Anaesthesia for direct laryngoscopy with propofol and fentanyl or sufentanil

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Abstract

Aim & objective To find if direct laryngoscopy (DL) could be done without using succinylcholine and secondly, to ascertain the appropriate anesthetic regimen.

Patients and methods In a double blind placebo controlled study 67 patients aged 40–75 years of age, of both sex requiring direct laryngoscopy (DL) either for diagnosis or for biopsy were enrolled. The patients were randomly divided in three groups. The patients in group F and S received Fentanyl or Sufentanil respectively along with Propofol, whereas those in group N received normal saline (placebo) and propofol. The conditions of laryngoscopy, hemodynamic parameters and any adverse events were recorded. Good or fair conditions for laryngoscopy were achieved in 91% (21), 87% (19) and 73% (16) of patients in groups F, S and N respectively ($p < 0.05$) in favor of group F and S. During DL arterial pressure and pulse rate changes were minimal when propofol was administered along with opioids, (group F and S) compared to group N where only propofol was used.

Results No serious side effects were seen in the three groups. Hence by these findings we concluded that better conditions of DL are achieved during anesthesia with propofol and fentanyl and sufentanil alone. The opioids provided additional benefit of stable hemodynamics.

Keywords Direct Laryngoscopy · Propofol · Fentanyl · Sufentanil · Hemodynamic changes

Introduction

Direct laryngoscopy (DL) with rigid laryngoscope allows for direct visualization of pharynx and larynx and permits the surgeon to perform biopsies, remove foreign bodies from throat and remove polyps or cysts [1]. Although DL can be done under topical anesthesia, there is no substitute for thorough examination and biopsy of a lesion with the patient under general anesthesia [1, 2].

DL is a short procedure which can be done safely under general anesthesia without intubation during apnea of succinylcholine, a short acting muscle relaxant. But the technique has certain drawbacks e.g. prolonged apnea, hypoxia, bradycardia and postoperative muscle pain etc. Recently few studies reported that DL could be safely done under general anesthesia with propofol alone [3] or in combination with opioids [4] with spontaneous ventilation. This study was planned with two objectives. Firstly, whether DL could be done without using succinylcholine and secondly, which anesthetic regimen was superior; total IV anesthesia with propofol only or along with two currently available short acting opioids, fentanyl and sufentanil. We determined the conditions of DL, haemodynamic changes and any adverse event during or after the procedure in a double blind placebo controlled trial.

Method

After approval from hospital Ethical Committee and informed written consent, 67 patients of either sex, aged between 40–75 yrs requiring DL under general anesthesia were recruited for the study. Exclusion criteria included patients with lipid allergy, where mask ventilation was

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difficult or long procedures (>10 minutes duration). In the operation theatre an IV line was secured and monitors were applied. Pulse rate and arterial oxygen saturation were monitored continuously while blood pressure was recorded non-invasively after each drug and during laryngoscopy at one minute interval.

As this was a placebo controlled double blind study, identical syringes containing fentanyl, sufentanil or normal saline were prepared by personnel not involved in the study. The surgeon was also unaware of the group. After preoxygenation with 100% O₂ for 3 minutes and glycopyrrolate 0.2 mg IV, the patients received either fentanyl 1–1.5 µg/kg (Group F), sufentanil 0.25–0.5 µg/kg (Group S) or Normal Saline (Group N) followed 2 minutes later by propofol (2.5 mg/kg mixed with lignocaine). All the patients were ventilated with a face mask and then handed over to ENT surgeon for laryngoscopy. If there was any difficulty in carrying out the procedure, additional doses of propofol were given. All the laryngoscopies were done by standard rigid laryngoscope. After the completion of the procedure the patients were transferred to post anesthesia care unit when vitals were stable and protective airway reflexes were intact. They were discharged home when fully alert, with stable vitals, no bleeding present and SpO₂ was more than 95% on room air.

The most common indication for laryngoscopy was benign or malignant neoplasm of larynx for biopsy followed by diagnostic laryngoscopy for hoarseness of voice, paralysis etc. The ENT surgeon was asked to grade the conditions of laryngoscopy as good, fair or poor based upon ease of laryngoscopy, glottic visualization and coughing. Intraoperative and postoperative complications such as hypotension, bradycardia, O₂ desaturation, pain, bleeding etc. were also noted. All the patients were discharged the same day when the vitals were stable, no bleeding present and oxygen saturation was > 95% on room air. They were instructed to report to hospital in case of any problem.

The data are presented as means ± SD and comparison between the groups was done using unpaired t-test.

Results

All the three groups were comparable on the basis of demographic variables of age, gender distribution, weight as well as indication and duration of DL. The mean age in the three groups was 56±7.6, 55±7.1, and 55±7.4 years in groups N, F, and S respectively. The duration of DL ranged between 1–5 min in all the groups and the chief indication for DL was biopsy from larynx (90%), hypopharynx (7%) or oropharynx (3%).

