International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article

Comparative study of Intra venous Regional Anaesthesia by using Lignocaine(0.5%), Bupivacaine (0.5%) and combination of Lignocaine (0.5%) and Bupivacaine (0.5%) in upper limb and lower limb surgeries with effect on postoperative analgesia and hemodynamics

Atul Kaushik[1*], Praveen Kumar[2]

[1*]Assistant professor, Department of Anesthesiology,
School of Medical Sciences and Research, Sharda University, Greater Noida, Uttar Pradesh, India.
[2]Assistant Professor, Department of Anesthesiology,
Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India.

ABSTRACT

Introduction: Intra venous Regional Anaesthesia is one of the best procedures, providing better intra operative hemodynamic control, post-operative pain relief and rapid recovery from surgery specially upper and lower limb general and orthopedic surgeries. The purpose of the study was to evaluate the efficacy and superiority combination of Lignocaine & Bupivacaince over the any of the drug if used alone and also investigate prolong postoperative pain relief and reduce the requirement of rescue analgesia in upper and lower limb with least side effects.. Intravenous regional Analgesia (I.V.R.A) is simple, effective, economic and safe method of pain relief during limb surgery. Each patient was premeditated with Fentanyl 1 mcg/kg, I.V.Phenargan (0.5 mg / kg, I.V. Medazolam 1 mg I.V was given slowly intravenously 15 minutes earlier to surgery.

Material and Methods: In our randomized control trial study, total 60 ASA class I and II patients of age between 15 to 65 years undergoing lower and upper limb orthopedic and other surgeries were given. Patients received 0.5% lignocaine 20 ml to 40 ml alone in one group A and groups B received 40ml to 60 ml of 0.5% of bupvacaine and group C received combination of lignocaine and Bupivacaine 0.5% respectively. All the patients were monitored for onset of sensory and motor blockade, intra operative hemodynamic, post-operative analgesia, adverse effect and complications.

Results: Onset of sensory and motor blockade was early in group C. Addition of Bupivacaine with Lignocaine increases the post-operative pain free period significantly and the incidences of complications start to appear in Group A. The incidence of side effects like hypotension, Bradycardia and shivering were not seen in patients of group C. Group A patients receiving Lignocaine 0.5% had hypotension (5%), tachycardia (5%), shivering (0%), vomiting (5%) and convulsion (5%). Group B had rigor in 5 % of the patients and Group C patient had no complication.

Conclusion: Addition of Lignocaine with Bupivacaine prolongs postoperative analgesia without altering block characteristics with no side effects and appears to be safe and reliable adjuvant to each other.

Key Words: Bupivacaine, Intra venous Regional Anaesthesia, Lignocaine, Post-operative analgesia.

***Correspondence to:**

Dr. Atul Kaushik,
Assistant professor, Department of Anesthesiology,
School of Medical Sciences and Research,
Sharda University, Greater Noida, Uttar Pradesh, India.

Article History:

Received: 24-08-2016, **Revised:** 16-09-2016, **Accepted:** 29-09-2016

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2016.2.5.052	

INTRODUCTION

Intra venous Regional Anaesthesia[1-3] is one of the best procedures, providing better intra operative hemodynamic control, post-operative pain relief and rapid recovery from surgery specially upper and lower surgeries and orthopedic surgeries. An ideal regional analgesia technique must be easy to administer, effective and most important free of complication. Intravenous regional Analgesia (I.V.R.A) is one of those as quickly and easily administered with the requirement expertise to obtain consistently good results practical utility came when Bier[4,5] (1908) published his account of venous anesthesia for limb surgery. The purpose of the study was to evaluate the efficacy and superiority combination of Lignocaine & Bupivacaine over the any of the drug if used alone

also investigate prolong relief and reduce the requirement of rescue analgesia in upper[6] and lower limb[7] orthopedic surgeries with least side effects. Intravenous regional Analgesia (I.V.R.A) is simple, effective, economic and safe method of pain relief during limb surgery. Moreover most of the patients requiring emergency surgical intervention with poor risks, morbid and co-morbid uncontrolled systemic issues are not suitable for general anesthesia are the appropriate candidate for this technique. Each patient was premeditated with Fentanyl (1 mcg/kg body weight). I.V.Phenargan (0.5 mg / kg body weight) I.V.Midazolam (1 mg) I.V was given slowly intravenously 15 minutes earlier to surgery.

