Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 6, 2024

INTRAVENOUS LIDOCAINE AND NALBUPHINE IN PAIN MANAGEMENT FOR UPPER EXTREMITY FRACTURE- A CLINICAL TRIAL

Dr. ADUSUMILLI BHAVANA SRI, Dr. Belli Yashaswi, Dr. Abhijith Kanti Dam, Dr. Birendra Kumar, Dr. Dharun Jims D A, Dr. Harihar Jadhav ,

MBBS, DNB ANESTHESIA, DEPATMENT OF ANESTHESIA, BOKARO GENERAL HOSPITAL,Bokaro Steel City, Jharkhand

MBBS, DNB ANESTHESIA, DEPATMENT OF ANESTHESIA, BOKARO GENERAL HOSPITAL, Bokaro Steel City, Jharkhand

MBBS (Hons.), MD ANESTHESIA (AIIMS), FCCP, M.Sc. Pall. Med (UK) ,Anesthesiologist, Intensivist and Pain Medicine ,HOD Department of Anaesthesia and Pain medicine
Bokaro General Hospital, Bokaro Steel City, Jharkhand

MBBS, MS ORTHOPAEDICS, Senior Consultant Department of Orthopedics,
Bokaro General Hospital, Bokaro Steel city, Jharkhand

MBBS, DNB ANAESTHESIA, DEPARTMENT OF ANESTHESIA, BOKARO GENERAL HOSPITAL,Bokaro Steel City, Jharkhand

MBBS, DNB ANAESTHESIA, DEPARTMENT OF ANAESTHESIA, BOKARO GENERAL HOSPITAL,Bokaro Steel City, Jharkhand

Received Date: 29-05-2024 **Accepted Date: 04-06-2024** **Published Date: 01-07-2024**

Abstract

Background- Lidocaine is a relatively safe drug in the amide group, which acts as an analgesic, anti-hyperalgesia and anti-inflammatory agent in low doses and is affective in relieving neuralgia, burn and procedural pains. Nalbuphine is a newer opioid drug with antagonism at μ receptors and agonism at κ receptors, with no significant effects on delta receptors. Nalbuphine elicits analgesia through a complex interaction of supraspinal κ3 and spinal κ1 mechanisms. Considering the limited number of studies on the effect of IV lidocaine in pain management, especially in emergency department (ED) and the existing contradictions regarding its effectiveness, the present study was designed with the aim of to evaluate analgesic benefit if any in patients of upper extremity fractures-distal end of radius fractures administered with intravenous lidocaine and intravenous nalbuphine and to compare their efficacy with respect to Increase in duration of analgesia, Reduction in total requirement of analgesics and to compare side effects (if any) of the two drugs in study.

Aims- The aim of this study is to evaluate analgesic benefit if any in patients of upper extremity fractures administered with intravenous lidocaine and intravenous nalbuphine and to compare their efficacy

Materials and methods- The study was carried out in the Department of Anaesthesiology, Bokaro General Hospital, Bokaro Steel City, Jharkhand from September 2019-March 2021. Patients coming to emergency with upper extremity fractures-Distal end of radius fractures at Bokaro Genera Hospital, Bokaro Steel City, Jharkhand was selected.

Results- Both the drugs provided good pain relief which was significant from 10min of administration of the drugs with VAS score <5 at 25 and 30 min. However, the VAS score in Lidocaine group was significantly lesser at both 25 and 30 min when compared to Nalbuphine. There were no medication side effects seen in patients receiving IV Lidocaine but mild sedation and nausea were observed in patients receiving IV Nalbuphine. Group A Lidocaine group required less rescue analgesia than Group B Nalbuphine group, although which was statistically non- significant. No statistical significant changes in hemodynamic variables were seen in both groups after administration of test drugs.

Conclusion- Both the drugs provided good pain relief which was significant from 10min of administration of the drugs with VAS score <5 at 25 and 30 min. However, the VAS score in Lidocaine group was significantly lesser at both 25 and 30 min when compared to Nalbuphine. There were no medication side effects seen in patients receiving IV Lidocaine but mild sedation and nausea were observed in patients receiving IV Nalbuphine. Our study confirmed that both the drugs are hemodynamically stable and safe.

Keywords- lidocaine, nalbuphine, neuropathic pain.

