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Propofol vs. Fentanyl-Midazolam Combination for Conscious Sedation for Fibreoptic Nasotracheal Intubation

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Abstract

Objective: The safest way of doing fibreoptic intubation is with the patient under conscious sedation and maintaining spontaneous respiration. Short-acting and easily titrable analgesics are excellent choices for the intensely, but usually brief airway manipulation during fibreoptic nasotracheal intubation. This study was undertaken to evaluate the efficacy of propofol for conscious sedation for FOI and to compare it with a combination of fentanyl and midazolam which is frequently used for this purpose

Method: The study was carried out at Shaheed Nirmal Mahto Medical College & Hospital, Dhanbad within a year. The parameters studied were the quality of sedation, intubating conditions, hemodynamic changes,

degree of amnesia, and global acceptance of the procedure under topical anesthesia.

Results: In our investigation, we discovered that propofol caused equivalent intubating circumstances as a mix of midazolam and fentanyl in the amounts we utilized. Although the difference between the two groups was significant only after 1 minute (p value=0.027), it induced noticeably greater drowsiness. When the fiberscope was placed endotracheally, propofol causes a smaller rise in heart rate (P value = 0.006). More propofol boluses were required as the surgery went on to proceed. Propofol caused less amnesia following the operation, although the level of general acceptability was comparable.

Conclusion: To conclude propofol can be used for nasotracheal fibreoptic intubation, however its role in difficult airway and the dose required need more evaluation.

Keywords: Fibreoptic intubation; Conscious sedation; Propofol; Nasotracheal FOI

Introduction

Awake fibreoptic intubation is an established method of securing a difficult airway [1,2]. The safest way of doing it is with the patient under conscious sedation and maintaining spontaneous respiration At the same time airway reflexes and haemodynamic changes associated with it also need to be obtunded [1]. The quality and success of this procedure depends on the experience of the intubating physician and the proper preparation of the patient [2]. Short acting and easily titrable analgesics are excellent choices for the intensely, but usually brief airway manipulation during fibreoptic nasotracheal intubation [1].

Fentanyl and midazolam have been used successfully for fibreoptic intubation (FOI) [2,3]. Propofol has not been evaluation for conscious sedation for nasotracheal intubation but has attributes that make it an ideal sedating agent in sub anaesthetic doses. It produces reliable and predictable sedation, maintenance of haemodynamic stability and profound amnesia [3] making it useful for sedation in ICU and surgery under regional anaesthesia. Propofol has been used for fibreoptic bronchoscope under conscious sedation [4-6]. It has also been used for FOI for induction of general anaesthesia for this purpose [7,8] and light general anesthesia [9]. It has also been used for this purpose as a target controlled infusion for oral FOI [10-12].

This study was undertaken to evaluate the efficacy of propofol for conscious sedation for nasotracheal FOI and to compare it with a combination of fentanyl and midazolam which is frequently used for this purpose. The parameters studied were, the quality of sedation, intubating conditions, haemodynamic changes, degree of amnesia and global acceptance of the procedure under topical anaesthesia.

Methods

Study Design: This was a prospective study carried out at Shaheed Nirmal Mahto Medical College & Hospital, Dhanbad.

Methodology: They were randomized by computer-generated numbers into two groups: group P (n=25) and group F (n=25) receiving sedation with propofol or a combination of fentanyl and midazolam respectively.

In the operation theatre, routine monitors were attached (spO2, ECG, NIBP) and the patient's basal vital parameters (pulse rate, blood pressure, arterial oxygen saturation) were noted and thereafter continuously recorded. An intravenous line was secured with an 18G intracath and the patients were premeditated with glycopyrrolate 0.1 mg I.V. 14 minutes before the start of

surgery. Every patient received topical anaesthesia of the airway structures as per a standard protocol- 2 drops of vasoconstrictor (xylometazoline) were instilled in each nostril followed by application of 2-3 puffs of lignocaine 11% spray (Astra-xylocaine 11% spray with nasal applicator) to the nasal mucosa. Thereafter, the patient was asked to protrude his tongue and lignocaine 11% was sprayed (1 puffs on the posterior pharyngeal wall and 1 puffs each on the 1 tonsillar pillars. Oxygenation was achieved by nasal catheter in the nostril with flow rate of 1 L/min. The fibreoptic equipment (Olympus tracheal intubating fiberscope, adult size with outer diameter of 5.2mm, with camera and monitor) was tested before start of procedure.

