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COMPARISON BETWEEN DEXMEDETOMIDINE AND PROPOFOL FOR CONSCIOUS SEDATION IN OUTPATIENT THIRD MOLAR SURGERY

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ABSTRACT Many clinicians have emphasized the necessity for better discomfort control in patients who undergo third molar surgery and several types of medications have been proposed for this purpose. Dexmedetomidine (DEX) is an alpha 2-adrenoreceptor agonist, which induces sedation and analgesia. It is a safe and acceptable sedative agent for those requiring minor surgical procedures. Propofol is an intravenous sedative hypnotic agent which rapidly and reliably causes loss of consciousness. The unique antiemetic, antiepileptic and anti-pruritic effects of Propofol may further broaden its appeal. The aim of this study is to compare the effects of intravenous Dexmedetomidine with intravenous Propofol during conscious sedation in third molar surgery.

KEYWORDS : Dexmedetomidine (DEX); Propofol, Impacted; Third molar surgery

Introduction

Most dental procedures are acquiescent under local anesthesia, but sometimes, depending on the extent of procedure, anxiety or phobia, patient needs some degrees of sedation. Procedural sedation outside the operating room increases the risk of adverse events.Many clinicians have emphasized the necessity for better discomfort control in patients who undergo third molar surgery and several types of medications have been proposed for this purpose. Anxiety can lead to various psychosocial consequences for a patient.[1] In particular, patients who have anxiety with regard to receiving dental treatment avoid receiving necessary dental treatment, particularly when their disease can be treated conservatively. Delaying treatment until more aggressive measures becomes their only option. There are various modes of pharmacologic management of pain, discomfort and anxiety. Good anaesthetic drug may be the possible solution for these as the qualities of a good anaesthetic agent include sedation, anxiolysis, analgesia, and amnesia.[2]

Dexmedetomidine is an alpha-2 agonist which acts on adrenoceptors in many tissues including the nervous, cardiovascular and respiratory systems.[3,4] The site of action in the central nervous system is at the locus coeruleus, where it induces electroencephalographic activity similar to natural sleep. The drug also reduces catecholamine secretion, thereby reducing stress and leading to a modest (10-20%) reduction in heart rate and blood pressure, which may be particularly beneficial in patients with cardiovascular disease.[5]In addition to sedation, it also produces analgesia, which could potentially alleviate pain after tooth extraction.[6,7]

Propofol is a potent intravenous anaesthetic agent because of its unique pharmacologic profile of rapid onset, reliable sedation, rapid recovery and lack off active metabolite has accounted for its popularity in the arena of procedural sedation. Often used in sub-anaesthetic dosage to provide procedural sedation in various procedures outside the OT.[8,9] There is no analgesic action of propofol and is associated with number of side-effects such as pain on injection, rapid attainment and overshoot of depth of sedation than intended. Onset of action is very rapid with peak effects at 90 - 120 sec with duration of action range from 5 - 10 min depending on the dose.[10-12]

Such a pharmaco-dynamic profile may have an advantage over one or other aspects for dental sedation. Therefore, we conducted this study to compare Dexmedetomidine and Propofol for conscious sedation in outpatient third molar surgery to find out which agent outscores over the other.

Material and methods:

A prospective, randomized comparative study was conducted by department of Dentistry and Anaesthesiology in BPS Government Medical College for women Khanpur Kalan after getting approval from Institutional Ethical Committee (IEC). Patients of either sex in the age group of 18-40 years diagnosed to have impacted mandibular third molars, coming to department of Dental surgery for surgical extraction were involved in study. Impacted tooth may be unilateral or bilateral but must be in the Pederson difficulty index of 4-7. Informed written consent was taken from the subjects.

Patients with history of peri-coronal infection, clinical history or ECG evidence of IHD; Heart block, Asthma, Sleep apnoea and on steroid therapy were excluded from the study. Pregnant ladies and lactating mothers, Patient with history of allergy to any of the study medications, patients with renal or hepatic disease, blood dyscrasia, gastric ulcers, impaired mental status, patients who refuse to give informed consent were also excluded from the study.

Total of 50 Patients were selected sequentially from the study population. These patients were divided randomly in two groups (25 patients in each group) using sealed opaque envelope. The groups were labeled as group A and group B. the subjects in group A received Dexmedetomidine 1microg/kg over 10 min and maintenance dose of 0.4micogram/kg/hr and group B received Propofol 0.5mg/Kg over 5min with maintenance dose of 4mg/kg/hr. In addition to different study medications, a fixed dose combination of ofloxacin 200 mg and tinidazole 600mg per orally, 30 minutes before surgery were given. These medications were asked to be continued twice daily for 5 days after surgery.