MATERIAL AND METHODS

In our randomized control trial study, total 60 ASA class I and II patients of age between 15 to 65 years undergoing lower and upper limb orthopedic and other general surgeries were performed. Patients received 0.5% lignocaine 20 ml to 40 ml alone in upper limb surgeries and 40-60ml in lower limb surgeries in group A and groups B received 20 ml to 40 ml alone in upper limb surgeries and 40-60ml in lower limb surgeries of 0.5% of bupvacaine and group C received combination of lignocaine[8,9] and Bupivacaine[10] 0.5% of same volume respectively. Sample size was based on inclusion and exclusion criteria. Ethical approval was taken from Hospital Ethical Committee. Patients of ASA Grade I or II, aged 15-65 years, weighing 40- 70 Kg were included in the study. Patients with hematological diseases, abnormal bleeding and clotting time, psychiatric disease, diabetes, sepsis at the site of injection, spinal deformities, non-consenting patients and patient with allergy to local anaesthetic agent were excluded from the study. After detailed examination and informed consent, patients were randomly assigned in three groups of 20 patients each. All the patients were monitored for onset of sensory and motor blockade, intra operative hemodynamic, post-operative analgesia, adverse effect and complications.

In the operation theatre, a good intravenous access was secured and monitoring devices were attached. Base line heart rate, electrocardiogram (ECG), pulse oximetry (SpO2), non-invasive blood pressure (NIBP), respiratory rate recorded. The drug syringes were prepared with all aseptic technique. After antiseptic preparation of administrative site and sterile draping the selected space for Venepuncture was done by an intracath (number 22 FG) at the most peripheral part of the limb to be operated upon in lying position, Intracath was then firmly secured in situ. It was flushed with normal saline to avoid blood clotting in the lumen of the device. Exsanguination of limb was performed by gravity and Es'march bandage application or orthopedic pneumatic splint alternatively. Then the limb was brought down after placing to Sphygmomanometer cuffs on proximal to other on the limb and upper one was inflated above the 50 mm Hg column of systolic blood pressure. Calculated amount of drug as per group was injected. In case of prolonged procedure repeat injections of the drug were given as and when required. The times of inflammation of Sphygmomanometer cuffs and initiation of drug were noted to know the duration of surgery and repeat doses if given. Vitals were recorded every 5 to 10 minutes interval. Surgery was allowed only when the desired effect had been achieved as assessed by the following schedule regarding the degree of analgesic and Procedure was conducted by same anesthesiologist every time.

After injection of drug/s (as per the group assigned), patient was made to lie down supine and each patient was observed for:

A. Time of onset for sensory block
B. Time of onset of motor block
C. Extent for sensory block achieved (by pin prick method)
D. Extent for of motor block
E. Duration of sensory block
F. Duration of motor block
G .Intraoperatively muscle relaxation (on Bromage scale)
G. Degree of sedation on Ramsay sedation scale
H. Duration of pain free period
I. Any adverse drug effect and
J. Any complication like bradycardia, hypotension, respiratory depression and sedation.

Postoperatively patient was monitored for offset time of motor and sensory regression and post-operative rescue dose of analgesia.

The study of Intravenous Regional Analgesia (I.V.R.A) cases were divided into three groups:

Group A: Lignocaine (0.5 %), drug doses 3 mg / kg body weight

Group B: Bupivacaince (0.5%), drug doses 1.5 mg / kg body weight

Group C: Combination of Lignocaine & Bupivacaince drug doses in equal volumes.

