International Journal of Current Research and Academic Review
ISSN: 2347-3215 Volume 3 Number 2 (February-2015) pp. 303-310
www.ijcrar.com

Original Research Article **Category: Medical Sciences**

Intravenous Regional Anaesthesia (IVRA) With 0.5% Lignocaine: Effect of Delayed Administration of Clonidine To IVRA For Upper Limb Surgeries

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KEYWORDS

IVRA,
Clonidine,
Blood Pressure

A B S T R A C T

Additives have been used with lignocaine for improving analgesia and reducing tourniquet pain after IVRA. Inconsistent results have been obtained with clonidine added to lignocaine bolus. Hence, effects of injecting clonidine separately towards the end of surgery was assessed for the same study parameters. Eighty patients undergoing below elbow surgeries were randomly allotted to two groups to receive IVRA; group I received 40 ml lignocaine 0.5% at the beginning of procedure with normal saline 15 ml at end; group II received same amount of lignocaine and clonidine 150 µg made upto 15 ml with normal saline at the end. Durationand quality of postoperative analgesia and tourniquet pain, haemodynamic parameters and adverse effects if any were noted. Almost all the patients in the group I required analgesic as compared to group II where less than 50% of patients needed analgesic by 15 mins. Duration of analgesia extended only upto a further 5 mins period in the group II. There was a small& statistically insignificant difference in VAS scores at 11-15 min & 16-20 mins intervals between the groups. All the patients expressed feeling of discomfort after tourniquet release. There was no difference with respect to haemodynamic parameters, O_2 saturation or other effects during the study period between the groups. Addition of clonidine to lignocaine 0.5% at end of surgery under IVRA did not significantly improve duration and quality of post operative analgesia or tourniquet pain.

Introduction

For all the happiness mankind can gain is not in pleasure but in rest from pain. (John Dryden 1631-1701).Relief of pain during surgery is one of the greatest objectives of anaesthesia. Intravenous regional anaesthesia (IVRA) is one of the useful and popular regional techniques in anaesthesia armamentarium.

A veteran among regional analgesia techniques, IVRA was first described in 1908 bythe then professor of surgery Karl August Bier in Berlin. It then fell into relative obscurity before being revived by Holmes in 1963. IVRA is almost 100 years oldyet, the technique remains as a useful tool in modern anaesthesia[1]. IVRA is safe, technically simple, and cost effective compared to general anaesthesia[2] with success rates of 94 to 98% for upper and lower limb surgeries.[3]It also provides bloodless field during surgery. Its limitations are systemic toxicity, tourniquet pain and inability to provide postoperative analgesia. To overcome these disadvantages many modalities have been tried with varying degrees of efficacy like alteration in percentage of local anaesthetics,[4] different local anaesthetics were tried like Ropivacaine[5] in low doses, modification of technique[6] and addition of many adjuvants[7] like opioids, sodium bicarbonate, Acetyl NSAID'S, Muscle relaxants, Ketorolac,[8] Ketamine[9], Clonidine[10] and Dexmedetomidine.[11]

Methodology

Source of Data

Study was undertaken in the Dept of Anaesthesiology and Critical Care at VIMS, Bellary in 80 patients posted for upper limb surgeries.

Study Subjects

Patients admitted to Dept of Orthopedics, General surgery and Plastic surgery posted for upper limb procedures fulfilling the following inclusion criteria;

Inclusion Criteria

Procedures lasting less than 90 minutes
ASA class I to II physical status
Age between 18 to 55 years, of either sex.

Exclusion Criteria

ASA class III to IV physical status.
Patients with contraindications to tourniquet application like sickle cell anemia, cellulitis, sepsis in the extremity to be used, etc.
Patients hypersensitive to lignocaine.
Patient not willing for IVRA.
Patient already on analgesics (opioids, NSAIDS).
Patients with significant respiratory and cardiovascular disorders and vascular insufficiency.