The outcomes evaluated were: pain score using VAS during local analgesia, need for rescue or additional analgesia administration to complete the procedure, patient's satisfaction, and surgeon's satisfaction of the sedation. Time for next dose of analgesia after procedure was also recorded. Safety was evaluated by reporting the incidence of complications during and after the administration of the drug. The complications were categorized into three main categories, cardiovascular, respiratory, and others. Cardiovascular complications involved extreme changes in heart rate or blood pressure as reported by the authors. When possible, extremes were defined as a change of greater than 20 percent from baseline. Respiratory complications could involve apnoea, hypoventilation, and desaturation. Desaturation was defined as, SpO2 less than 90%. Nasal O2 was given if SPO2 <95% and if it goes <90% than airway manipulation was done. Rescue analgesia was given by injection fentanyl 0.5 microgram/kg. If mean arterial pressure is less than or equal to 20% fall from baseline, then injection ephedrine 6mg was given.

For assessing pain VAS was used. Sedation was assessed using Ramsay score (1-6) while the degree of surgical difficulty was assessed using Winter's and Pell-Greogory classification and the degree of surgical difficulty will be rated by Pederson scale . Surgeon's satisfaction was assessed on likert's scale of 1-5 (1 very poor, 2 poor, 3 fair, 4 good, 5 very good). Patient satisfaction score on 1-10 point numeric rating scale.

Subjects were prohibited from smoking and drinking liquids other than water for 2 hours before the experiment. Same surgeon performed procedure in all of the patients. After procedure completion and drug discontinuation patient monitored and time noted till ALDRETE score is 9 i.e. fully conscious.

Analysis was performed using appropriate statistical tests. For quantitative variables mean, median and standard deviation were calculated. The difference between these variables across group A and group B were analyzed using Wilcoxon's sign rank and T test (both paired and unpaired) using SPSS version 12.0. For qualitative variables chi-square test was used.

Results:

No statistically significant difference was there in demographic parameters. Patients were comparable in age, sex and difficulty scores of third molar diseasein both groups.

Distribution of SBP & DBP in between groups

Time	PROPOFOL		Dexmedetomidine		P value
	Mean ± SD		Mean ± SD		
	SBP	DBP	SBP	DBP	
Base line	118 ± 14	74 ± 12	119 ± 11	72 ± 12	NS
5 min	118 ± 12	70 ± 12	115 ± 12	71 ± 11	NS
10 min	106 ± 16	64 ± 13	110 ± 10	72 ± 12	NS
20 min	110 ± 11	68 ± 13	112 ± 13	73 ± 10	NS
30 min	108 ± 13	70 ± 11	111 ± 12	76 ± 11	NS
40 min	110 ± 12	78 ± 11	116 ± 14	74 ± 10	NS

After start of induction with loading doses and continuation of maintenance doses, mean time to reach RSS between 3-4 was significantly shorter in propofol group 4.2 ± 1.12 minute than Dexmedetomidine 9.1 ± 0.81 min.

Intra operative RAMSAY sedation score in both groups.

		PROPOFOL	Dexmedetomidine	P value
VAS score during LA Inj.	Mean ± SD	1.4 ± 2.0	0.9 ± 1.6	NS
VAS Sedation	Mean ± SD	8.6 ± 0.9	7.4 ± 2.1	NS
RSS Induction	Mean ± SD	2.71 ± 1.69	2.86 ± 1.71	NS
Intra Op RSS	Mean ± SD	2.92 ± 0.96	3.05 ± 1.10	NS
Time to reach Sedation RSS (3-4)	Mean ± SD	4.2 ± 1.12	9.1 ± 0.81	S
Recovery time after end of infusion	Mean ± SD	22.30 ± 3.81	10.12 ± 1.26	S

In propofol group time to recover aldrete score >9 after discontinuation of infusion was statistically significant shorter than group Dexmedetomidine (10.12 ± 1.26 minute and 22.30 ± 3.81) respectively

Desaturation Occurred in 10 patients (SPO2 <95 – nasal oxygen applied) in propofol group, among them 2 patients desaturated < SPO2 90% which relieved after airway manipulation only. No active intervention required to secure airway.

