Original Article

Local Anaesthesia for Fiberoptic Intubation : A Comparison of Three Techniques

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Abstract

Background: The successful conduct of fiberoptic aided intubation is dependent upon effective local anaesthesia. The aim of the study was to compare three different methods of anaesthetizing the airway.
Methods: 60 adult patients (American Society of Anaesthesiologists status I-III and Mallampati class III & IV), scheduled for elective surgery, received sedation followed by spraying of the nares and posterior pharyngeal wall with 4% lignocaine. Thereafter the patients received 4 ml of 4% lignocaine either by transtracheal injection (n=20, group A), via intubating fiberscope (Pentax F1-10P2) using 'spray as you go' technique (n=20, group B) or by nebulizer (Devilbiss 5610W) 20 min before intubation, (n=20, group C). Patients were asked to score the procedure using visual analog scale (VAS) and severity scores. Episodes of coughing, choking, stridor, extra / total local anaesthetic used and intubation times were recorded. Patients were monitored continuously for vital parameters.
Results: Group B patients showed better VAS scores with shorter intubation times and had a lower incidence of coughing and choking. The endoscopists' VAS scores also showed a preference for group B.
Conclusion: In conclusion the 'spray as you go' technique was safe, provided effective local anaesthesia and was preferred by both patients and endoscopists.

MJAFI 2005; 61 : 22-25

Key Words : Awake intubation; Difficult airway; Fiberoptic intubation

Introduction

Awake fiberoptic aided intubation is now an accepted technique for managing the difficult airway. However it is often an unpleasant procedure. The principal patient complaints include sensation of passage of the instrument through the nose and larynx, pain and coughing while endoscopists usually ascribe difficulty in laryngeal visualization to secretions and inadequate local anaesthesia [1-3]. Inevitably the patient's tolerance and the success of fiberoptic-assisted intubation depends on the effectiveness of topical anaesthesia and obtundation of pharyngeal, laryngeal and tracheobronchial reflexes [3,4].

Prior to endoscopy, while the upper airway is commonly anaesthetized by local lignocaine spray or gel, the modalities of applying local anaesthetic to the larynx and lower respiratory tract include injection via the fiberoptic bronchoscope and transtracheal injection delivery via a nebulizer [5].

The aim of this study was to compare the three techniques of local anaesthesia using VAS and severity scale for patients undergoing awake intubation. It was also proposed to study the acceptability and suitability of these techniques to the patient with objective measurement of cough, stridor, intubation time and total dose of anaesthetic used.

Methods

Sixty adult patients in American Society of Anaesthesiologists (ASA) status I-III between the age group of 18 to 60 years were included in the study. All the patients had an anticipated difficult airway with Mallampati Class III and IV, and were to undergo elective fiberoptic intubation. After informed consent and approval by the Hospital Ethics Committee, patients were randomized into three groups, each receiving 4 ml of 4% lignocaine with either of three different methods: group A (n=20) via transcricoid injection (cricothyroid puncture); group B (n=20) via intubating fiberscope; group C (n=20) via nebulizer.

A common standard anaesthetic regimen was followed for all the patients which included overnight fasting and premedication in the form of tablet diazepam 10 mg the night before surgery and 10 mg in the morning 2 hours before surgery. In the theatre, they received injection glycopyrrolate 0.2 mg, pethidine 50 mg and phenergan 25 mg intramuscularly 45 minutes before the start of the procedure. Further

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Received : 12.07.2002; Accepted : 08.05.2004

0.1% xylometazoline drops were instilled in both the nostrils 15 minutes later. Thereafter, both the nasal passages were lubricated with 2 ml of 2% lignocaine jelly. Posterior pharynx was then anaesthetized with 4 sprays of 4% lignocaine and the patient was asked to gargle with the excess solution trickling down the throat.