Introduction-

Following bone fracture, mechanical injury to sensory or sympathetic nerve fibres that innervate the bone may occur generating a neuropathic pain state[1,2] . It is also clear is that following bone fracture, the brain will also undergo sensitization (i.e., “central sensitization”) that amplifies the perception and severity of pain[3,4]. Central sensitization is thought to occur when the chemical, electrophysiological, and pharmacological systems that transmit and modulate pain are altered in the spinal cord and brain so that normal use and movement of the bone is now perceived as a noxious event[5].

Lidocaine is a relatively safe drug in the amide group, which acts as an analgesic, anti-hyperalgesia and anti-inflammatory agent in low doses and is affective in relieving neuralgia, burn and procedural pains[6]. This drug induces its analgesic effects via stimulating secretion of anti-inflammatory cytokines (interleukin- 1) receptor antagonist and blocking central and peripheral voltage-dependent sodium channels[7]. In cases that opioids lack efficient effectiveness, IV injection of lidocaine has been used as a proper replacement[6,8,9].

Although many studies have indicated the role of IV lidocaine in pain relief after trauma or surgery and decrease in the need for other opioids, there are also studies that do not agree[10]. For example, in one study continuous infusion of low doses of lidocaine, had not reduced use of other analgesics[11]. In addition, for induction of analgesia after tonsillectomy surgery, infusion of IV lidocaine did not play an effective role in reducing pain after surgery[12].

Nalbuphine is a newer opioid drug with antagonism at μ receptors and agonism at κ receptors, with no significant effects on delta receptors. Nalbuphine elicits analgesia through a complex interaction of supraspinal κ3 and spinal κ1 mechanisms[13]. It has been shown to effectively antagonize the respiratory depressant activity of narcotic analgesics while concomitantly adding to their analgesic responses. Nalbuphine is a powerful analgesic almost equipotent with that of Morphine and 3-4 times as potent as Pentazocine. Oral Nalbuphine is 1/4th– 1/5th as potent as IM Nalbuphine in terms of intensity and duration of action and 1/10th as potent in terms of peak effects. The usual parenteral dose is 10-20mg by SC, IM, or IV injection. The onset of action is 2-3 min after IV injection and 15 min after IM or SC route. The duration of action is 3-6hr. At usual therapeutic doses it has a respiratory depressant action equivalent to that of Morphine. But ceiling effect to both respiratory depressant and the analgesic action starts at single doses of 20-30mg. The respiratory depression may be reversed by Naloxone. Other Nalbuphine produces limited respiratory depression in animals and in man. Significant cardiovascular effects have not been found with Nalbuphine. Nalbuphine was found to produce significantly less inhibition of gastrointestinal activity than any of the clinically useful narcotic or agonist/antagonist analgesics tested in animals.

Therefore, considering the limited number of studies on the effect of IV lidocaine in pain management, especially in emergency department (ED) and the existing contradictions regarding its effectiveness, the present study was designed with the aim of to evaluate analgesic benefit if any in patients of upper extremity fractures-distal end of radius fractures administered with intravenous lidocaine and intravenous nalbuphine and to compare their efficacy with respect to Increase in duration of analgesia, Reduction in total requirement of analgesics and to compare side effects (if any) of the two drugs in study.

Aims- The aim of this study is to evaluate analgesic benefit if any in patients of upper extremity fractures administered with intravenous lidocaine and intravenous nalbuphine and to compare their efficacy

- Increase in duration of analgesia.
- Reduction in total requirement of analgesics.
- To compare side effects (if any) of the two drugs in study.

Material and methods-

Study location:

The study was carried out in the Department of Anaesthesiology, Bokaro General Hospital, Bokaro Steel City, Jharkhand.

Study population:

Patients coming to emergency with upper extremity fractures-Distal end of radius fractures at Bokaro Genera Hospital, Bokaro Steel City, Jharkhand was selected.

Sample Size:

In a study with research hypothesis viz. Null

hypothesis $H_0 : m_1 = m_2$ vs.

Alternative hypothesis $H_a : m_1 = m_2 + d$

Where d is the difference between two means and n1 and n2 are the sample size for group

– I and group – II

Such that, N = n1 + n2

The ration, r = n1 / n2 is considered, whenever the researcher needs unequal sample size due to various reason such as ethical, cost, availability, etc.

Then the total sample size for the study was as follows Where

Zα is the normal deviate at a level of significance (Zα is 1.96 for 5% level of significance)

Z1 – β is the normal deviate at (1- β)% power with β% of type II error (0.84 at 80% power of study)

r = n1 / n2 is the ratio of sample size required for 2 groups

δ is standard deviation ,d is difference of means of 2 groups.

