

Intraspace Administration of Local Anesthetic Admixture with Dexmedetomidine for Sedation in Minor Oral Surgery

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Abstract - Purpose : Pain control in dentistry is imperative for proper patient management. An anxious patient is always difficult to handle, therefore control of patient's pain is very important which in turn reduces patient anxiety. Thus anxiolytic drugs are used in day care patient management which enhances the patient's cooperation.

One such anxiolytic is Dexmedetomidine which is a selective α_2 adrenoceptor agonist. The sedative actions are believed to be mediated primarily by post synaptic α_2 adrenoceptors & is less investigated for day care minor surgical procedures.

This study aims at administration of dexmedetomidine as an adjunct with local anesthetic agent via pterygomandibular space and to assess its sedation effect.

Thirty patients were randomly divided into two groups. Fifteen patients received inferior alveolar nerve block with 2% lignocaine with adrenaline mixed with dexmedetomidine injection for mandibular third molars extraction & rest were administered 2% lignocaine with adrenaline. Baseline vital parameters were assessed preoperatively and constant monitoring of vitals was done throughout the procedure. Sedation was assessed using Ramsay Sedation Scale.

In this study thirty patients were assessed. Patients who were administered 2% lignocaine with adrenaline mixed with dexmedetomidine were found to be more cooperating intraoperatively with prolonged analgesia postoperatively in comparison to the patients receiving 2% lignocaine with adrenaline alone.

The anxiety & psychomotor performance were lower & the duration of analgesia was longer in patients receiving 2% lignocaine with adrenaline mixed with dexmedetomidine

Index Terms - anxiolytic, dexmedetomidine & α_2 adrenoceptors.

INTRODUCTION

Patient anxiety has always been the challenge for the operating surgeon to deal with. Fear of pain during procedure makes the patient worried and affects physiological parameters. From past, pain control has always been at the priority for the operating surgeon. With the advances in technology, new discoveries and inventions led to the formation of newer drugs which helps in patient's pain control and so the anxiety. One such newer anxiolytic drug is dexmedetomidine, which is a selective α_2 adrenoceptor agonist¹. with sympatholytic, sedative, amnesic, and analgesic properties². It has recently become evident that complete anesthesia is feasible by employing more potent α_2 agonists, such as medetomidine and its stereoisomer, dexmedetomidine³. Veterinarians employed xylazine and detomidine for a long time to induce analgesia and sedation in animals^{4,5}. It has also been reported that dexmedetomidine enhances central and peripheral neural blockades by local anesthetics⁶. The sedative actions are believed to be mediated primarily by post synaptic α_2 adrenoceptors. It has low affinity towards beta adrenergic, muscarinic, dopaminergic & serotonin receptors. There are 3 subtypes of α_2 receptors in our body. Subtype A responsible for sedative, analgesic and sympatholytic effect. Subtype B responsible for short term hypertensive response. Subtype C is responsible for anxiolytic effect⁷. Subtype D is also present which is unknown. This study aims at administration of dexmedetomidine as an adjunct with local anesthetic agent via pterygomandibular space and to assess its sedation effects & anxiolysis.

MATERIALS & METHOD

The ethical clearance was duly approved by Institutional Ethical Committee clearance (IEC) followed by which, a randomised prospective study was done. Preoperatively the patients were informed about the risk of anesthesia and then written informed consent was taken. All the 40 patients were otherwise healthy and aged between 18 to 40 years and were classified ASA 1 or 2. Sample falling in exclusion criteria included old aged patients, systemically ill & debilitated patients, patient’s refusal for block and known to have adverse drug reactions to local anesthetic agent.

All patients were randomly divided into two groups. Twenty patients received inferior alveolar nerve block with 2% lignocaine with adrenaline for mandibular third molars extraction & rest were administered with 2% lignocaine with adrenaline mixed with 0.2mcg/kg body weight of dexmedetomidine injection. Inferior alveolar nerve block, lingual and long buccal nerve block was administered. Repeatative aspiration was done during injection to avoid accidental intravenous administration of the drug. Constant multiparametric monitoring was done for all the patients which included baseline pulse, respiratory rate, peripheral oxygen saturation (SpO2) & non invasive arterial blood pressure (NIBP), pre operatively, peri operatively & post operatively to assess the status of vital signs using pulse oxymeter. After proper chair positioning, inferior alveolar nerve block was given. 20 patients including both sexes, were administered with 2% lignocaine with adrenaline & rest were given the same block with 2% lignocaine with adrenaline mixed with 0.2mcg/kg body weight of dexmedetomidine injection. After 5minutes the subjective symptoms were obtained. Time interval between administration of block & initiation of sedation was recorded. Level of sedation was assessed using Ramsay Sedation Scale⁸. After sedation is achieved, standard minor surgical procedure for the removal of impacted mandibular 3rd molars was performed under aseptic conditions. After the procedure was done, patients were kept under observation for 1 hour & then were discharged.

Assessment of patient satisfaction : Patient satisfaction with the regional anesthesia after complete recovery from sedation (group A patients), and postoperatively (group B patients) was assessed using the following 5-

point scale⁹ by asking question, “How satisfied were you with the anesthesia?”: 0, extremely dissatisfied; 1, dissatisfied; 2, neutral (neither satisfied nor dissatisfied); 3, satisfied; and 4, completely satisfied.

RESULT

In this study, a total of forty patients (n = 40) were involved. Out of which 50% patients were in group A (LA with adrenaline mixed with dexmedetomidine) & rest 50% patients were in group B (LA with adrenaline without mixing dexmedetomidine. Onset of sedation occurred at 20 minutes. The patients who received 2% lignocaine with adrenaline mixed with 0.2mcg/kg body weight of dexmedetomidine tolerated the procedure well. The mean duration of onset of sedation in group A patients was 24 ± 4.77 min. & prolongation of analgesia in group A was 297.25 ± 35.56 min & group B was 109.50 ± 17.98 min. The two tailed P values calculated using unpaired t test is less than 0.0001, thus the difference is extremely statistically significant & t value is 21.0714.

