Original Article

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A Comparative Study of Dexmedetomidine and Fentanyl on Airway Reflexes and Hemodynamic Responses to Tracheal Extubation in Nasal Surgeries

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Abstract

Background: Extubation at light levels of anesthesia or sedation can stimulate reflex responses via tracheal and laryngeal irritation. The present study was conducted to compare dexmedetomidine and fentanyl on airway reflexes and hemodynamic responses to tracheal extubation in nasal surgeries. **Subjects and Methods:** The present study was conducted on 60 patients of ASA grade I and Grade II of both genders. Patients were divided into 2 groups of 30 each. Group I were dexmedetomidine 0.5 μg/kg in 100 mL of isotonic saline and group II patients received fentanyl 1 μg/kg in 100 mL of isotonic saline intravenously. Parameters such as duration of surgery and duration of anesthesia (minutes) were recorded. Extubation time, awakening time and orientation time was recorded. **Results:** The ASA grade I was seen in 20 in group I and 14 in group II, ASA grade II was seen in 10 in group I and 16 I group II. Group I comprised of 14 males and 16 females, group II had 17 males and 13 females. Mean duration of surgery in group I was 172.4 minutes and in group II was 174.6 minutes in group II. Mean duration of anesthesia was 194.2 minutes in group I and 198.6 minutes in group II. The difference was non- significant (P> 0.05). The mean extubation time in group I was 7.2 minutes and 5.6 minutes in group II, awakening time was 10.2 minutes in group I and 10.8 minutes in group II and orientation time was 14.3 minutes in group I and 15.2 minutes in group II. **Conclusion:** Authors found that dexmedetomidine 0.5 μg/kg IV, administered before extubation, was more effective in attenuating airway reflex responses to tracheal extubation as compared with fentanyl 1 μg/kg IV.

Keywords: Dexmedetomidine, tracheal extubation, nasal surgery.

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Introduction

Tracheal extubation is the discontinuation of an artificial airway when the indications for its placement like airway obstruction, protection of airway, suctioning, ventilatory failure and hypoxemia no longer exist.[1] For a smooth extubation, there should be no straining, movement, coughing, breath holding or laryngospasm.[2] Extubation at light levels of anesthesia or sedation can stimulate reflex responses via tracheal and laryngeal irritation.[3,4]

When a patient is deeply anesthetized, tracheal extubation during rhinoplasty can be difficult because of an obstructed nasal airway, blood and secretions in the pharynx, and difficulty performing manual ventilation by face mask owing to the newly reconstructed nose.[5] However, when a patient is lightly anesthetized, extubation can stimulate reflex responses via tracheal and laryngeal irritation. Complications of extubation such as breath holding, laryngospasm, and pulmonary edema might occur.[6]

Fentanyl, a synthetic opioid, has been reported to reduce the prevalence of coughing during and after extubation and to suppress the sneezing reflex after abdominal hysterectomy and periocular injections. Fentanyl has also been reported to attenuate the cardiovascular responses to tracheal extubation in elective gynecologic surgery.[7] Dexmedetomidine, an α2 adrenoreceptor agonist with a distribution half life of approximately 6 minutes has been successfully used for attenuating the stress response to laryngoscopy. Currently, dexmedetomidine is indicated for intensive care unit sedation in mechanically ventilated patients and for sedation of non intubated patients before or during surgical and other procedures.[8] The present study was conducted to compare dexmedetomidine and fentanyl on airway reflexes and hemodynamic responses to tracheal extubation in nasal surgeries.

Subjects and Methods

The present study was conducted in the department of Anesthesiology on 60 patients of ASA grade I and Grade II of both genders admitted for nasal surgeries. All patients were informed regarding the study and written consent was obtained. Ethical approval was obtained from institutional ethical committee.