The total sample size for the study with r = 1 (equal sample size) The

values were obtained from previous study.

Taking the α at 5% and desired power of study as 80%

Generally the sample size for any study depends on the following

i) Acceptable level of significance.

ii) Power of the study.

iii) Expected effect of size.

iv) Underlying event rate in the population.

v) Standard deviation in the population.

We had accepted a $p<0.05$ as significant. We mean that we are ready to accept that the probability that the result is observed due to chance is 5%

Confidence level = 95% Confidence

interval = 5.22 Sample size = 40

Find the smallest sample sizes required to achieve a fixed margin of error, using simple random sampling.

Therefore,

$n = \{(r+1) (Z_{\alpha/2} + Z_{1-\beta}) \delta^2 \} /rd^2$

$n = (1+1) (1.96+0.84) (10.366)^2 /1* (19.29 - 12.8)2 = 1684.878 / 42.12 = 40.112 \approx 40$

The total sample size required for the study 80, each group contain 40 patients (Total population = 80)

Study Design:

1. The study was a randomized, prospective, triple-blinded study.
2. The study was duly approved by the ethics committee of the hospital.
3. Patients were enrolled for the study after taking their informed consent.

Randomization:

Randomization of the sample was done by the computer generated block using random number generator to create list of random numbers. To ensure an equal number of patients in each group, block randomization was done.

Study duration:

September 2019-March 2021

Group allocation:

Group A – Patients receiving i.v. lidocaine. Group

B- Patients receiving i.v. nalbuphine.

Inclusion Criteria of the patients:

Patients with the following criteria were included in the study:

1. Patients in the age group 20years-65years (both gender).
2. Patients belonging to ASA Grade I, II.
3. Patients with upper extremity fractures-Distal end of radius fractures.
4. Patients who had given their free consent for participation in the study.

Exclusion criteria of the patients:

Patients with the following criteria were not included in the study:

1. Patients who had not given their free consent for participation in the study

2. Patients belonging to ASA Grade III and IV
3. Patients of age <20 years or >65 years
4. Patients with central nervous system disorders, patients on anticonvulsant therapy.
5. Patients having cardiac diseases, respiratory diseases.
6. Patients with h/o of chronic pain using regular analgesics, sedatives and anticonvulsants
7. Patients with hypersensitivity to this drug
8. Patients with impaired renal function

TRIPLE BLINDING:

The study was designed as a triple blind prospective trial, in which, the study subject, the person injecting the drug and the examiner were blinded to:

- The group into which the patients were to be placed prior to completion of study.
- The type of test drug to be given to a patient.

Methodology:

The study was conducted at Bokaro General Hospital, Department of Anaesthesiology. Patients who suffered upper extremity fractures- Distal end of radius fractures, and those who fulfil the inclusion criteria were selected. They were informed about the procedure and were told that one of the two analgesic drugs were be administered intravenously which would improve the quality of pain relief and were shifted to the perioperative area where all monitors and all emergency resources were available .They were explained and shown the VAS (visual analog scale) before start of the study.

They were divided into 2 groups receiving either IV lidocaine (1.5 mg/kg during 2 minutes followed by infusion at the rate of 0.5mg-2mg/kh/hr) or IV Nalbuphine (0.15mg/kg) over 2minutes. The study was designed as a triple blind manner as the patient, person injecting the drug and examiner was blind to the type of drug consumed. Both drugs were colourless and odourless and to make them look alike, both drugs were injected in a 10cc

volume with syringes with the same shape and colour. Injection was performed by a senior resident of anaesthesiologist. Before the injection of drug, vital signs of the patient and their pain score using visual analog scores (VAS) were assessed .A checklist consisting of demographic data (age, gender), vital signs (number of breaths per minute, systolic and diastolic blood

pressures, heart beats per minute, and oxygen saturation percentage) and pain severity on presentation and 5, 10, 15, 20, 25, and 30 minutes after injection was filled for all the patients. The senior resident in charge of the patient was responsible for gathering the data, but evaluation of vital signs of the patient was performed by someone other than the one injecting the drugs, who was blind to the type of drug used.

