ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

EVALUATION OF NASOTRACHEAL FIBEROPTIC INTUBATION UNDER LOCAL ANAESTHESIA: OBSERVATIONAL STUDY

Dr Sarav Patel[1], Dr Shailesh Patel[2]

[1]Assistant Professor, Department of Anaesthesia, Zydus medical college and hospital, Dahod, Gujarat, India

[2]Professor and Head, Department of Anaesthesia, Zydus medical college and hospital, Dahod, Gujarat, India

Corresponding Author: **Dr Sarav Patel, Department of Anaesthesia, Zydus medical college and hospital, Dahod, Gujarat, India**

Email Id: sarav.274@gmail.com

Conflict of Interest: none

Source of Support: Nil

Abstract

Introduction: The principal patient complaints of awake nasal fibreoptic intubation 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. So the present study was undertaken to evaluate the intubating conditions, patient comfort and haemodynamic changes during awake nasotracheal fibreoptic intubation.

Materials & Methods: The study population consisted of 100 patients in the age group of 20 to 60 years belonging to ASA grade I and II physical status and Mallampatti airway grade I and II posted for elective surgeries under General anaesthesia.

Results: Heart rate increased more than 20 beats/minute in 24 intubations and had increased in more than 30 beats/minute in 8 intubations. Maximum increases occurred during placement of endotracheal tube in the trachea. Most of the intubations were carried out within 4 minutes. Patient comfort during the procedure was satisfactory with 90% of patients having favourable grades.

Discussion & Conclusion: fibreoptic intubation performed through nasal route under sedation and airway anaesthesia, offers stable haemodynamics, good intubating conditions and better patient comfort, acceptance and safety with high rate of successful intubation.

Keywords: Fibre optic Intubation, Local Anaesthesia, Hemodynamic Changes, Nasal Route

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

Introduction

The most common cause of mortality and serious morbidity due to anaesthesia is from airway problems. It is estimated that one third of all anesthetic deaths are due to failure to intubate and ventilate. During routine anesthesia the incidence of difficult tracheal intubation has been estimated at 3 – 18%.[1, 2] Awake fibreoptic intubation (FOI) is regarded as a safe way of managing some airway problems, particularly anticipated difficulty with direct laryngoscopy.1–3 In order to provide effective training; courses have been developed where anaesthetists act as subjects and practise skills on each other.[3]

Nasotracheal intubation is often preferable to oral intubation in maxillofacial surgery. It provides unrestricted access to the mouth, which facilitates the insertion of instruments. Fiberoptic intubation is a very useful technique for patients with an anticipated difficult airway, such as those with reduced mouth opening due to infection, temporomandibular joint problems, or jaw fracture.[4, 5]

With difficult airways, the anatomy is often deviated from normal, and comorbid conditions may lead to complete loss of the airways. Thus, close attention must be devoted to the anesthetic drugs and dosages used to achieve sedation and analgesia for nasal intubation. The ideal sedation technique enables patients to maintain spontaneous ventilation, to be cooperative, and to tolerate passage of a fiberscope to facilitate nasotracheal intubation. It is important for patients undergoing sedated—but awake—fiberoptic intubation to have decreased anxiety, discomfort, and hemodynamic disturbances.[6, 7]

With difficult airways, the anatomy is often deviated from normal, and comorbid conditions may lead to complete loss of the airways. Thus, close attention must be devoted to the anesthetic drugs and dosages used to achieve sedation and analgesia for nasal intubation. The ideal sedation technique enables patients to maintain spontaneous ventilation, to be cooperative, and to tolerate passage of a fiberscope to facilitate nasotracheal intubation. It is important for patients undergoing sedated— but awake—fiberoptic intubation to have decreased anxiety, discomfort, and hemodynamic disturbances.[6, 8]

The principal patient complaints of awake nasal fibreoptic intubation 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. Adequate local anaesthesia will reduce this problem. So the present study was undertaken to evaluate the intubating conditions, patient comfort and haemodynamic changes during awake nasotracheal fibreoptic intubation.