Data such as name age, gender etc. was recorded. Patients were divided into 2 groups of 30 each. Group I were

dexmedetomidine 0.5 μg/kg in 100 mL of isotonic saline and group II patients received fentanyl 1 μg/kg in 100 mL of isotonic saline intravenously. Parameters such as duration of surgery and duration of anesthesia (minutes) were recorded. Extubation time, awakening time and orientation time was recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).

Results

Table 1: Distribution of patients

Groups	Group I	Group II
Agent	Dexmedetomidine 0.5 μg/kg in 100 mL of isotonic saline	Fentanyl 1 μg/kg in 100 mL of isotonic saline
Number	30	30

[Table 1] shows that group I received dexmedetomidine 0.5 μg/kg in 100 mL of isotonic saline and group II patients received fentanyl 1 μg/kg in 100 mL of isotonic saline intravenously.

Table 2: Comparison of parameters

Parameters	Group I	Group II	P value
ASA grade			
I	20	14	0.17
II	10	16	
Gender			
Male	14	17	0.11
Female	16	13	
Duration of surgery (minutes)	172.4	174.6	0.94
Duration of anesthesia (minutes)	194.2	198.6	0.81

Table 3: Comparison of extubation, awakening and orientation times

Parameters (mins)	Group I	Group II	P value
Extubation time	7.2	5.6	0.14
Awakening time	10.2	10.8	0.23
Orientation time	14.3	15.2	0.38

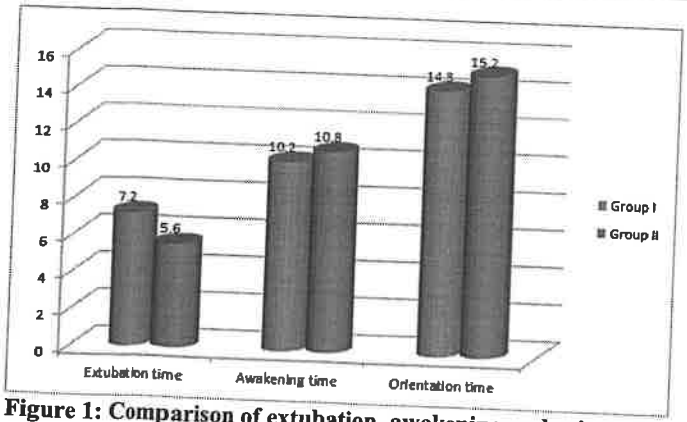

Figure 1: Comparison of extubation, awakening and orientation times

[Table 2] shows ASA grade I was seen in 20 in group I and 14 in group II, ASA grade II was seen in 10 in group I and 16 I group II. Group I comprised of 14 males and 16 females, group II had 17 males and 13 females. Mean duration of surgery in group I was 172.4 minutes and in group II was 174.6 minutes in group II. Mean duration of anesthesia was 194.2 minutes in group I and 198.6 minutes in group II. The difference was non- significant ($P> 0.05$).

[Table 3 & Figure 1] shows that mean extubation time in group I was 7.2 minutes and 5.6 minutes in group II, awakening time was 10.2 minutes in group I and 10.8 minutes in group II and orientation time was 14.3 minutes in group I and 15.2 minutes in group II. The difference was non- significant ($P> 0.05$).

Discussion

Extubation can be associated with several complications like coughing and respiratory and hemodynamic alterations. These changes are usually transient and well tolerated by most patients, but may be deleterious in certain subgroups of patients. Dexmedetomidine has been successfully used to attenuate the hemodynamic responses to tracheal intubation.[9] The present study was conducted to compare dexmedetomidine and fentanyl on airway reflexes and hemodynamic responses to tracheal extubation in nasal surgeries.