To measure pain severity, VAS scale was used. Pain score of 3 to 6 was considered as moderate pain and score ≥6 is considered as severe pain. Atleast 3 points drop in pain score was considered as success in pain management. If pain was still present after 30 minutes, Parenteral diclofenac 75mg dose was prescribed as a bolus .At least 3 scores drop in pain severity was considered success and less than 3 scores as failure in treatment on 15^{th} and 30^{th} minutes. In addition, patients were assessed regarding manifestation of any side effects such as confusion; tremor; stupor; seizure; restlessness; anxiety; lethargy; sleepiness; hallucination; strabismus; syncope; hypotension; bradycardia; cardiac failure; new arrhythmia; cardiac failure; anaphylaxis; status asthmaticus ;respiratory depression; edema; nausea; vomiting; rash and tinnitus. It was determined that in case of any drug side effects, the patient should be excluded from the study and be rapidly treated for relieving the side effect. Patient was handed over to orthopaedician for reduction of fracture.

Observation:

Observations was done under following headings VAS

score

Time to rescue analgesia

Haemodynamic profile Heart rate

Systolic BP Diastolic

BP Mean BP

STATISTICAL ANALYSIS

The collected data were organized, tabulated and statistically analysis using

"MedCalc". The data were analyzed by appropriate statistical tools. Data were presented as mean with standard deviation or proportions as appropriate. Mean, median, standard deviation and variance were calculated and following statistical significance tests were applied.

1. T-test were used to compare two independent groups of continuous data.
2. Chi-square tests were used to compare categorical data.
3. Student t-test was employed to compare for difference between two means.
4. Test of Significance for Difference of Proportions.
5. "2 x 2"diagnostic table was used for sensitivity, specificity, positive predictive value, negative predictive value, odds ratio, etc.
6. "ANOVA" also used for different calculation.

Finally the calculated values were compared with the tabulated value at particular degree of freedom and finds the level of significance. A "p-value" was considered to be non-significant if $p > 0.05$ and significant if $p < 0.05$.

Observations and results-

-The patients who were accepted for the study were in age group 20-65 years. Both the groups were compared for significance in difference of age distribution. Mean age of group A is 44.37 years and group B is 39.6 years.
- in gender distribution there is 18 male and 22 females in group A and 15 males and 25 females in group B.
-Both the groups were compared for ASA Grade. The apparent difference was not found to be significant in both groups. In Group A, 45% patients were ASA Grade 1 and 55% were ASA Grade 2. In Group B, 55% were ASA Grade 1 and 45% ASA Grade 2, suggesting ASA Grade in both groups were comparable (p value= 1.000).

Table no-1 [ASA grade]

ASA Grade	Group A		Group B	
	Number	Percent	Number	Percent
1	18	45.0	22	55.0
2	22	55.0	18	45.0
Total	**40**	**100.0**	**40**	**100.0**
P Value	**1.000**			

- On an average, 71.05 people in the lignocaine group required rescue analgesia compared to 107.15 people in the nalbuphine group. However, the difference observed was non-significant (p=0.575).

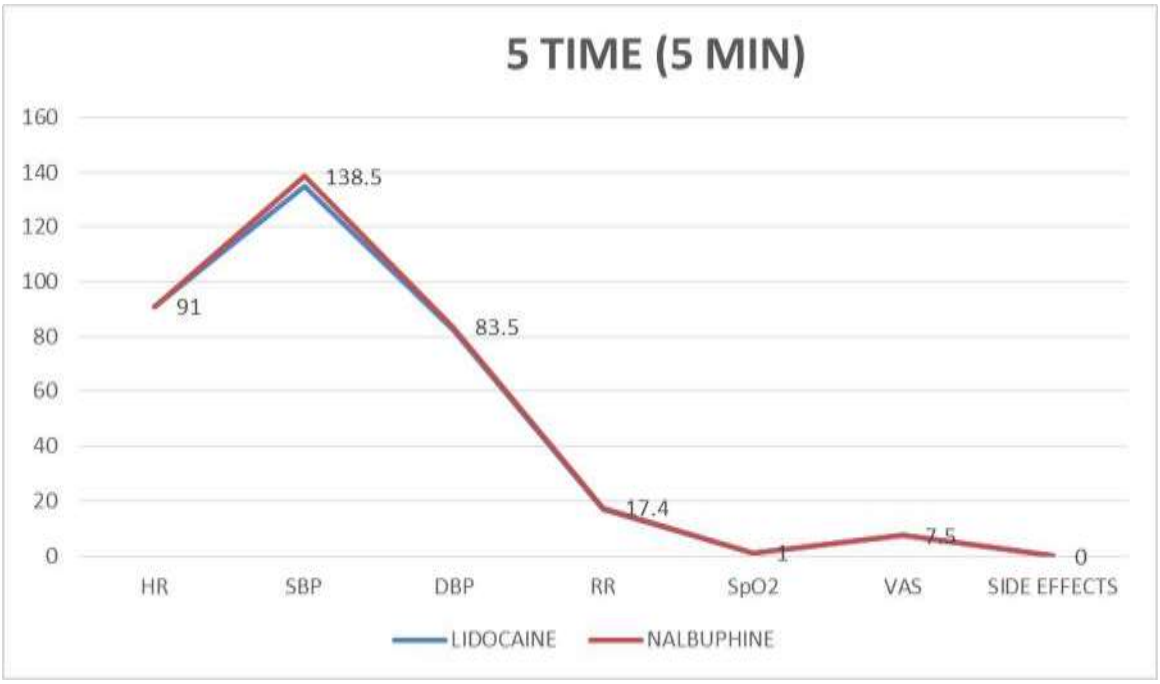
Table no- 2 [Need for Rescue analgesia]