The patients of group N where no opioids were used needed higher dose of propofol for induction and needed more number of incremental doses subsequently compared to groups F and S ($p<0.05$) (table 1). Good or fair conditions for laryngoscopy were achieved in 91% (21), 87% (19) and 73% (16) of patients in groups F, S and N respectively indicating better conditions of laryngoscopy when opioids were used along with propofol and this difference was statistically significant ($p<0.05$) (Table 1). The incidence of coughing was higher in group N than other two groups. (Table 1) Haemodynamic parameters are depicted in Table 2. There was some rise in pulse rate during laryngoscopy in all the groups but it was significantly more in group N ($p<0.05$) in comparison to other two groups. There was no significant change in mean arterial pressure in the groups F and S during laryngoscopy compared to significant rise in group N ($p<0.05$) from the baseline values. Oxygen saturation ranged between 95–100% in all the groups in majority of the patients. Transient desaturation occurred in few patients in each group (Table 1). No serious complications were noted in any group. Four patients complained of pain in throat in the postoperative period in group N while one patient each in groups F and S had pain. The time of awakening from anesthesia was slightly less in group N than in other two groups but the difference did not reach statistical significance ($p>0.05$) (Table 1). The time of discharge from the recovery room and hospital were similar in all the groups (Table 1).

Table 1 Conditions of Laryngoscopy, Dose of propofol required and complications

	Group N (n=22)	Group F (n=23)	Group S (n=22)
Conditions of laryngoscopy Good/ Fair/ Poor	5/11/6	11/10/2*	10/9/3*
Recovery from anesthesia (Sec)	96±10	105±10	106±9
Discharge from Recovery room (min)	80±9	98±8	97±10
Propofol Induction dose (mg)	108±12	88±10*	84±10*
Additional dose (no)	4	2	2
Complications	9	6	6
Coughing	4	2	3
Arterial desaturation	4	1	1
Pain in throat	3	4	3
Bleeding			

* Statistically significant ($P<0.05$) compared to group N

Table 2 Cardiovascular changes during DL

Time during DL	Pulse Rate(per min) (Mean± S.D)			Mean Arterial Pressure(mm of Hg) (Mean± S.D)		
	Group N	Group F	Group S	Group N	Group F	Group S
Baseline	89 ± 7	89 ± 9	90 ± 10	99 ± 4.9	98 ± 4.9	99 ± 4.8
T1	116 ± 7.9	98 ± 8.4	97 ± 8.0	122 ± 6.0	100 ± 5.6	102 ± 5.8
T2	117 ± 7.3	98 ± 7.8	98 ± 7.5	123 ± 5.8	101 ± 7.8	102 ± 5.6
T3	115 ± 6.3	97 ± 6.4	97 ± 6.2	124 ± 5.1	102 ± 4.7	102 ± 4.4
T4	114 ± 4.8	98 ± 4.5	98 ± 4.5	121 ± 4.2	100 ± 3.7	99 ± 3.8
T5	114 ± 4	95 ± 3.5	96 ± 4.0	121 ± 3.8	100 ± 3.5	100 ± 3.0

There is a statistically significant increase in MAP and PR in group N compared to other two groups.

Discussion

During DL the surgeon requires calm and quite patient without coughing, clear view of glottis and other structures along with adequate space for inspection and instrumentation. Good anesthetic practice demands overall safety, adequate gaseous exchange, protection of lower airways, abolition of reflexes, good analgesia and quick recovery. The abolition of cough is a major issue during laryngoscopy as coughing exposes the patients to risk of injury by laryngoscope and impairs the precision [2]. Laryngeal and pharyngeal reflexes are depressed by propofol. These effects are further potentiated by opioids [5, 6]. Thus provocation of reflexes due to mechanical stimulation by laryngoscopy are reduced or abolished by combination of propofol and opioids, thus facilitating the procedure. [7]. In the present study the incidence of coughing during laryngoscopy was significantly less in patients receiving fentanyl or sufentanil, a finding in agreement with previous reports[8]. The conditions of laryngoscopy were better in groups F and S compared to group N. Our results indicate that combination of propofol and fentanyl or sufentanil provided optimal conditions of laryngoscopy than propofol alone.

The laryngoscopy may provoke reflexes due to mechanical stimulation resulting in undesirable cardiovascular disturbances [9, 10]. In this study we found that both fentanyl and sufentanil resulted lesser increase in mean arterial pressure and pulse rate during laryngoscopy from baseline values compared to the patients where no opioid was given. Opioids have been shown to attenuate the cardiovascular response to laryngoscopy during anesthesia [4, 11].

In the current study all the DLs were done on the outpatient basis i.e. were discharged the same day. The chief serious complications after laryngoscopy are airway collapse, the incidence of which is less than 1% [12]. None of the patients in any group had serious postoperative complications. All the patients were discharged from the hospital same day and none needed hospital readmission for complication.

To conclude, adequate condition for direct laryngoscopy, less haemodynamic stress without any untoward effects confirm that general anesthesia with propofol and fentanyl or sufentanil without apnea is a simple, safe, suitable

and better alternative compared to propofol alone. Lastly our findings suggest that DL can be done without succinylcholine.

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