Research Article

Efficacy of intravenous regional anesthesia by using 0.25% lignocaine with fentanyl and pancuronium bromide

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Abstract

Introduction: Regional anesthesia is a term first used by Harry Cushing in 1901 to describe pain relief by nerve block. The term regional anesthesia denotes the interruption of pain impulses by physiological blockade at certain point along their pathway of transmission in the peripheral nerve. Intravenous regional anesthesia is the simple method of producing analgesia of the arm or leg by intravenous injection of the local anesthesia drug, while circulation is occluded. **Aims and objective:** To study the efficacy of Intravenous Regional Anaesthesia by using 0.25% lignocaine with fentanyl and pancuronium bromide **Material and Methods:** For the purpose of study two groups were formed containing 25 patients each. **Group A:** Patients received intravenous regional anesthesia with standard method i.e. 3 mg/kg of 0.5% lignocaine. **Group B:** Patients received intravenous regional anesthesia with 1.5mg/kg of 0.25% lignocaine + Pancuronium 0.5 mg + fentanyl 1 ug/kg. The details of all the patients were entered on a standard proforma. Standard protocol was used for inducing the regional anesthesia. The limb to be operated was kept elevated above the level of the heart for 2 to 4 minutes for gravity drainage. Esmarch's bandage was applied to ensure complete exxsanguination. Both the methods were used for all patients. After exsanguinations, the tourniquet was applied to occlude the vessels by first wrapping the side where the tourniquet was to be applied with cotton roll to reduce the tourniquet discomfort. **Then group A patients received** Lignocaine 0.5%, 3 mg/kg and group B received, Lignocaine 0.25%, 1.5mg/kg+fetanyl 1 ug/kg+ pancuronium 0.5mg. The drug was injected, the skin usually became mottled and analgesia developed rapidly. The muscle relaxation was profound. As the drug was injected, the forearm was tested for analgesia (loss of sensation for pin prick was elicited). The time of onset of sensory block and motor block was noted. The quality of anesthesia developed was also measured. **Results:** The age and sexwise distribution in both group was nearly same and thus both the groups were comparable with each other. In group A the onset of sensory block occurred in 5.4±2.06 minutes while in group B onset of sensory block occurred in 8±2.22 minutes. The onset of motor block in patient of group A occurred in 11.44±1.98 minutes and in group B patients occurred in 13.4±2.18 minutes. It was seen that in group A, 20 patients had excellent block, 3 had good quality block and 2 had moderate quality block. Whereas in group B 19 patients had excellent block, 4 had good quality block and 2 had moderate quality block. There was not a single case of poor block in both the groups. **Conclusion:** Thus in the end we conclude that the mean time of onset of sensory and motor block were shorter in group lignocaine group however there was no difference quality of analgesia.

Keywords: Intravenous Regional Anaesthesia, lignocaine, fentanyl, pancuronium bromide.

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INTRODUCTION

Regional anesthesia is a term first used by Harry Cushing in 1901 to describe pain relief by nerve block. The term regional anesthesia denotes the interruption of pain impulses by physiological blockade at certain point along their pathway of transmission in the peripheral nerve. Intravenous regional anesthesia is the simple method of producing analgesia of the arm or leg by intravenous injection of the local anesthesia drug, while circulation is occluded. This method of intravenous analgesia was discovered by 'August Bier' in 1908. Bier was professor

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of surgery, who was using spinal anesthesia regularly. His method of intravenous regional anesthesia consisted of isolating a segment of the arm with tourniquet and injecting a solution of 0.5% procaine into a vein in the isolated segment.[1,2,3] Traditionally, lidocaine is used as 0.5% solution at the dose of 3mg/kg in IVRA for effective anesthesia during upper limb surgeries[4]. However, at this high dose, life threatening side effects such as convulsions, coma, cardio-respiratory depression and even cardiac arrest can occur due to accidental release of tourniquet during the procedure or deliberate release of tourniquet at the end of the procedure. In order to avoid these potential life threatening side effects, many modified techniques of IVRA have been attempted by using a low dose of lidocaine, muscle relaxant and opioid. Thus in the present study we tried to studied the Efficacy of Intravenous Regional Anesthesia by using 0.25% lignocaine with fentanyl and pancuronium bromide

AIMS AND OBJECTIVE

To study the efficacy of Intravenous Regional Anaesthesia by using 0.25% lignocaine with fentanyl and pancuronium bromide

MATERIAL AND METHODS

The present study was conducted in the Dr. V.M. Medical College and Shri Chhatrapati Shivaji Maharaj General Hospital, Solapur. For the purpose of study two groups were formed containing 25 patients each.

- **Group A:** Patients received intravenous regional anesthesia with standard method i.e. 3 mg/kg of 0.5% lignocaine.
- **Group B:** Patients received intravenous regional anesthesia with 1.5mg/kg of 0.25% lignocaine + Pancuronium 0.5 mg + fentanyl 1 ug/kg

Following inclusion and exclusion criteria was used to select the study subjects and patients satisfying the below mentioned inclusion criteria were enrolled in the study. He selected patients were randomly divided in group A and B.