Materials & Method

The present study is the observational study with the purpose to study the haemodynamics, ease of intubations and also check for comfort of patients. The college ethical committee was informed about the study and the ethical clearance certificate was obtained prior to the start of the study. The study population consisted of 100 patients in the age group of 20 to 60 years belonging to ASA grade I and II physical status and Mallampatti airway grade I and II posted for elective surgeries under General anaesthesia.

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

Thorough pre-anaesthetic examination was carried out and patients were informed about the study and a written consent obtained. Investigations included Haemoglobin, Blood grouping and Rh typing, Random blood sugar, blood Urea, serum creatinine and Urine routine. Patients belonging to ASA III and IV, patient refusal, patients with coagulopaties, patients with Mallampatti airway grade III and IV, patients with local infection in the nose, significant deviated nasal septum and previous nasal surgeries were excluded from the study. All the patients meeting the criteria underwent awake fiberoptic intubation via nasal route under local anaesthesia.

PREOPERATIVE PREPARATION

Routine preanaesthetic evaluation is performed and the more patent nostril (right or left sided) was identified. Airway was assessed thoroughly. On arrival in the operating room, patient's basal parameters- B.P, heart rate and ECG were monitored using pulse oximetry, NIBP and ECG monitor. Intravenous access was established and an IV infusion of Ringer lactate started. Sterile fiberoptic scope with light source and appropriate sized endotracheal tubes were kept ready. Inj midazolam IV 0.04 mg/kg body wt and Inj Glycopyrrolate 0.2 mg IV were given. 2 drops of nasal mucosal vasoconstrictor (Xylometazoline) were instilled into each nostril as decongestants. 2cc of 4% lignocaine solution soaked with gauge was put into each nostrils to anaesthetize the mucosa for 10 minutes. 10% lignocaine sprayed was over tongue and posterior pharyngeal wall using tongue depressor. Superior laryngeal nerve block with Bupivacaine 0.25%, 2 ml on each side and recurrent laryngeal nerve blocks with 2 to 3 ml of 2% lignocaine were performed, both by external approach.

An appropriate sized lubricated endotracheal tube is fixed to the fiberscope. After lubricating the fiberoptic scope, it is introduced through endotracheal tube and passed into the predetermined nostril with patient's head in 'sniffing of morning air' position.

Fibreoptic scope is advanced until vocal cords are seen. The patient is then asked to take a deep breath and the bronchoscope is passed through the cords. If this precipitates coughing, additional lignocaine 4%, 2 to 3 ml is sprayed through the working channel of the bronchoscope.

After passing through the vocal cords, the fiberscope is advanced until the tracheal rings come into view. The carina is identified. - When the tip of the fiberscope is at the carina, the endotracheal tube is passed into the trachea using fiberscope as a guide. The scope is removed by holding endotracheal tube in place.

The endotracheal tube is connected to the Magill's circuit and assisted ventilation done. The endotracheal tube is secured after confirming placement by 5 point auscultation and capnography.

Following observations are then made:

1.Haemodynamics; patient's vitals- NIBP, heart rate, ECG and oxygen saturation(SpO2) monitored throughout the procedure and up to 15 minutes after intubation. The changes in

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

Blood Pressure (SBP, DBP and MAP) and Heart Rate during different times of the procedure compared to the basal levels as well as the overall average increases (as percentages) were noted.

2. Ease of intubation – number of attempts and time taken to intubate from the time of insertion of fiberscope.

3. The patient comfort – representing the patient`s response to fibreoptic bronchoscopy was graded as Gr I – no movement observed Gr II – coughing observed Gr III – extremity movement observed Gr IV – violent movement observed Gr III and IV patients were sedated with incremental doses of propofol and fibreoptic bronchoscopy completed.

4. Complications – epistaxis, intraoperative arrhythmias noted.

All the observed parameters, study parameters were entered in the master chart and tabulated individually and analyzed.

STATISTICAL METHODS: Descriptive statistical analysis has been carried out in the present study.

Results

Study Design: A Prospective Clinical evaluation study of awake fibreoptic nasotracheal intubation in 100 patients was undertaken to assess the haemodynamic changes, ease of intubation and patient comfort during fibreoptic intubation. Majority of the patients (n=80) in the study belonged to age of 20 to 40 years. Equal numbers of male and female patients were included in the stuidy.