In present study, group I received dexmedetomidine 0.5 μg/kg in 100 mL of isotonic saline and group II patients received fentanyl 1 μg/kg in 100 mL of isotonic saline intravenously. Aksu et al,[10] included 40 patients. There were no clinically significant decreases in HR, SBP, DBP, or SpO2 after extubation with dexmedetomidine or fentanyl. In the dexmedetomidine group, HR was not significantly increased after extubation; however, in the fentanyl group, HR was significantly increased compared with the pre-extubation values. HR was significantly higher in the fentanyl group compared with the dexmedetomidine group at 1, 5, and 10 minutes after extubation. Compared with pre-extubation values, SBP was significantly increased at 1 and 5 minutes after extubation in the dexmedetomidine group and at 1, 5, and 10 minutes after extubation in the fentanyl group. The postoperative sedation scores and the extubation, awakening, and orientation times were not significantly different between the 2 groups. In the dexmedetomidine group, bradycardia (HR <45 beats/min) was observed in 2 patients and emesis was observed in 2 patients. In the fentanyl group, emesis was observed in 3 patients, bradycardia in 2 patients, vomiting in 1 patient, and shivering in 1 patient; vertigo was reported in 1 patient. There were no significant differences in the prevalence of adverse events between the 2 groups.

In present study, ASA grade I was seen in 20 in group I and 14 in group II, ASA grade II was seen in 10 in group I and 16 I group II. Group I comprised of 14 males and 16 females, group II had 17 males and 13 females. Mean duration of surgery in group I was 172.4 minutes and in group II was 174.6 minutes in group II. Mean duration of anesthesia was 194.2 minutes in group I and 198.6 minutes in group II.

Bindu et al,[11] included fifty patients aged 20 45 years, scheduled for elective general surgical, urological and gynecological surgeries. Group A and B, received an intravenous infusion of dexmedetomidine 0.75 mcg/kg or placebo respectively, over 15 minutes before anticipated time of end of surgery, in a double blind manner. Anesthesia techniques were standardized. Heart rate, systolic, diastolic,

mean arterial pressures were recorded while starting injection, at 1, 3, 5, 10, 15 minutes after starting injection, during extubation, at 1, 3, 5 minutes after extubation, and thereafter every 5 minutes for 30 minutes. Quality of extubation was evaluated on a 5 point scale and postoperative sedation on a 6 point scale. Any event of laryngospasm, bronchospasm, desaturation, respiratory depression, vomiting, hypotension, undue sedation was noted. Heart rate, systolic, diastolic, mean arterial pressures were significantly higher in group B. Extubation quality score of majority of patients was 2 in group A and 3 in group B. Sedation score of most patients was 3 in group A and 2 in group B. Bradycardia and hypotension incidences were higher in group A. One patient in group A, two patients in group B had vomiting. No patient had any other side effects. We found that mean extubation time in group I was 7.2 minutes and 5.6 minutes in group II, awakening time was 10.2 minutes in group I and 10.8 minutes in group II and orientation time was 14.3 minutes in group I and 15.2 minutes in group II. Nishina et al,[12] compared the effects of fentanyl 1 and 2 μg/kg IV with those of a control group (placebo) on hemodynamic changes during tracheal extubation and emergence from anesthesia in 60 patients who underwent elective gynecologic surgery. Although those authors recommended the 2-μg/kg dose—because while the number of patients who experienced coughs or strains was similar among the 3 groups, the severity of these symptoms was attenuated in the fentanyl group that received the higher dose—they reported that the 1- and 2-μg/kg doses were associated with a significantly reduced HR ($P < 0.05$) but found no significant difference in the prevalence of cough compared with placebo.

Conclusion

Authors found that dexmedetomidine 0.5 μg/kg IV, administered before extubation, was more effective in attenuating airway reflex responses to tracheal extubation as compared with fentanyl 1 μg/kg IV.