De-saturation in both groups.

	PROPOFOL	Dexmedetomidine
SPO2 <95	8	5
SPO2 <90	2(Airway manipulation)	0

Side effects among both the groups

Problems		PROPOFOL	Dexmedetomidine
Additional analgesia	Yes	4	1
	No	21	24
Vomiting	Yes	0	2
	No	21	23

Difficulty scores were comparable in both groups. Duration of surgery was similar in both groups and all surgeries were performed by same surgeon. Surgeon satisfaction score was similar in both groups. (4.3 ± 0.5 & 4.2 ± 0.7 respectively). Patient satisfaction score on a 0–10 numeric rating scale was similar in both groups i.e. 8.8±1.9 and 8.9±1.7 in Dexmedetomidine and Propofol respectively and the difference was not statistically significant.

Discussion

Various sedatives use in literature for to reduce procedure related anxiety an fear for IV sedation in dental care. Although Dexmedetomidine is widely used in ICU, MRI, Dental Clinics, Endoscopy, use of propofol in sub-anaesthetic doses is effective in reducing patients apprehensions & can improves patient's compliance for dental treatment without adversely affecting patients physiological status.[20-23]

In the present study, we aimed to evaluate efficacy of propofol to produce moderate sedation and its comparison with Dexmedetomidine for suitability in outpatient third molar dental surgery under local anaesthesia.

Researchers have a studied propofol in lower doses for conscious sedation for fear full patients for dental treatment[13] but in the present study, we used 0.5 mg/kg loading doses for five minutes than 4 mg/kg/hr infusion as maintaince doses of propofol.

In our study time to reach RSS (3-4) was shorter in propofol group than Dexmedetomidine. VAS score on local anaesthetic injection was similar in both groups. Heart rate and arterial BP (SBP and DBP) findings are comparable to other studies. Heart Rate changed over the study period. In both groups heart rate decreased after induction in both groups but more in propofol. Heart rate then increased in both groups after LA injection but more in dexmedetomidine group and results were comparable to findings of other researchers.[24-25]

In children study conducted for MRI shows low intervention required in dexmeditomidine group. In our study in propofol group number of patients who desaturated upto 90% SPO_2 was 2 out of 10 patients who desaturated below 95%. In dexmedetomidine group only 5 patients out of 25 patients desaturated upto 95%. They all managed by airway manipulation only. No active intervention needed to secure airway.

Intraoperative sedation after achieving RSS (3-4) was similar in both groups. Pain reaction to injection of local anaesthetic was interestingly lower in propofol group but was non significant statistically. Rather patients comment for pain during iv injection more than pain during LA injection, may be due to hypnotic properties of propofol. The VAS score allows for quantitative measurement of pain and was more in Dexmedetomidine. Our findings are similar to other studies to sedation during dexmedetomidine and propofol used for iv sedation for cataract surgery, nerve blocks, ICU, GI endoscopies.

In our studies 4/25 patients of group propofol need additional analgesia after LA for completion of procedure as compared to 1/25 of dexmedetomidine group. Dexmedetomidine has some analgesic properties so less analgesic requirement postoperative were found in studies with dexmedetomidine.

Among side effects nausea and vomiting was found in 2 patients and more in propofol group. In dexmedetomidine group dryness of mouth, postoperative nausea and excessive sedation was noted in 1patient each.

In our study patient satisfaction score was similar in both groups and was comparable to study done by Mac kary.

Surgeon's satisfaction was assessed on numeric rating scale and was comparable to reading of other studies in dental patients 3.9+/- 1.3.

Time to recovery from anaesthesia was significantly shorter in propofol after discontinuation of infusion at end of 3rd molar surgery as compared to dexmedetomidine group. Propofol redistributed and metabolised rapidly so recovery is fast and clear headed recovery in propofol group, so overall patient's overall duration of stay in hospital is reduced.

CONCLUSION

Propofol in comparison to dexmedetomidine provides similar sedation characteristics in 3rd molar surgery under LA. Patient satisfaction and surgeon satisfaction score showed more favourable profile in propofol sedation. Although vital parameters also had non-significant difference in both groups, but based on respiratory profiles, more respiratory depression noted in propofol and hence use is recommended in monitored anaesthesia care only. Children with special needs (developmental, emotional or behavioural problems),

adults with mental retardation or geriatrics with dementia , non cooperative patients to dentist may be benefitted by using propofol under anaesthetist's care in office based dental care.

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