Inclusion Criteria

Patients of the age group between 20 and 60 years of both sexes requiring elective surgery of upper extremity below the mid arm were selected.

Exclusion Criteria

- Patients shock or with severe crush injury.
- Hypersensitivity to local anesthesia.
- Highly nervous and uncooperative patients.

After receiving permission from the institution ethical committee and informed written consent from the patents the study was performed. The details of all the patients were entered on a standard proforma. Standard protocol was used for inducing the regional anesthesia. The limb to be operated was kept elevated above the level of the heart for 2 to 4 minutes for gravity drainage. Esmarch's bandage was applied to ensure complete exxsanguination. Both the methods were used for all patients. After exsanguinations, the tourniquet was applied to occlude the vessels by first wrapping the side where the tourniquet was to be applied with cotton roll to reduce the tourniquet discomfort. Thn group A patients received Lignocaine 0.5%, 3 mg/kg and group B received, Lignocaine 0.25%, 1.5mg/kg+fetanyl 1 ug/kg+ pancuronium 0.5mg. The drug was injected, the skin usually became mottled and analgesia developed rapidly. The muscle relaxation was profound. As the drug was injected, the forearm was tested for analgesia (loss of sensation for pin prick was elicited). The time of onset of sensory block and motor block was noted. The quality of anesthesia developed was graded according to following scale.

Quality of Block

- Excellent: Complete loss of sensation and muscle paralysis.
- Good: Loss of sensation except deep pressure sense and poor muscle
- Moderate: Mild pain or discomfort.
- Poor: Poor analgesia and general anaesthesia was required to complete the surgical procedure.

The collected data was entered in Microsoft excel and Results were expressed as percentage and mean ± SD. The results were analyzed for statistical significance using paired student t-test. Differences were considered to be statistically significant when P value was < 0.05.

RESULTS

Table 1: Age and sex distribution of patients in the study

Variable		Group A	Group B
Age	20-30	12 (48%)	12 (48%)
	30-40	06 (24%)	06 (24%)
	40-50	06 (24%)	07 (28%)
	50-60	01 (04%)	00 (00%)
Sex	Male	16 (64%)	15 (60%)
	Female	09 (36%)	10 (40%)

It was seen that majority of cases are male in both the groups. The age group in majority of patients undergone surgery was 20-30 years. The age and sexwise distribution in both group was nearly same and thus both the groups were comparable with each other.

Table 2: Distribution according to the surgical procedure performed

Sr. No.	Surgical procedure peformed	No. of cases (%)
1	Open reduction and sq.nal	07 (14%)
2	Open reduction and fixation with 'k'wire	10 (20%)
3	Open reduction and fixation with 'L'wire	04 (08%)
4	Implant removal	04 (08%)
5	Radial head excision	05 (10%)
6	Both bone nailing	08 (16%)
7	Plating of radius and ulna	06 (12%)
8	Tension band wiring of olecrenon	01 (02%)
9	Open reduction with internal fixation	05 (10%)
	Total	**50 (100%)**

Among all the above surgical procedure the most common procedure was open reduction and fixation with 'k' wire and only one patient undergone the procedure of tension band wiring for olecrenon.

Table 2: Onset of sensory block in Group A and Group B patients

Onset of sensory block (min)	Group A		Group B	
	No. of cases	Percentage	No. of cases	Percentage
0-5	10	40%	04	16%
06-10	14	56%	17	68%
11-15	01	04%	04	16%
Mean ± SD*	5.4±2.06		8±2.22	

*Unpaired 't' test statistically Significant

In group A the onset of sensory block occurred in 5.4±2.06 minutes while in group B onset of sensory block occurred in 8±2.22 minutes. Sensory block was established earlier in group A as compared to group B and the difference observed was also statistically significant (P<0.001).

Table 3: Onset of motor block in Group A and Group B patients

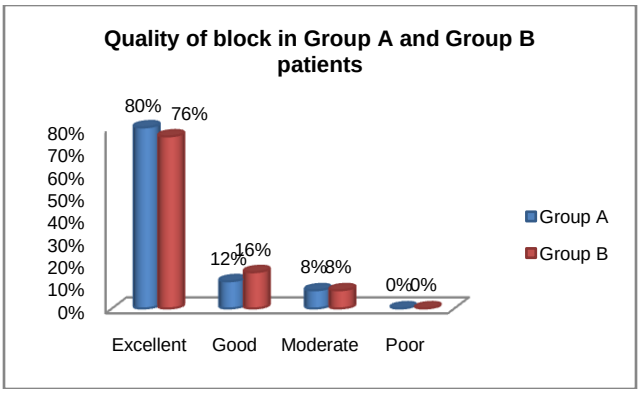
Onset of motor block	Group A		Group B	
	No. of cases	Percentage	No. of cases	Percentage
0-5	00	00%	00	00%
06-10	09	36%	00	00%
11-15	16	64%	18	72%
16-20	00	00%	07	28%
Mean ± SD*	11.44±1.98		13.4±2.18	

*Unpaired 't' test statistically Significant

The onset of motor block in patient of group A occurred in 11.44±1.98 minutes and in group B patients occurred in 13.4±2.18 minutes. The difference observed was statistically significant (P<0.01).