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Original Article

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Comparison of 0.5% Levobupivacaine Versus 0.5% Isobaric Levobupivacaine with 3mcg Dexmedetomidine in Spinal Anaesthesia- A Comparative Study

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Abstract

Background: Effective postoperative pain control is an essential component of the care of the surgical patient. The present study was conducted to compare levobupivacaine 0.5% versus isobaric levobupivacaine 0.5% with 3mcg dexmedetomidine in spinal anaesthesia. **Subjects and Methods:** The present study was conducted on 80 patients of ASA Grade-I and Grade-II of both genders. They were divided into 2 groups of 40 each. Group I were those who received 3 ml of 0.5% isobaric levobupivacaine with 0.3 ml of normal saline and group II patients received 3 ml of 0.5% isobaric levobupivacaine with 3µg of dexmedetomidine. Parameters such as onset of sensory blockade at T10 dermatome and onset of motor blockade motor blockade, maximum level of sensory and motor blockade attained and the time taken for the same, total duration of sensory blockade and motor blockade were recorded. **Results:** Group I, ASA grade I was seen in 25 and II in 15, in group II, ASA grade I was seen in 22 and II in 18 patients. Group I comprised of 18 males and 22 females, group II had 20 males and 20 females. Mean duration of surgery in group I was 58.2 minutes in group I and 56.4 minutes in group II. Mean heart rate was 82.3 per minute in group I and 81.6 per minute in group II. The mean time required to obtained sensory block in group I was 10.4 minutes and in group II was 7.4 minutes. The mean time for motor block in group I was 8.2 minutes and in group II was 5.4 minutes. The mean time required to obtain motor block in group I was 16.5 minutes and in group II was 16.1 minutes. **Conclusion:** Authors found that addition of intrathecal dexmedetomidine to 0.5% isobaric levobupivacaine shortens sensory and motor block onset time and prolongs block duration.

Keywords: Dexmedetomidine, Levobupivacaine, Sensory Block.

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Introduction

Anesthesiologist is looking after preoperative and intraoperative care of the patients and he/she is also responsible for the postoperative pain relief.[1] Effective postoperative pain control is an essential component of the care of the surgical patient. Inadequate pain control may result in increased morbidity or mortality. With the growing world, there is great interest in the use of regional anesthesia techniques for a number of common surgeries replacing the general anesthesia.[2]

Till recently hyperbaric bupivacaine 0.5% was the only drug used for spinal anaesthesia after the discontinuation of lidocaine's intrathecal use.[2] Bupivacaine is available as a racemic mixture of its enantiomers, dextrobupivacaine and levobupivacaine. It has been found that dextro enantiomer is the cause for cardiotoxicity and the levobupivacaine the pure S (-) enantiomer does not have the cardiotoxicity. Levobupivacaine has similar pharmacodynamic properties of racemic bupivacaine but a documented reduced central nervous system and cardiovascular toxicity.[4]

Opioids and α2-receptor agonists are important as neuraxial adjuvants not only to improve the quality of perioperative analgesia but also to minimize the local anesthetic dose, particularly in high-risk patients and in ambulatory procedures.[5] Dexmedetomidine is a α2-adrenoceptor agonist that is approved as an intravenous sedative and coanalgesic drug. Its use is often associated with a decrease in heart rate and blood pressure.[6] It has been proved that 5 µg dexmedetomidine is associated with prolonged motor and sensory block, hemodynamic stability and reduced demand for rescue analgesics when added to 12.5mg of hyperbaric bupivacaine in patients undergoing lower abdominal surgeries.[7] The present study was conducted to compare levobupivacaine 0.5% versus isobaric levobupivacaine 0.5% with 3mcg dexmedetomidine in spinal anaesthesia.

Subjects and Methods

The present study was conducted on 80 patients of ASA Grade-I and Grade-II of both genders admitted to the department of Anesthesiology for elective lower limb surgeries. Approval for the study was obtained from institutional ethical committee. All patients were informed regarding the study and written consent was obtained.

Data such as name age, gender etc. was recorded. They were divided into 2 groups of 40 each. Group I were those who received 3 ml of 0.5% isobaric levobupivacaine with 0.3 ml of normal saline and group II patients received 3 ml of 0.5% isobaric levobupivacaine with 3µg of dexmedetomidine.

Parameters such as onset of sensory blockade at T10 dermatome and onset of motor blockade motor blockade, maximum level of sensory and motor blockade attained and the time taken for the same, total duration of sensory blockade and motor blockade were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).