There was gradual increase in Heart Rate at each minute during fibreoptic bronchoscopy (FOB), which was significant till 4^{th} minute. In total 18 patients in the study where the FOB took longer time, there was persistence increase in the heart rate. Heart rate gradually decreased towards basal levels and even lesser till 10^{th} minute of monitoring. Heart rate increased more than 20 beats/minute in 24 intubations and had increased in more than 30 beats/minute in 8 intubations.

There was increase in Systolic Blood Pressure in all the patients compared to basal values from the time of introduction of the Fibreoptic bronchoscope, at intubation and for 3 min after intubation. The SBP came down subsequently; the max increase was 17.46 ± 19.46.mm Hg at intubation and returned towards basal values after 3^{rd} min of intubation.

Changes in Diastolic Blood Pressure:

Introduction of Fibreoptic Bronchoscopy was associated with increased Diastolic Blood Pressure. The increase in DBP was maximum at the time of successful endotracheal intubation, which was statistically significant.

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

At Endotracheal Intubation (ETI) the increase was statistically significant but later, the increase was not significant compared to basal values. The maximum increase was 10.23±16.15 mm Hg. and 11.42±12.62 mm Hg at 3rd min of Fibreoptic Bronchoscopy and at intubation respectively.

Overall haemodynamics with increases over 15 % of basal values:

There is a gradual increase in the percentage of patients having increases over 15% of basal values in HR, SBP, DBP at each minute from the time of introduction of fibreoptic bronchoscope till the 4th to 5th minute of bronchoscopy.

Ease of intubation:

Majority of Fibreoptic enotracheal Intubations were possible within 5 minutes (86 patients).
Minimum time taken for endotracheal intubation was 1 minute (2 patients).
Maximum time taken for endotracheal intubation was 10 minutes (2 patients)
Mean time taken for endotracheal intubation was 4.23±3.45 minutes (table 1)

Patient comfort:

Majority of the patients (n= 90) were well comfortable (Gr I and II) during awake fibreoptic nasotracheal intubation. (table 2)

Table 1: Total time required for intubation

Time for intubation	No. of patients
1 min	2
2 min	14
3 min	30
4 min	29
5 min	11
6 min	3
7 min	3
8 min	2
9 min	4
10 min	1
Mean ± SD	4.23±3.45

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

Table 2: Patient comfort during fibreoptic bronchoscopy

Patients comfort	No. of patients
Grade I	70
Grade II	24
Grade III	4
Grade IV	2
Total	100

Discussion

The use of fiberoptic tracheal intubation is well established and has been extensively supported in the literature for managing the difficult airway. An awake fiberoptic intubation allows the patient to maintain the tonicity of the airway muscles providing a degree of safety that may be lost in the anesthetized, paralyzed patient. In addition to difficult tracheal intubation, there are other conditions in which fiberoptic laryngoscopy may be superior to conventional techniques in securing the airway.[9, 10]

Successful awake fiberoptic intubation requires cooperation from the patient. This can be enhanced by adequate explanation and preparation of the patient. Keys to successful intubation include control of secretions by the use of an antisialagogue adequate sedation to alleviate anxiety, and adequate anesthesia to ensure patient comfort.[11, 12]

Anesthesia for awake fiberoptic intubation can be accomplished by a variety of techniques, which include topical anesthesia, nerve blocks, and transtracheal injection of a local anesthetic. One or a combination of these anesthetic techniques can be used successfully with little evidence of the superiority of any one individual technique.[13]

Fibreoptic intubation via nasal route is usually easier and has a higher success rate compared with an oral approach, the advantages being- a straight route to larynx and trachea, easier passage of endotracheal tube and the stability of endotracheal tube once it has been secured in position.[14]

P. Kundra et al[15] compared efficacy of upper airway anaesthesia produced by 4ml of 4% nebulized lignocaine against combined regional block and 4% lignocaine-soaked cotton swabs in the nose for awake fibreoptic nasotracheal intubation. All patients underwent successful fibreoptic nasotracheal intubation in both groups.[15] A progressive increase in heart rate and mean arterial pressure was observed in all patients from the beginning of the procedure in both groups but the rise in the nebulisation group was greater and also lasted longer than in the CRB group. A higher grimace score was recorded on insertion of the endotracheal tube (ETT) through the nostril in the nebulisation group when compared to the CRB group. Thus they concluded that CRB provided better patient comfort and haemodynamic stability.