Method of Collection of Data

In this prospective, randomized, double blind study all patients were subjected to undergo thorough preoperative checkup. Informed and written consent was taken before the procedure. Patients were kept nil per mouth as per standard guidelines. In the operating room, patients were monitored for mean arterial blood pressure (MAP), oxygen saturation (Spo2)and heart rate (HR). Two 20 G cannulae were placed: one was in a vein on the dorsum of the operative hand and the other in the opposite hand for crystalloid infusion. Inj fentanyl 50 μg IV was given. The operative arm was elevated for 2 min and was then exsanguinated with an Esmarch bandage22. A pneumatic double tourniquet was then placed around the upper arm, and the proximal cuff was inflated to 150 mm Hg above the systolic blood pressure of the patient. Circulatory isolation of the arm was verified by inspection, absence of a radial pulse, and a loss of the pulse oximetry tracing in the ipsilateral index finger and the following procedure was followed:

In Group I: 0.5% lignocaine 40ml was administered at the start of IVRA and

15mlnormal saline 10min before expected end of procedure on the same side as IVRA.

In Group II: 0.5% lignocaine 40ml was administered at the start of IVRA and 150µg of clonidine made up to 15ml with normal saline 10min before expected end of procedure. IVRA solutions were injected over 90 sec. After complete sensory and motor blocks were achieved, the distal tourniquet was inflated to 250 mm Hg and the proximal tourniquet was released.

Results and Discussion

Eighty ASA physical status I-II patients in the age group of 18 to 55 years scheduled for upper limb procedures lasting less than 90 minutes, were randomized into

Group I: 0.5% Llignocaine 40ml administered at the start of IVRA and 15ml normal saline10 min before expected end of procedure.

Group II: 0.5% Lignocaine 40ml is administered at the start of IVRA and 150µgofclonidine made up to 15ml with normal saline 10min before expected end of procedure.

Three patients in each group were excluded from the study as they had pain at the surgical site in the intraoperative period.

The mean age of the patients in this study in Group I was 36.05 ± 10.4 years and in Group II was 34.9 ± 8.6 years. The Mean BMI(kg/m2) in Group I was 23.6±1.9 and in Group II it was 23.5±1.9. Most of the patients, 27(73%) in Group I were males while the rest 10(27%) were females and In Group II 26(70.3%) were males and 11(29.7%) were females. The mean duration of surgery in Group I was 48.13±17.8 minutes and in Group II it was 48.5±19.0 minutes. There was no difference with respect to Systolic BP in Postoperative period. However during the time interval of 6-8 hr, the SBP was less in Group II compared to Group I. It was high in both groups during the time interval of10-30 min. There was no difference with respect to Diastolic BP in Post operative period. However during the time interval of 4-8hr, the DBP was less in Group II compared to Group I. It was high in both groups during the time interval of10-30 min

There was no difference with respect to in MAP in Postoperative period. However during the time interval of 6-8hr, the MAP was less in Group II compared to Group I. It was high in both groups during the time interval of10-30 min

In our study, almost all the patients in the Group I (34/37) required analgesics within 15 minutes as compared to Group II where less than 50% of patients needed analgesics. However, the duration of analgesia extended only up to a further 5 minutes period in group II. The VAS scores in Group II at 11-15 minutes time interval was4.2±0.66 and at 16-20minutes time interval it was 4.4±0.65 and it was less compared to Group I where the VAS scores were 4.46±0.64 at 11-15 minutes time interval and4.49±0.64 at 16-20 minutes time interval but it was statistically not significant, which is comparable with that of Marc Gentili et al[10] where clonidine was administered with local anaesthetic at the beginning of IVRA reported a duration of post operative analgesia was not statistically significant between the two groups (for Lignocainealone it was 6±2 min and for Lignocaine with clonidine it was 12±12 min).In another study by Samkaoui MA et al[12], where clonidine was administered with local anaesthetic at the beginning of IVRA, the time to first analgesic request after deflation of

tourniquet was similar in two groups(for Lignocaine alone it was at38±15 min and for Lignocaine with clonidine it was at 44±19 min) ,however their VAS scores were 5.2 in Lignocaine alone group and 6.8 , in Lignocaine with clonidine group at those time intervals which explains the delay in first analgesic request in their study .