Need for rescue analgesia	**Group A**		**Group B**	
	Mean	**SD**	**Mean**	**SD**
	71.05	5.05	107.15	8.37
P Value	0.575			

-The effect in patients after 5 min. in both the groups was comparable and statistically non-significant.

Table no-3 [5-min effect]

TIME IN MIN	**GROUP A**			**GROUP B**			**T**	**P VALUE**	**INFERENCE**
	N	**MEAN**	**SD**	**N**	**MEAN**	**SD**			
HR	40	90.76	1.37	40	91.0	1.99	-.297	0.768	NS
SBP	40	134.78	8.63	40	138.5	7.02	4.967	0.44	NS
DBP	40	82.61	0.80	40	83.5	5.97	-780	.441	NS
RR	40	16.93	0.80	40	17.4	0.99	-2.042	0.49	NS
SpO2	40	0.98	0.01	40	1.0	0.01	-656.085	021.00	NS
VAS	40	7.43	0.50	40	7.5	0.51	-.231	0.53	NS
SIDE EFFECTS	40	-	-	40	-	-			

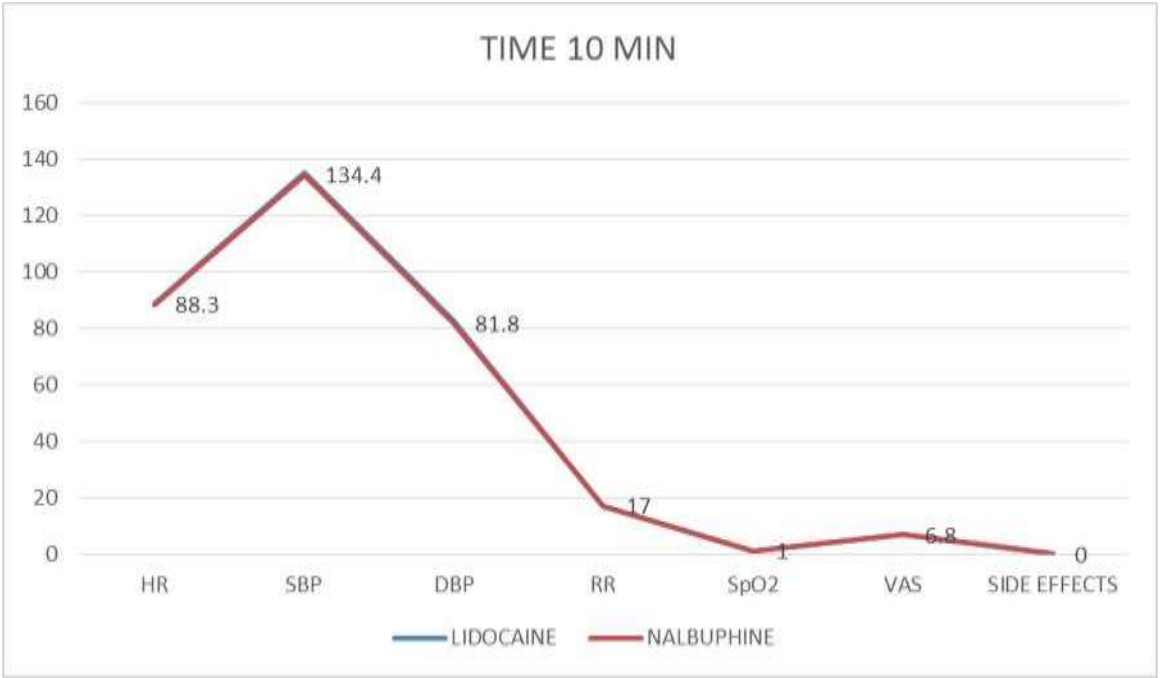


Graph 1: Time (5 Min)

-The effect in patients after 10 min. in both the groups was comparable and statistically non-significant.