Following investigation performed followed by thorough clinical examination along with P.A.C. Hb, TLC, DLC, urine R/M, S. Bilrubin, BUN, Creatinine, Coagulation profile.

Patients were explained about the procedure and complications. Preoperative fasting if possible was advised at least for six hours before surgery. Sensitivity of drug was performed intradermally on the forearm and patient was premedicated.

Fentanyl (1 mcg/kg body weight), Phenargan (0.5 mg / kg body weight), Midazolam (1 mg) I.V. given slowly intravenously 15 minutes prior to surgery.

Complete: No sensation was felt at all. (Loss of sensory, pain (pinprick) touch or discomfort from the operative procedure and these was no tourniquet pain felt by the patient.

Partial: Complete loss of touch and pain sensation. The sensory response to the maximum pressure was retained which if applied to the finger of the toes nail was interpreted as burning and there was slight or no tourniquet pain.

Inadequate: When patient experienced pain or discomfort from the operative procedure and tourniquet pain.

Nil: When no sensory or motor block i.e., failure or analgesia and surgical procedure was not possible under this technique and general anesthesia had to be given.

Statistical Analysis

Descriptive statistics were used and mean and percentage were calculated. Paired t test applied using SPSS software for analysis between four groups. P value less than 0.5 percent was considered statistically significant.

RESULTS

Demographic data of patient included in the study was comparable with respect age and sex of patient in each group (Table-1). The time for onset of sensory and motor block was early in group C and no statistical significant difference noted ($p > 0.05$) (Table-2).

Post-operative analgesia increased significantly in group B and C group when compared with A group ($p<0.005$). Side effect like

hypotension, bradycardia and shivering was seen in Group A only (Table-12). All patients in control group and study group were co-operative, oriented, calm and responsive to commands and mostly remained sleepy during entire surgery .

In majority of the patient degree of muscle relaxation in study group was acceptable and provide smooth intra operative period. Incidence of increase in heart rate (5 %) was seen in group A only (Table-12). Incidence of decrease in blood pressure was seen in group A that is 5% table 12 but were not statistically significant (Table-12).

Table 1: Age Distributions

Age in Years	Group A	Group B	Group C
20-30	13	13	13
31-40	3	3	3
41-50	2	2	2
51-60	1	1	1
61-70	1	1	1
Total	20	20	20

Table 2: Sex Distributions

Sex	Group A	Group B	Group C
Male	15	15	15
Female	5	5	5
Total	20	20	20

Table 3: Onset of Sensory Block (Minutes)

Group	Mean (minutes)	S.D (minutes)
Group A	5.737	+/- 1.045
Group B	9.63	+/- 1.606
Group C	4.40	+/- 0.940

Table 4: Onset of Motor Block (Minutes)

Group	Mean (minutes)	S.D (minutes)
Group A	9.50	+/- 1.618
Group B	20.0	+/- 2.52
Group C	7.78	+/- 0.787

Table 5: Extent of sensory Block (Minutes)

	No. of cases			
Group	**Complete**	**Partial**	**Inadequate**	**Nil**
Group A	12	6	1	1
Group B	8	10	1	1
Group C	11	8	1	0

Table 6: Extent of Motor Block (Minutes)

	No. of cases			
Group	**Complete**	**Partial**	**Inadequate**	**Nil**
Group A	8	6	1	1
Group B	2	10	1	1
Group C	7	8	1	0

Table 7: Duration of surgery (Minutes)

Group	Upper limb (S.D)	Lower limb (S.D)
Group A	+/- 7.524	+/- 10.12
Group B	+/- 8.124	+/- 7.34
Group C	+/- 8.139	+/- 7.86

Table 8: Comparative evaluation of Respiratory rate of three groups.

Group	Mean (minutes)	S.D (minutes)
Group A	7.89	+/- 1.286
Group B	11.80	+/- 1.745
Group C	15.9	+/- 1.832

Table 9: Comparative evaluation of Pulse Rate of three groups.