Group P- A bolus of 2 mg/kg body weight propofol was followed by infusion at the rate of 2 mg/kg/hr for maintenance with a syringe infusion pump. Group FBoluses of midazolam 0.04 mg/kg and fentanyl 2 µg/kg body weight were followed by fentanyl infusion at the rate of 1 µg/kg/hr with a syringe infusion pump. The degree of sedation was assessed 60 seconds after medication and every 2 minutes during airway manipulation using 'Observer's Assessment of Alertness/Sedation scale [1].

After assessment of the sedation score, airway manipulation was started. If the patient was uncooperative, a bolus of 11 mg of propofol in group P or 11 µg of fentanyl in group F was given until the patient became cooperative and the number of such boluses was recorded. A nasotracheal tube (7.5 to 7.0 size in males, 6.0- 7 size in females, portex) lubricated with lignocaine jelly was inserted through the nostril (tube first method) and the fibrescope guided through it. A modified version of the intubating condition score [1] described by Machata et al was used to evaluate the conditions of intubation which included jaw relaxation, vocal cord movement, coughing and limb movements.

Jaw relaxation was assessed one minute after the bolus dose. After orientation and localization of the laryngo-epiglottic region through the fibreoptic bronchoscope (FOB), vocal cord movement was assessed. Coughing and limb movements were assessed during the entire procedure

Sample Size: 50 patients were enrolled in this study.

Inclusion criteria: All the patients had undergone pre-anaesthetic checkup and those in ASA grade I and II, not having repiratory, cardiovascular, liver or kidney disease were included

Exclusion criteria: history of drug abuse and airway difficulty as assessed by Mallampatti grading (III, IV), thyromental distance (30) an informed written consent was taken and all the patients were educated about the fibreoptic intubation procedure

Statistical analysis: Measured parameters (age, weight and sex) were compared by the Chi square test with significance of 'P<0.004'

Results

The types of surgeries performed in the two groups were similar. The age, weight and sex distribution of the two groups was statistically similar [Table 1].

Table 1: Distribution in patients based on age, gender and weight

Groups	Age in years (Mean± S.D)	Sex ratio Female: Male	Weight in kg (Mean ± S.D)
P	35.4 ± 12.067	15:3	51.1 ± 8.617
F	30.44 ± 8.567	16:2	54.7 ± 13.020

As seen, most patients in both the groups were under light sedation (sum score= 14-16). However, patients in Group P were more sedated (lower sum score) than

Group F. In both groups, as time progressed, patients were intubated fibreoptically and the number of patients being assessed decreased. After 5 minutes only 2 patient remained in each group therefore statistical analysis was done for sedation scale at 1,3 and 5 minutes only. The difference between the two groups was significant only at 1 minutes (p value=0.027) i.e., patients were more sedated in group P at 1 minutes but not at 1 minutes (p value=0.13) and 3 minutes (p value=0.902). On comparison of OAA/S at different times within the groups, the change at 1 and 2 minutes to 1 minutes was not significant.

Intubating Conditions

A modified version of the intubating condition score [1] which included jaw relaxation, vocal cord movement, coughing and limb movements was used to assess intubating conditions.

The degree of jaw relation in the two groups was assessed 60 seconds after giving the bolus dose. Slight jaw tone was present in majority of the patients in the two groups while rigidity was not seen in any patient. There was no significant (p value= 0.66) difference between the two groups. In few of the patients (2 in group F and 3 in group P, there was collapse of soft tissues of the pharynx that hampered visualization with the FOB. These patients had either complete jaw relaxation or slight jaw tone. In these patients, a jaw thrust maneuver was performed to generate the requisite space for successfully performing FOI [13].

The vocal cord movement was assessed fibreoptically after the first localization and orientation of the laryngoepiglottic region. In both groups , the vocal cords were either open(grade 1) or open but moving and no patient had closing or closed vocal cords. There was no significant difference (Chi square test, p value=0.518) between the two groups. Coughing was assessed in response to the FOI. No patient had severe coughing (grade 4) and the majority had slight coughing (grade 2) during the procedure. There was no significant difference between the groups (Chi square test, p value=0.120). Most patients in group F had none to slight limb movements and most in group P had slight to moderate (grade 3) limb movements. The difference was not statistically significant (Chi square test, P value=0.223). The mean integrated intubating condition score (sum of all the condition parameters) was higher in group P as compared to group F but the difference was not significant.