The lack of adequate duration of post operative analgesia when clonidine was administered with local anaesthetic at the beginning of IVRA is possibly because of the rapid washout of the local anaesthetic and clonidine once the tourniquet isreleased[10] and possibly some mass of both the drugs attached to neural tissues in the IVRA extremity causing less mass to be available for systemic effects. Taking this factor into consideration, the administration of clonidine was delayed to till [10]minutes before closure of wound so that the drug is available for action within the IVRA extremity and then in the system in sufficient concentrations. This obviously did not occur in the present study as there was no associated significant prolongation of analgesia. The actual serum concentrations of the clonidine and local anaesthetic if assessed after tourniquet release would be helpful in confirming this hypothesis

The tourniquet pain in our patients in both the groups was insignificant, however the VAS scores for Group II (1.67±0.92) was less than Group I (1.88±0.61) which were comparable with previous studies by Gentili et al[10] and Lurie et al[13]who suggested that clonidine improved tourniquet pain tolerance

Table.1 Time for first analgesic administration

	Group I		Group II		
Time interval for Analgesic administration	Frequency	Mean ± SD	Frequency	Mean ± SD	P value
< 5 min	0	0	0	0	
5 - 10 min	2	4.48 ± 0.64	0	0	
11 - 15 min	34	4.46 ± 0.64	17	4.2 ± 0.66	0.182
16 - 20 min	1	4.49 ± 0.64	20	4.4 ± 0.65	0.552
> 20 min		0	0	0	

Almost all the patients in the Group I required analgesic within 15 minutes, as compared to Group II where < 50% of patients needed analgesia (Fisher Exact Test–p value 0.00001). Duration of analgesia extended up to a further 5 min period in Group II. There was a small and statistically insignificant difference in VAS scores at 11-15 min and 16-20 min among the groups

Table.2 Tourniquet Pain intra operatively and post operatively

Tourniquet Pain(VAS)			
	Group I	**Group II**	**P value**
	n (%)	n (%)	
Intra-operative			
No Pain (0)	0 (0%)	0 (0%)	
Mild Pain (1 - 3)	37 (100%)	37 (100%)	
Moderate Pain (4 - 6)	0 (0%)	0 (0%)	
Severe Pain (7 - 10)	0 (0%)	0 (0%)	
Mean ± SD	1.88 ± 0.61	1.67 ± 0.92	0.01189
Post-operative			
No Pain (0)	0 (0%)	0 (0%)	
Mild Pain (1 - 3)	37 (100%)	37 (100%)	
Moderate Pain (4 - 6)	0 (0%)	0 (0%)	
Severe Pain (7 - 10)	0 (0%)	0 (0%)	
Mean ± SD	1.83 ± 0.59	1.38 ± 0.49	0.00038

None of the patients in both groups complained of significant tourniquet painintraoperatively but all of them (37 each) expressed feeling of discomfort attourniquet site both intraoperatively and after torniquet release. The VAS scores fortourniquet pain were significantly less in GroupII compared to Group I in thepostoperative period

Table.3 Sensory and motor blockade

Characteristics of Sensory and Motor blockade				
		Group I	Group II	P value
		Mean ± SD	Mean ± SD	
Duration of Surgery		48.13 ± 17.89	48.50±19.09	
Sensory				
	Onset time for Sensory block	9.58 ±1.53	10.25±1.19	0.03
	Sensory block recovery	13.53±1.96	15.63±1.63	0.000
Motor				
	Onset time for Motor block	14.65±1.79	15.03±1.31	0.30
	Motor block recovery	9.35±1.59	11.45±1.54	0.000

The recovery of both sensory (15.63±1.63 min) and motor block(11.45±1.54 min)was delayed in Group II compared to recovery of sensory (13.53±1.96 min) andmotor (9.35±1.59 min) block of Group I respectively and this difference was foundto be statistically significant

Table.no4: Adverse effects

Interval	Group I (%)	Group II(%)
Intra-operative		
Yes	0 (0%)	0 (0%)
No	37 (100%)	37 (100%)
Post-operative		
Yes	0 (0%)	0 (0%)
No	37 (100%)	37 (100%)

There was no significant adverse effect in either of the groups both intra operativelyand post operatively