Results

Table 1 : Distribution of patients

Groups	Group I	Group II
Agent	3 ml of 0.5% isobaric levobupivacaine with 0.3 ml of normal saline	3 ml of 0.5% isobaric levobupivacaine with 3µg of dexmedetomidine
Number	40	40

[Table 1] shows distribution of patients based on agent used in both groups. Each group had 40 patients.

Table 2: Comparison of parameters

Variables	Group I	Group II	P value
ASA grade			
Grade I	25	22	0.12
Grade II	15	18	
Gender			
Male	18	20	0.14
Female	22	20	
Duration of surgery	58.2	56.4	0.82
Heart beat/ mins	82.3	81.6	0.91

[Table 2] shows in group I, ASA grade I was seen in 25 and II in 15, in group II, ASA grade I was seen in 22 and II in 18 patients. Group I comprised of 18 males and 22 females, group II had 20 males and 20 females. Mean duration of surgery in group I was 58.2 minutes in group I and 56.4 minutes in group II. Mean heart rate was 82.3 per minute in group I and 81.6 per minute in group II. The difference was significant ($P< 0.05$).

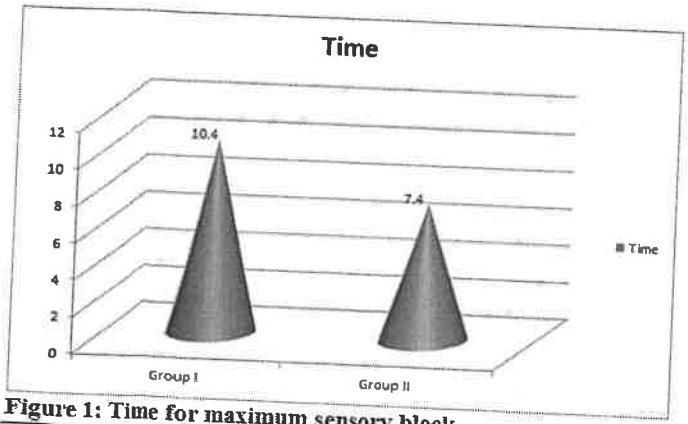

Figure 1: Time for maximum sensory block

[Figure 1] shows that mean time required to obtained sensory block in group I was 10.4 minutes and in group II was 7.4 minutes. The difference was significant ($P< 0.05$).

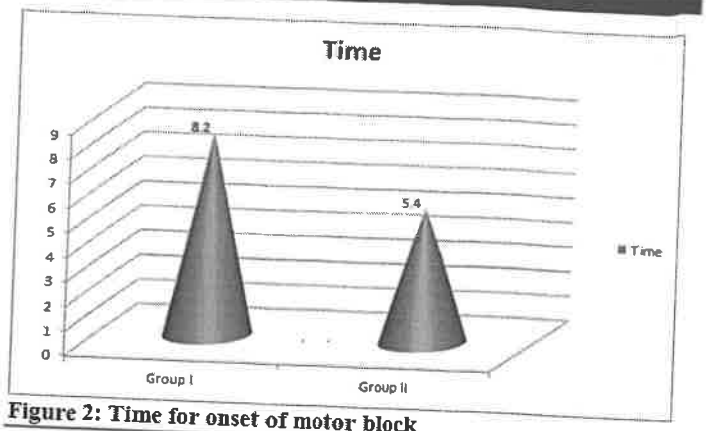

Figure 2: Time for onset of motor block

[Figure 2] shows that mean time for motor block in group I was 8.2 minutes and in group II was 5.4 minutes. The difference was significant ($P< 0.05$).