Group	Preoperative	Preoperative	Postoperative
Group A	81.3 +/- 6.34	81.4 +/- 6.59	81.25 +/- 6.38
Group B	81.1 +/- 6.16	81.3 +/- 6.0	81.2 +/- 6.13
Group C	77.55 +/- 12.15	78.4 +/- 6.05	78.35 +/- 6.17
P value	>.05	>.05	>.05

Table 10: Comparative evaluation of Blood Pressure of three groups.

Groups		Preoperative	Preoperative	Postoperative
Group A	Systolic	125.78 +/- 7.292	125.8 +/- 6.56	125.7 +/- 6.97
	Diastolic	79.3 +/- 5.038	79.4 +/- 4.95	79.1 +/- 5.17
Group B	Systolic	123.6 +/- 8.84	123.8 +/- 8.26	123.7 +/- 8.007
	Diastolic	76.6 +/- 6.3	76.3 +/- 5.96	76.9 +/- 6.138
Group C	Systolic	125.7 +/- 8.6	125.7 +/- 8.39	125.5 +/- 8.5
	Diastolic	78.5 +/- 5.907	78.6 +/- 5.58	78.7 +/- 6.087
P value	Systolic	>.05	>.05	>.05
	Diastolic	>.05	>.05	>.05

Table 11: Duration of Postoperative Analgesia

Group	Mean (minutes)	S.D (minutes)
Group A	7.89	+/- 1.286
Group B	11.80	+/- 1.745
Group C	15.9	+/- 1.832

Table 12: Complication observed

	Group A	Group B	Group C
Rigor	-	1	-
Nausea	1	-	-
Vomiting	1	-	-
Convulsion	1	-	-
Hypotension	1	-	-
Tachycardia	1	-	-
Bradycardia	-	-	-
Nerve Palsy	-	-	-

DISCUSSION

In our study of intravenous regional analgesia. The observations were analyzed after administration of drug Lignocaine (Group A) Bupivacaince (Group B) and mixture of Lignocaine and Bupivacaince in equal volumes (Group C). Each group was containing 20 cases belonging the age group of 20 -65 years of both sexes undergoing upper and lower limb surgery. The study revealed following facts.

The onset of analgesia was 5.737 (+/-) 1.045 minutes with the drug Lignocaine, 9.63 (+/-) 1.606 minutes with the drug Bupivacaince and it was very interesting to observe and note that analgesia was started in 4.4 (+/-) 0.94 minutes with the mixture of Lignocaine and Bupivacaince.

In our study, the extent of sensory block[11] in Lignocaine group (A) was complete in 12 (60%), partial effect in 6 patients (30%), inadequate in 1 (5%) and Nil effect in 1 (5%) this group. In group B effect was complete in 8 (40%), partial effect in 10 patients (50%), inadequate in 1 (5%) and Nil in 1 patient that is 5% in this group. In group C complete effect in 11 (55%), partial effect in 08 patients (40%), inadequate in 1 (5%).

Extent of motor block[12] in group A was complete in 8 (40%), partial effect in 9 patients (45%), inadequate in 1 (5%) and Nil in 2 patient that is 10% in this group. In group B effect was complete in 2 (10%), partial effect in 16 patients (80%), inadequate in 0 (0%) and Nil in 2 patient that is 10% in this group. In group C complete effect in 7 (35%), partial effect in 12 patients (60%), inadequate in 0 (0%) and 1 patient that is 5%.

Postoperative analgesia[13,14] is the time required for recovery of sensation postoperatively after the release of torniquete. In this study group A had 7.89+/-1.29, group B had 11.8+/-1.74 and group C 15.9+/-1.83 minutes (mean +/- S.D).