Figure.1 Intra operative changes

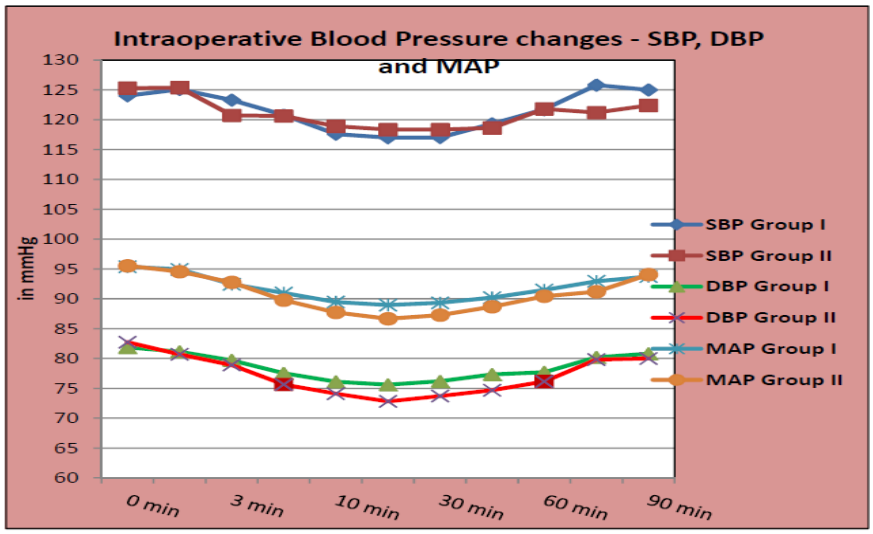
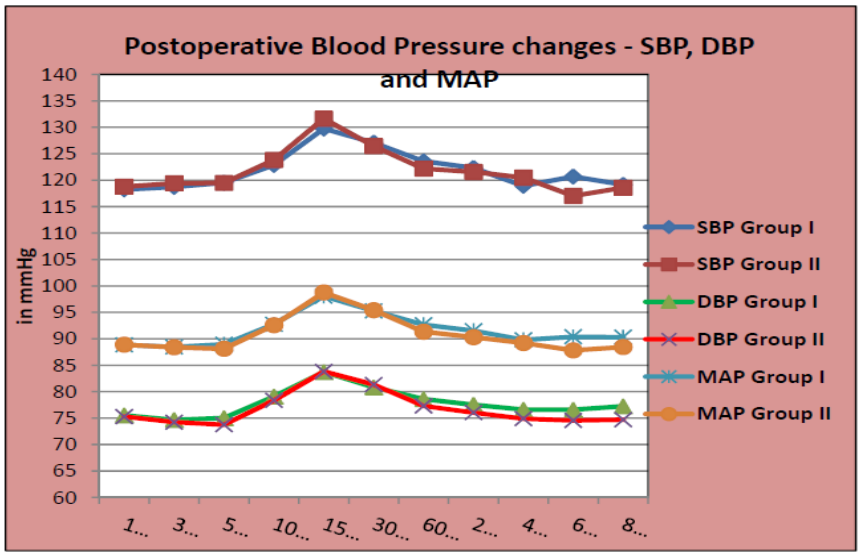


Figure.2 Post operative changes



In Group I, in our study, the mean onset time for sensory block was 9.58±1.53 min and mean onset time for motor block was 14.65±1.79min.The sensory block recovery time was 13.53±1.96min and motor block recovery time was9.35±1.59min.This was comparable with a study by Santosh MCB et al[14] in which has administered 0.5% Lignocaine alone for IVRA, where mean onset time for sensory block was 7.12±0.75 min and mean onset time for motor block was11.93±0.87min,the sensory block recovery time was 10.57±0.81 and motor block recovery time was 7.64±0.83min.

However in a study by Huseyinsen et al[15], with 0.5%Lignocaine alone for IVRA the onset time for sensory block was 7±3 min and onset time for motor block was 12±4 min 37 which were comparable with our study, but the sensory block recovery time was faster (5±3 min) and motor block recovery time was faster (6±2 min), compared to Group I in our study

In Group II in our study, the mean onset time for sensory block was 10.25±1.19 min and mean onset time for motor block was 15.03±1.31min.The sensory block recovery time was 15.63±1.63min and motor block recovery time was11.45±1.54min.

The sensory and motor blockade was delayed in Group II compared to Group I in our study. The onset times for sensory and motor blocks were not assessed in other similar studies.

Conclusion

After evaluation of the effects, it can be concluded that, addition of clonidine did not significantly improve the duration, and quality of post-operative analgesia, when added to lignocaine 0.5% during IVRA. There was also no difference in tourniquet pain score at the end of surgery and in the immediate post operative period in both the groups. No significant changes in MAP, HR, and O2 saturation and sedation scores between the groups were observed.

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