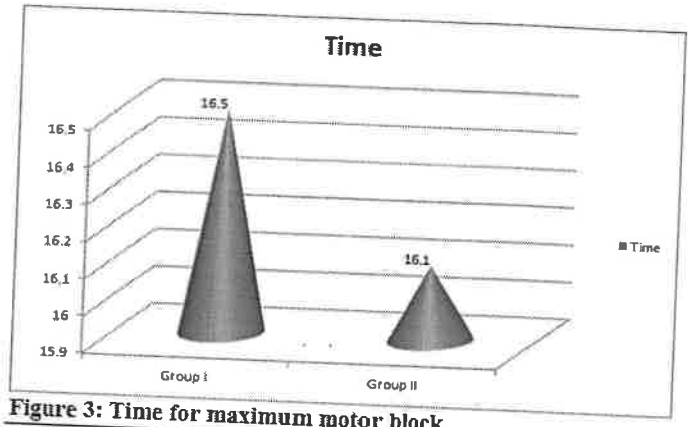

Figure 3: Time for maximum motor block

[Figure 3] shows that mean time required to obtained motor block in group I was 16.5 minutes and in group II was 16.1 minutes. The difference was non- significant ($P> 0.05$).

Discussion

Regional anesthesia has many benefits over general anesthesia as it eliminates the pain both intraoperatively and postoperatively, provides excellent muscle relaxation, and reduces intraoperative bleeding. Regional anesthesia techniques are also superior to systemic opioid agents with regard to analgesia profile and adverse effects.[8] Spinal anesthesia is the most commonly used technique due to its unmatchable reliability, simplicity, and cost effectiveness. It provides a fast and effective onset of sensory and motor block, excellent muscle relaxation, and prolonged postoperative analgesia.[9] Due to decreased cardiovascular and central nervous system toxicity, levobupivacaine is a good alternative.[10] The present study was conducted to compare levobupivacaine 0.5% versus isobaric levobupivacaine 0.5% with 3mcg dexmedetomidine in spinal anaesthesia.

In present study, group I were those who received 3 ml of 0.5% isobaric levobupivacaine with 0.3 ml of normal saline and group II patients received 3 ml of 0.5% isobaric levobupivacaine with 3µg of dexmedetomidine. They were divided into 2 groups of 40 each.

We found that in group I, ASA grade I was seen in 25 and II in 15, in group II, ASA grade I was seen in 22 and II in 18

patients. Group I comprised of 18 males and 22 females, group II had 20 males and 20 females. Mean duration of surgery in group I was 58.2 minutes in group I and 56.4 minutes in group II. Mean heart rate was 82.3 per minute in group I and 81.6 per minute in group II. Hala EA Eid et al,[11] found significant prolongation of the duration of spinal blockade by intrathecal administration of dexmedetomidine as an adjunct to hyperbaric bupivacaine. Patients in the groups that received dexmedetomidine had reduced postoperative pain scores and a longer analgesic duration than those who received spinal bupivacaine alone. This effect appears to be dose dependent and more pronounced with the dose of 15 µg. Fifteen µg dexmedetomidine but not 10 µg was associated with lower 24-hours analgesic requirements and desirable level of sedation.

We found that mean time required to obtained sensory block in group I was 10.4 minutes and in group II was 7.4 minutes. The mean time for motor block in group I was 8.2 minutes and in group II was 5.4 minutes. The mean time required to obtain motor block in group I was 16.5 minutes and in group II was 16.1 minutes.

Kataria et al,[12] had 60 adult patients between the age group of 20 and 65 years of physical status ASA grade I and II who underwent infraumbilical surgeries. Group L patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml normal saline while Group LD patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml (3 µg) dexmedetomidine. The two groups were compared with respect to the onset and duration of sensory and motor block and hemodynamic stability. Results: The mean duration of sensory block in Group L was 199.50 ± 7.96 min while in Group LD was 340.20 ± 11.78 min. All the differences were statistically highly significant between the two groups. Mean duration of motor block in Group L and LD was 150.83 ± 9.17 min and 190.20 ± 9.61 min, respectively. Both the differences were highly significant.

Conclusion

Authors found that addition of intrathecal dexmedetomidine to 0.5% isobaric levobupivacaine shortens sensory and motor block onset time and prolongs block duration.

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