Haemodynamic Changes

Haemodynamic parameters were noted at different stages of the procedure. The baseline mean heart rate , systolic and diastolic blood pressures were comparable in the two groups(T test).There was a rise in heart rate from stage 1(insertion of tube at the nares)and was maximum at stage 3 i.e. during advancement of the tube into the trachea. On comparison of the change in heart rate from the baseline it was found that the change was more in group F at all the stages but was significantly more(P value=0 .006) in group F as compared to group P at stage 2(fibrescope inserted endotracheally). The baseline mean systolic and diastolic blood pressures were comparable in the two groups (T test).A rise in both systolic and diastolic blood pressures was seen in both the groups at the start of the procedure and was maximum at stage 3 .There was no significant difference in the changes in systolic and diastolic blood pressure on comparison of the two groups at any stage

Oxygen Saturation: The change in mean oxygen saturation in the two groups during the different stages of the FOI. in the same group went into bradypnoea

(respiratory rate < 7 breaths/minute) without associated significant fall in saturation. One patient in group P had a fall in oxygen saturation to 93% at stage 2 and 91% at stage 3.

Degree of Amnesia: As can be seen, a higher number of patients in group F had total amnesia and this difference between the groups was highly significant (P value=0.013).

Requirement of Additional Boluses: In group F, additional boluses were required in 3 patients i.e. 2 bolus in 2 patients and 2 boluses in 2 patient. In group P more patients required boluses i.e. 11 patients (3 patients- 1 boluses, 1 patients – 2 boluses, 2 patient- 2 boluses). The difference was significant (p value=0.0032) The total average duration of time taken to achieve intubation was 231 seconds and 254 seconds in groups F and P respectively and was comparable in the two groups.

Discussion

FOI is a very useful technique in patients with predicted difficult airway and is the technique of choice in patients with airway pathology such as tumours, trauma, limited mouth opening and decreased atlanto-occipital extension [13]. In such patients it is essential that the patient should be under conscious sedation and breathing spontaneously [1]. Blunting of airway reflexes is achieved by local anaesthesia and sedative agents. Narcotic analgesics are the key to facilitating conscious intubation. These are usually combined with benzodiazepines such as diazepam and midazolam [2,14,15].This combination has been used widely [2-4].

Propofol has been used as a sedating agent for fibroptic bronchoscopy [4-6] as it produces predictable and quick sedation, haemodynamic stability and deep amnesia. There are reports of its use during awake oral fibreoptic intubation and comparison of target controlled infusions of propofol with remifentanil [10-12]. Though remifentanil has ideal properties for sedation during FOI, it has been found to have very little amnesic effect [11]. Propofol has been compared to midazolam and found to be superior to it [16] but has been found comparable with the fentanylmidazolam combination for conscious sedation during awake nasotracheal FOI [15].

We used the dose of propofol used by Gonzalez, et al. [4] and Randell, et al. [5] for sedation during bronchoscopy .The dose of midazolam was that used by Machata, et al. [1] in combination with remifentanil for nasal FOI and fentanyl was used in the dose used by Randell, et al. [5] In our study, we found that in the doses used by us, propofol produced comparable sedation and intubating conditions as a combination of midazolam and fentanyl. It produced significantly more sedation at stage 2 which is a desirable characteristic as it did not lead to bradypnoea and desaturation however, as the procedure progressed more boluses of propofol were needed to continue with the procedure. It also lead to less increase in heart rate at stage 2 which may be a desirable characteristic in some patients.

However airway collapse was seen more frequently with the dose used by us in comparison to fentanyl-midazolam combination. Increasing the dose further may cause collapse of airway more easily thereby compromising the airway in patients with difficult airways. The degree of amnesia for the procedure was less with propofol however, the degree of acceptance was comparable to group F.

Conclusion

Propofol is a suitable agent for conscious sedation for FOI under topical anaesthesia without combination with any other agent. The exact infusion dose of propofol required for this purpose needs further study.

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