed by tube because its easier to locate the cords and it reduces the duration and number of attempts and also reduces complications for the placement of an endotracheal tube in a difficult airway scenario [11].

For the purpose of oxygenation in between two attempts at passing the tube, NM Woodall, oxygenated by nasal cannula positioned over patients mouth, lightly gripped by teeth during the FOI [7]. In our study oxygenation between theattempts was provided by nasal ET tube in pharynx.

N. M. Woodall et al, concluded that in the presence of Hypertension or IHD, sedation has an important role in tracheal intubation under topical anaesthesia and not otherwise [7]. Ovassapian A et al, suggested that if intubation is done immediately after spraying of the trachea with Lidocaine, cardiovascular responses are not attenuated [3]. We observed that with adequate topical anaesthesia changes in hemodynamics were not significant and were acceptable in otherwise ASA I or II patients.

Heidegger et al, reported a failure rate of 1.8% in 955 patients undergoing naso tracheal AFOI [12]. However patients received Fentanyl and Etomidate iv before intubation. N. M. Woodall et al, reported failure rate as high as 10% as they had adopted a low threshold for abandonment of intubation attempts because in this study no sedation was used and there was no clinical need for intubation in volunteers [7]. In our study FOI was abandoned in 2 cases (6%) due to technical reasons of poor vision due to bleeding, secretions and no suction channel.

N. M. Woodall, et al, concludes that FOI under topical anaesthesia is associated with complications of infection, local trauma and symptoms of Lidocaine toxicity [7]. In our study minimal trauma with bleeding and secretions were common complications. Symptoms of Lignocaine toxicity were not seen even with maximum Lignocaine dose of 6-9mg/kg.

Ahmet Salim et al. demonstrated that the North pole tube was associated with less epistaxis and manipulations such as laryngeal compression and head position changes when compared with the Spiral tube during nasotracheal intubation in anaesthetised patients [13].

We conclude that awake FOI can be performed with only airway topical anesthesia and no sedation. Secondly, the changes in hemodynamics were acceptable in otherwise ASA I or II patients. Furthermore, Ivory North pole tube was superior to PVC portex tubes for awake FOI with regards to ease of intubation (intubationtime), number of attempts and complications.

References

[1] HwanS. Joo "The intubating laryngeal mask airway after induction of general anesthesia versus awake fiberoptic intubation in patients with difficult airways". AnesthAnalg.2001 May; 92 (5): 1342-6. doi: 10.1097/00000539-200105000-00050. PMID: 11323374.
[2] Morris IR. "Fibreoptic intubation". Can J Anaesth 1994; 41: 996-1007
[3] Ovassapian A. "Blood pressure and heart rate changes during awake FOI" AnesthAnalg 1983; 62: 951-4
[4] Jaime B. Hyman1 · William H. Rosenblatt, "Awake Intubation Techniques, and Why It Is Still an Important Skill to Master" Current Anesthesiology Reports, 2022; 12: 382-389
[5] Andranik Ovassapian"Airway management in adult patients with deep neck infections: a case series and review of the literature". AnesthAnalg.2005 Feb; 100 (2): 585-589. doi: 10.1213/01. ANE.0000141526.32741. CF. PMID: 15673898.
[6] M. R. Neal Anaesthesia Volume 51 Issue 11, "Awake fibreoptic intubation in the semi-prone position following facial trauma" Pages 1053 — 1054November 1996 https: //doi. org/10.1111/j.1365-2044.1996. tb15004. x
[7] N. M. Woodall, R. J. Harwood, G. L. Barker, "Complications of awake fibreoptic intubation without sedation in 200 healthy anaesthetists attending a training course", *BJA: British Journal of Anaesthesia*,

Volume 100, Issue 6, June 2008, Pages 850-855, https: //doi. org/10.1093/bja/aen076

[8] Crosby ET, Lui A, “The adult cervical spine: implications for airway management”. Can J Anaesth.1990 Jan; 37 (1): 77-93. doi: 10.1007/BF03007488. PMID: 2136808.

[9] Scher C “Dexmedetomidine and low-dose ketamine provide adequate sedation for awake fibreoptic intubation”. Can J Anaesth.2003 Jun-Jul; 50 (6): 607-10. doi: 10.1007/BF03018650. PMID: 12826556.

[10] Foldes FF, Malloy R, McNall PG, Koukal LR. “Comparison of toxicity of intravenously given local anaesthetic agents in man”. JAMA 1960; 172: 1493-8

[11] Syal R, Parvez M et al. “Comparison of Conventional Technique versus Modified Tube First Technique of Awake Nasotracheal Fiber-optic Intubation: A Randomized Control Open-Label Trial”. Anesth Essays Res.2020 Jul-Sep; 14 (3): 395-400. doi: 10.4103/aer. AER_104_20. Epub 2021 Mar 22. PMID: 34092848; PMCID: PMC8159060.

[12] Heidegger T, Gerig HJ, Ulrich B, Schnider TW. “Structure and process quality illustrated by fibreoptic intubation: analysis of 1612 cases”. Anaesthesia 2003; 58: 734- 9

[13] Ahmet Salim, Sedat Akbar et al. "North Polar Tube Reduces the Risk of Epistaxis during Nasotracheal Intubation: A prospective, Randomized Clinical Trial": CurrTher Res Clin Exp.2018 Oct 9; 90: 21-26.10.1016/j. curtheres.2018.09.002. PMID: 30787962; PMCID: PMC6369142.