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

Based on the established literature and on above studies, we undertook a study of fibreoptic nasotracheal intubation under local anaesthesia – combined regional block technique by performing translaryngeal block with 2 to 3 ml of 2% lignocaine, bilateral superior laryngeal nerve block with bupivacaine 0.25% , 2 ml on each side, 10% lignocaine sprayed over tongue and posterior pharyngeal wall and 4% lignocaine-soaked gauze in the nose, in 100 ASA I/II patients posted for surgeries under endotracheal general anaesthesia. Preoperative explanation of the procedure to the patient, use of midazolam sedation and glycopyrrolate as antisialogogue was part of the protocol.

Sedation for Fibreoptic Bronchoscopy:

Agents used to produce sedation generally fall into 2 groups: benzodiazepines and opioids. In appropriate doses, any of the popular benzodiazepines, such as diazepam, lorazepam, and midazolam, can be used to produce sedation during fibreoptic intubation. Midazolam, due to its quick onset, fairly short duration of action, and lack of pain with injection is preferred. Midazolam in the dose of 0.04 mg/kg (1 to 3 mg IV) provides adequate sedation and amnesia and is usually enough to produce a comfortable, cooperative patient.[16]

The demographic criteria were noted and various study parameters such as hemodynamics (vitals), ease of intubation and patient comfort were noted. Also complications like epistaxis, intraoperative arrhythmias, etc noted.

Hemodynamic changes:

Heart rate increased gradually and progressively with each stage in the intubation process and was significantly above baseline values with each stage, starting with the introduction of FOB. At 5th minute, the HR was 103.17±22.63 bpm. However, the maximal increase in HR above baseline levels occurred during placement of the endotracheal tube in the trachea (mean 11.72±13.18 beats/min). The increases could have been exaggerated because of continued action of glycopyrrolate, the anticholinergic drug used for reducing secretions during the study. An awake patient is also likely to have some amount of awareness of passage of the FOB and endotracheal tube inspite of adequate topical anaesthesia and sedation[58]. Passage of endotracheal tube through the glottic opening provides the maximum stimulus to haemodynamic changes.

Blood pressure (SBP, DBP) increased gradually with each stage in the intubation process and was significantly above baseline values till the 4th minute of ongoing FOB intubation and came down gradually. The maximal increase in blood pressure above baseline levels occurred during placement of the endotracheal tube in the trachea.

In our study, the rise in mean arterial pressure was less than 20 mm Hg in nearly 50% of cases. Heart rate increased more than 20 beats/min in 24 intubations and more than 30 beats/min in 8 intubations. In rest of the cases, it was relatively well maintained.

In the study of awake fiberoptic nasotracheal intubation under local anaesthesia conducted by Andranik Ovassapian, et al,[17] heart rate increased gradually and progressively with each stage in the intubation process and was significantly above baseline values at each stage with maximal increase in HR above baseline levels occurred during placement of the endotracheal tube in the trachea (mean 14 beat/min).[18] HR increased more than 20 beats/min in 61(30.5%) intubations and more than 30 beats/min in 24 (12.2%) intubations. Our study results are

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

consistent with the findings of this study, though in our study mean arterial pressure was significantly higher in all stages of intubation procedure.

In the study of P Kundra et al,[15] HR increased gradually during FOB with maximum HR (mean 9 beats/min) during passage of endotracheal tube through the glottis. MAP increased gradually from the time of introduction of FOB and maximum values were observed at endotracheal intubation (mean 4 mm Hg). Our study results are consistent with the findings of this study, though in our study mean arterial pressure was higher. There was increase in other hemodynamic parameters as well. As discussed above, these are expected during passage of FOB and during endotracheal intubation.

In our study, patient comfort was assessed in 4 grades – (Gr I –no movement, Gr II – coughing, Gr III – extremity movement, and Gr IV – violent movement). Majority of the patients in our study (94%) had comfortable grades (Gr I and Gr II) during the procedure. Two patients with Gr III were successfully intubated through FOB under propofol sedation. One patient with Gr IV was intubated with direct laryngoscopy.