Inside the theatre an intravenous access was established and monitoring instituted viz electrocardiogram (ECG), oxygen saturation (SaO_2), and non-invasive blood pressure (NIBP). The next step was aimed at achieving laryngo-tracheal anaesthesia prior to intubation of trachea. Group A patients had 4 ml of 4% lignocaine injected through the cricothyroid membrane in two aliquots using 22 G catheter over needle. Group B patients had the intubating fiberscope (Pentax F1-10P2) inserted transnasally until just above the cords and 4 ml of 4% lignocaine was administered through an 18G epidural catheter which was passed through the suction channel. This was done in two steps: the first onto the vocal cords and the second into the trachea during inspiration. Group C patients had 4 ml of 4% lignocaine delivered by nebulizer (Devilbiss 5610W) starting 20 minutes before the procedure and taking 10 minutes to complete. In each group additional 1-2 ml aliquots of 2% lignocaine were administered if required.

The lubricated endotracheal tube (Mallinckrodt flexometallic) was passed through the nares. The fiberscope was manoeuvred through the tube beyond the vocal cords and into the trachea. The endotracheal tube was then slid off the fiberscope and mid-tracheal placement was confirmed under direct vision. During this entire procedure that is, from the passage of the tube into the nares and the manipulation of the scope till placement of the tube in the trachea, the following observations were made:

a) Intubation time (i.e. time from introduction of the fiberscope till the first measurement of end-tidal carbon dioxide was recorded) and number of attempts

b) Pulse, NIBP, SaO_2, ECG and complications such as arrhythmias, bleeding or sore throat.

Table 1

Severity scale (as reported by the patient)

Not unpleasant	1
Uncomfortable	2
Unpleasant	3
Most unpleasant	4
Intolerable	5

Table 2

Grading of overall intubating conditions (as assessed by the endoscopist)

I	No adverse events, cough or stridor, co-operative and well tolerated
II	Coughed once or twice, co-operative with reassurance, tolerated the tube well.
III	Coughed repeatedly, no stridor, tube accepted
IV	Coughed repeatedly, stridor present, unco-operative, did not allow scope to be passed beyond glottis

c) Incidents of cough (abrupt expiratory sounds) and stridor (musical inspiratory sounds)

To assess the severity of symptoms, a 10 cm VAS ranging through 'not pleasant to 'intolerable' was used to assess the patients' symptoms and affirm the endoscopists' appraisal. A severity scale ranging from 1 to 5 [6] (Table 1) was also employed to assess the patients' quality of anaesthesia (nasal & laryngeal) and intubation (fiberoptic & endotracheal). In addition, the endoscopist was asked to grade the overall 'scope inserting and intubating' conditions in each case. The defining criteria are described (Table 2). All the patients were interviewed post operatively to comment about discomfort if any in the form of coughing, choking and pain.

The study was terminated when these recordings pertaining to VAS and severity scores were completed at the end of fiberoptic endoscopy. Additional amount of lignocaine used (in mg) was also recorded. The results were analysed statistically using Student's t test and chi square test and probability values $p<0.05$ were taken as significant.

Results

All the three groups were similar demographically (Table 3) without any significant difference. There were no adverse/ untoward incidents like desaturation or arrhythmias. The types of surgery are displayed (Table 4).

Subjective Assessment

The patients' VAS for symptoms and the endoscopists' assessment showed a significant overall preference for group B (Fig. 1) with lower scores for coughing and choking. The severity scores (Table 5 and Fig. 2) recorded by the patients showed no significant difference in nasal anaesthesia (mean scores of 2.2, 1.8, 2.0). However, the quality of laryngeal anaesthesia was significantly better in group B as evidenced by significantly lower scores ($p<0.05$). Similarly fiberoptic intubation of the larynx (mean scores of 2.2,1.0, 2.3) and endotracheal intubation (2.0, 1.2, 2.7) displayed significantly lower scores for group B ($p<0.05$).

Objective Measurement

The cough counts during the procedure were recorded as the mean count per procedure. The total number of coughs

Table 3

Demographic data

	Group A	Group B	Group C
Age (years)	38 ± 2.1	37 ± 1.6	39 ± 1.1
Weight (kg)	56.8 ± 1.5	55 ± 2.3	58.1 ± 1.3
Sex (M:F)	12:8	13:7	11:9

Table 4

Types of surgery

Head and neck malignancy	32
Dental tumours and TM joint ankylosis	20
Burns contractures (face and neck)	8
Total	60