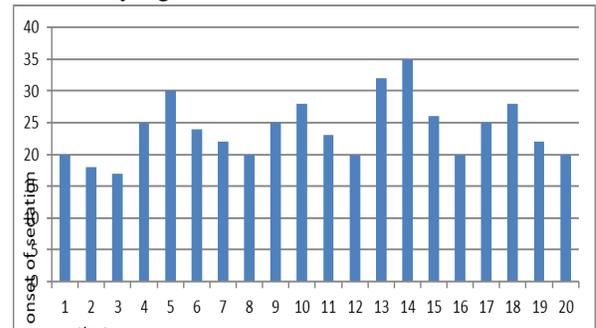


Fig. 1

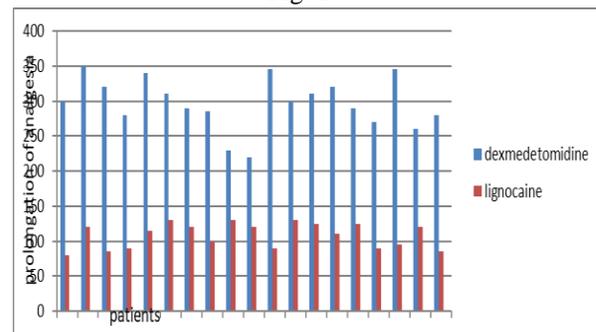


Fig. 2

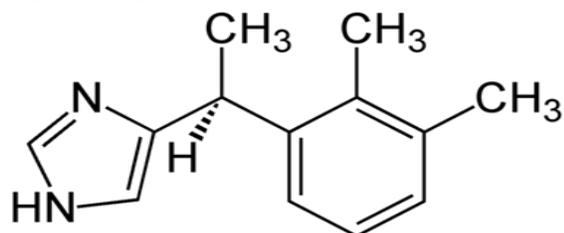
Table 1 :

Patients	Onset of sedation	Prolongation of analgesia
Group A	24 ± 4.77 min.	297.25 ± 35.56 min.
Group B	-	109.50 ± 17.98 min.

Table 2 :

Patients	't' value	'p' value
Group A	21.0714	< 0.0001
Group B		

Figures to legends:



DISCUSSION

During any operative procedure patient's anxiety and fear for pain is the most challenging part to deal with. With the advent of modern time and formation of new pharmacologic agents like Local anesthesia, the patient's anxiety and fear is very easily taken care of. Although improvisation never stops. New drugs are developed in order to augment patient cooperation by sedating the patient perioperatively. Dexmedetomidine provides sedation and analgesia without causing respiratory depression¹⁰

Aim of this study was to administer dexmedetomidine as an adjunct to local anesthetic agent in minor surgical procedures to induce sedation and to assess its effects. Our results showed that dexmedetomidine enhances the potency and duration of analgesia if administered as an adjunct to local anesthetic agent. Also due to its sedative property, anxiety of the patients were easily eradicated.

3 different subtypes α_2 receptors have their own peculiar functions. But α_2 receptors are present at the presynaptic area. Thus, in the presynaptic activation of α_2 receptors inhibition of secretion of norepinephrin occurs via a negative feedback mechanism, which in turn terminates the propagation of pain signals. Also postsynaptic activation of α_2 receptors in CNS inhibits sympathetic activity henceforth decreasing the blood pressure and heart rate. Combined, these effects can produce analgesia, sedation, and anxiolysis³

Dexmedetomidine was found to be more efficacious for prolongation of analgesia and providing sedation² which in turn greatly reduced patient's anxiety and anxiety related perioperative and postoperative complications.

Ralph gertler, h et al.³ gave a conclusion that the patients who were perioperatively treated with dexmedetomidine were found to be more hemodynamically stable than others moreover, the patients the patients were more sedated and also they emerged more rapidly from anesthesia, required less volatile anesthetic to achieve hemodynamic endpoints. Tatsushi Yoshitomi et al.⁵ in their study concluded that dexmedetomidine enhances the local anesthetic action of lidocaine. It increases the analgesic potency of lignocaine which helps reducing patient's anxiety. Kanazi GE, et al.⁶ concluded in their study that Dexmedetomidine and clonidine shortened the onset of motor block and prolongs motor and sensory block when compared to bupivacaine alone, moreover $3\mu\text{g}$ of dexmedetomidine was required whereas $30\mu\text{g}$ of clonidine was required

Joana Afonso & Flávio Reis¹⁰ in their study gave a conclusion that dexmedetomidine gives a unique ability of providing excellent sedation along with moderate analgesia without respiratory depression. It is a drug with wider safety margin which enhances patient's cooperation.

Carollo et al¹¹ in a review article concluded that dexmedetomidine has decreased the use of opioids, propofol and benzodiazepines, and managed to provide effective short-term sedation.

Andrea Paris & H Tonner¹² gave a conclusion that dexmedetomidine offered beneficial pharmacologic profile with sedation, sympatholysis and analgesia. Though its side effects are predictable but promises its benefits not only in ICU but also during the peri operative period.

Laura E. Nelson et al.¹³ concluded that sedation with dexmedetomidine involves inhibition of locus ceruleus which disinhibits ventrolateral preoptic nucleus firing the increased release of GABA at the terminals of the VLPO inhibits tuberomammillary nucleus firing, which is required for the sedative response.

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