Conclusion

Our clinical study confirms that awake fibreoptic nasotracheal intubation done under adequate local anaesthesia is associated with good intubating conditions and patient comfort with minimal increases in haemodynamics.

References

[1] Cook T, MacDougall-Davis S: Complications and failure of airway management. British journal of anaesthesia 2012, 109:i68-i85.

[2] Tamire T, Demelash H, Admasu W: Predictive values of preoperative tests for difficult laryngoscopy and intubation in adult patients at tikur anbessa specialized hospital. Anesthesiology research and practice 2019, 2019.

[3] Woodall N, Harwood R, Barker G: Complications of awake fibreoptic intubation without sedation in 200 healthy anaesthetists attending a training course. British journal of anaesthesia 2008, 100:850-5.

[4] Stricker P, Kovatsis PG: Flexible Nasal and Bronchoscopy Oral Approaches Techniques. Management of the Difficult Pediatric Airway 2019:90.

[5] Stricker P, Kovatsis PG: Flexible Bronchoscopy Techniques: Nasal and Oral Approaches.

[6] Lallo A, Billard V, Bourgain J-L: A comparison of propofol and remifentanil target-controlled infusions to facilitate fiberoptic nasotracheal intubation. Anesthesia & Analgesia 2009, 108:852-7.

[7] Sinha SK, Joshiraj B, Chaudhary L, Hayaran N, Kaur M, Jain A: A comparison of dexmedetomidine plus ketamine combination with dexmedetomidine alone for awake fiberoptic nasotracheal intubation: a randomized controlled study. Journal of anaesthesiology, clinical pharmacology 2014, 30:514.

[8] Collins SR, Blank RS: Fiberoptic Intubation: An Overview and UpdateDiscussion. Respiratory care 2014, 59:865-80.

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 05, 2022

[9] Myatra SN, Shah A, Kundra P, Patwa A, Ramkumar V, Divatia JV, Raveendra US, Shetty SR, Ahmed SM, Doctor JR: All India Difficult Airway Association 2016 guidelines for the management of unanticipated difficult tracheal intubation in adults. Indian Journal of Anaesthesia 2016, 60:885.
[10] Law JA, Broemling N, Cooper RM, Drolet P, Duggan LV, Griesdale DE, Hung OR, Jones PM, Kovacs G, Massey S: The difficult airway with recommendations for management–part 1–difficult tracheal intubation encountered in an unconscious/induced patient. Canadian Journal of Anesthesia/Journal canadien d'anesthésie 2013, 60:1089-118.
[11] Larijani GE, Cypel D, Gratz I, Mroz L, Mandel R, Afshar M, Goldberg ME: The efficacy and safety of EMLA® Cream for awake fiberoptic endotracheal intubation. Anesthesia & Analgesia 2000, 91:1024-6.
[12] Chatrath V, Sharan R, Jain P, Bala A: The efficacy of combined regional nerve blocks in awake orotracheal fiberoptic intubation. Anesthesia, essays and researches 2016, 10:255.
[13] Finucane BT, Santora AH: Fiberoptic airway management techniques. Principles of Airway Management 2003:78-125.
[14] Galway U, Khatib R, Zura A, Khanna S, Wang M, Thida F, Ruetzler K: Awake Fiberoptic Intubation: A narrative clinical review based on the Cleveland Clinic Experience. Trends in Anaesthesia and Critical Care 2021.
[15] Kundra P, Kutralam S, Ravishankar M: Local anaesthesia for awake fibreoptic nasotracheal intubation. Acta anaesthesiologica scandinavica 2000, 44:511-6.
[16] Young CC, Prielipp RC: Benzodiazepines in the intensive care unit. Critical care clinics 2001, 17:843-62.
[17] Ovassapian A, Yelich SJ, Dykes MH, Brunner EE: Blood pressure and heart rate changes during awake fiberoptic nasotracheal intubation. Anesthesia & Analgesia 1983, 62:951-4.
[18] Yentis S, Hirsch NP, Ip J: Anaesthesia and Intensive Care AZ-Print & E-Book: An Encyclopedia of Principles and Practice: Elsevier Health Sciences, 2013.