Table 4: Quality of block in Group A and Group B patients

	Group A		Group B	
	No. of cases	Percentage	No. of cases	Percentage
Excellent	20	80%	19	76%
Good	03	12%	04	16%
Moderate	02	08%	02	08%
Poor	00	00%	00	00%



It was seen that in group A, 20 patients had excellent block, 3 had good quality block and 2 had moderate quality block. Whereas in group B 19 patients had excellent block, 4 had good quality block and 2 had moderate quality block. There was not a single case of poor block in both the groups.

DISCUSSION

The present study was conducted in the Dr. V.M. Medical College to study the efficacy of Intravenous Regional Anaesthesia by using 0.25% lignocaine with fentanyl and pancuronium bromide. In the present study only adult patients of both sexes belonging to ASA grade I and II and between the age groups of 20-60 years were selected. Group A patient received 0.5% lignocaine with a dose of 3 mg/kg whereas. Group B patients received 0.25% lignocaine, 1.5mg/kg +fentanyI 1ug/kg+pancuronium 0.5 mg. All the patients received 5-10 mg of diazepam orally on the previous night. It was seen that age and sex distribution of the patients in Group A and B was nearly same. And majority of cases were male in both groups and majority being in age group of 20-30 years. Thus both the groups were comparable as far as age and sex distribution was concerned. It was seen that the onset of sensory block in group A which occurred in 5.4±0.06 minutes and in group B the onset of sensory block occurred in 8±2.2 minutes. Sensory block was earlier in group A patients and the difference observed was statistically significant (P<0.001). In a study conducted by Mittal and Kacher[5], the authors noticed analgesia in 5.31 minutes while None *et al*[6], it was between 3 to 5 minutes. With Ware *et al*[7], it was 4.5±0.3 minutes, with Mishra *et al*[8], it was 3.9±1.5 minutes and with Agrawal *et al*[9], it was 3.97±0.87 minutes. The onset of motor block in patients of group A occurred in 11.44±1.98 minutes and group B occurred in 13.4±2.18 minutes and the difference was also statistically significant (P<0.01). Mishra *et al*[8] showed that motor block with 0.5% lignocaine was to be 11.86±3.28 minutes and with Kulkarni *et al*[10], it was 7.8±2.46 minutes. The onset of sensory block was only delayed be about 2.5 minutes in group B as compared to group A. whereas motor onset was delayed by 2 minutes. This difference thought statistically significant appears to be clinically insignificant. It was seen that in group A, 20 patients had excellent block, 3 had good quality block and 2 had moderate quality block. Whereas in group B 19 patients had excellent block, 4 had good quality block and 2 had moderate quality block. There was not a single case of poor block in both the groups. No patients in our study required general anesthesia for the completion of the procedure, thus the results showed that IVRA block with dose lignocaine 1.5 mg/kg, 0.25%+fentany1 1ug/kg +pancuronium 0.5 mg was effective. The results of quality of block were comparable with standard technique of IVRA with 0.5% lignocaine alone. By reducing the dose of lignocaine 50% we can reduce the chances of toxicity. The results of the present study were comparable to Abdullah and Fadhi[11]. They obtained successful anesthesia in 100% of cases with the combination of lignocaine 100 mg +fentanyl 50ug+pancuronium 0.5 mg. Whereas IVRS with 100mg lignocaine alone, the successful block occurred in 13% of the cases and addition of fentanyl 50 ug to the same 100 mg lignocaine gave successful block in only 27% cases. In addition the safety of this new combination was confirmed by absence of toxic signs and symptoms after release of tourniquet pressure immediately after the injection of solution. The mechanism and the effects of the opiods or muscle relaxants in IVRA remains unclear. El Hakin and Sedek, Acta A.S. *et al* have shown that the addition of muscle relaxant such as atracurium to lignocain for IVRA improved the muscle relaxation and the operating conditions as compared to 0.25% lignociane alone. The peripheral analgesia effects of opioids during IVRA are still controversial. Several studies did not find any synergism between opioids and local anesthetics during IVRA. The effects of fentanyl on nerve conduction reported in experimental studies do not seem clinically relevant for IVRA[12]. The inadequate peripheral analgesic

effects of opioids could be due to failure of this drug to reach in sufficient concentrations after intravenous injection. Contradictory to this some positive results of opioids induced analgesia were obtained after brachial plexus block.

CONCLUSION

Thus in the end we conclude that the mean time of onset of sensory and motor block were shorter in group lignocaine group however there was no difference quality of analgesia.

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