Complication reported in group A were nausea, vomiting, convulsion which was generalized tonic clonic in nature which was managed symptomatically and low dose of Benzodiazepine that is Inj Midazolam 2 mg and 250 mg of inj Thiopantane sodiuim with suxamethonium 100 mg and intubated with endotrachaeal tube which was ventilated with 100% oxygen,after a period of 30 minutes patient become fully conscious with spontaneous respiration and which was extubated successfully. Hypotension of 74/56 mmHg with tachycardia which was managed by fluid resuscitation and minimal dose of vasopressor inj.epinephrine 3mg and tachycardia in 5 patients after the release of tourniquet. In group B one patient developed Rigor Intraoperatively which was managed by maintain hyperthermia by applying heater and injection Tramadol 50 mg iv bolous. In group C no patient had serious side effects.

CONCLUSION

On the basis of this study, IVRA conducted on 60 cases for various and elective and emergency surgical procedures of limb surgery. We conducted that the onset, duration and extend of analgesia were more with group C in comparison to each group individually with no complication in group C. More complication was observed in Lignocaine group if compared with Bupivacaince group. Therefore to binder the conclusion group C is quite superior in comparison to other group, as it has got quicker onset, prolonged analgesia with less toxicity and safe. I.V.R.A is valuable adjunct to anesthesia and analgesia with the advantages in terms of greater simplicity of administration, elimination of various risks if compared with other extremity blocks and relatively free side effects and reactions.

REFERENCES

1. Adams J.P., Dealy T. J. and Kanmore P. I.; Intravenous regional anaesthesia in hand surgery. 46 A; 811, 1964.
2. Atkinson D.I., Modell J. and Mayer F. Intravenous regional anaesthesia, Anaesth. and analgesia. Corrent researches 49; 313-317, 1965.
3. Adams R.C., Intravenous anaesthesia; page 11, London, 1944.
4. Bier A (1908) Uber einess neven weg der Lakalanas- thesis as den Gliedm assen Zu erzeugen. A rehiv. Fur . Kllnische , chieurgie 86 ; 1007-1016 (Translated and reprinted in classical file surv. Anaesthesiology , 1967 ,11 , 230).
5. Bier A. Versuche uber cocaininisirung des Ruckenmar Kes Dtsch A chir 51: 361 p, 1899.
6. Adams J.P., Dealy T. J. and Kanmore P. I.; Intravenous regional anaesthesia in hand surgery. 46 A; 811, 1964.
7. Adams J., Albert S.; The blood volume in the lower extremities; a technique for its determination Cr tagged red cell. J Bone, Joint, 44 A, 489 1962.
8. Bell H. M, Slater E. M. and Harries. Regional anaesthesia with intravenous Lignocaine JAMA 186; 544 ,1963.
9. Cox J.M.R., Intravenous regional anaesthesia canad. Anaesth. Soe. J.11: 503 (sept.) , 1964
10. Ware R.J., Caldwell J.; Clinical & pharmacological studies of I.V.R.A. using Bupivacaine, Brit . J. Anaesth 48 ; 1124, 1976.
11. Carrel E.D. & Eyring E. J. Intravenous regional anaesthesia for childhood fractures, S. J. Traema, 11; 301, 1971.
12. Bromage P. R. and Robson J.G: concentrations of lignocaine in the blood after intravenous, intramuscular, epidural and endotracheal administration . Anaesthesia; 16; 451,1961.
13. Crile G. W, Anaesthesia of nerve roots cocaine. Cleveland Med. J. 2: 355, 1897.
14. Allens F.M, Crossman L.W. and Lyous L.V., Intravenous Procaine analgesia . Anaesth. & analog. Cur. Res . 25; 1, 1946.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Atul Kaushik, Praveen Kumar. Comparative study of Intra venous Regional Anaesthesia by using Lignocaine (0.5%), Bupivacaince (0.5%) and combination of Lignocaine (0.5%) and Bupivacaince (0.5%) in upper limb and lower limb surgeries with effect on postoperative analgesia and hemodynamics. Int J Med Res Prof. 2016; 2(5):241-45.