Table no-4 [10-min effect]

TIME IN MIN	GROUP A			GROUP B			t	P VALUE	INFERENCE
	N	MEAN	SD	N	MEAN	SD			
HR	40	88.52	1.79	40	88.3	1.87	.389	0.700	NS
SBP	40	135.0	6.91	40	134.4	6.60	.861	-1.177	NS
DBP	40	82.61	4.91	40	81.8	4.59	.466	.644	NS
RR	40	16.93	0.77	40	17.0	0.89	-.724	.474	NS
SpO2	40	0.93	0.01	40	1.0	0.01	-1.719	.095	NS
VAS	40	6.61	0.61	40	6.8	0.61	-.702	.488	NS
SIDE EFFECTS	40	-	-	40	-	-			

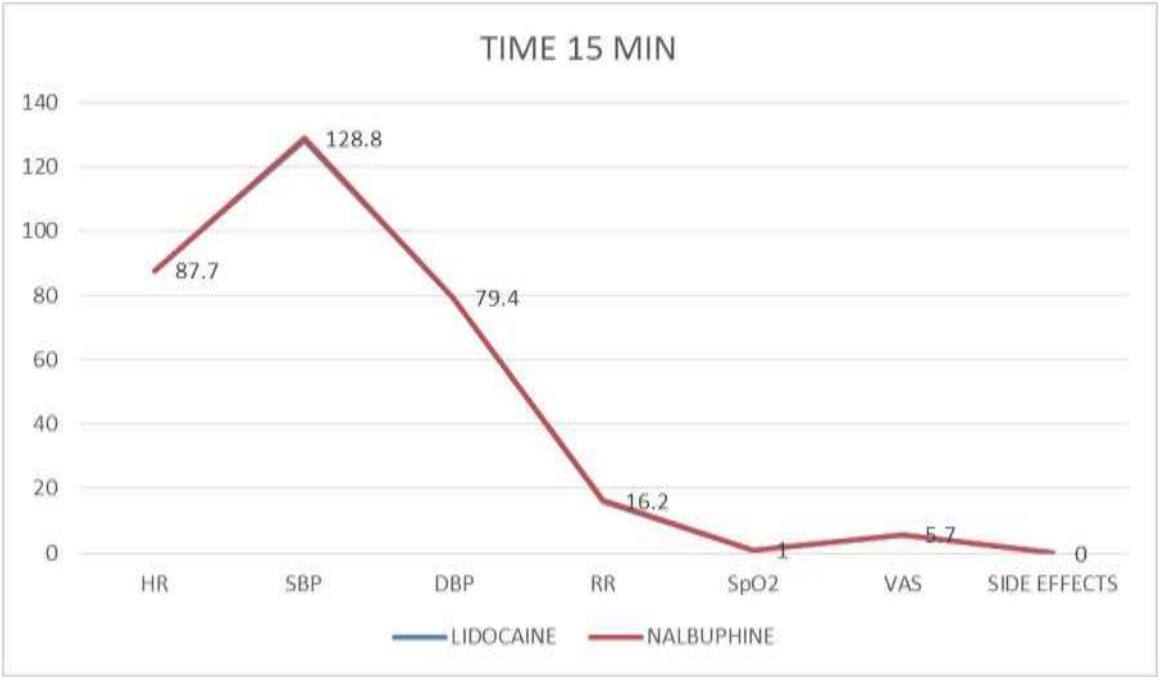


Graph 2: Time (10 min)

-The effect in patients after 15 min. in both the groups was comparable and statistically non-significant.

Table no-5 [15-min effect]

TIME IN MIN	GROUP A			GROUP B			t	P VALUE	INFERENCE
	N	MEAN	SD	N	MEAN	SD			
HR	40	87.76	2.00	40	87.7	1.75	.064	.949	NS
SBP	40	128.04	6.54	40	128.8	6.86	-.681	.501	NS
DBP	40	79.35	2.50	40	79.4	3.43	.442	.661	NS
RR	40	16.09	0.66	40	16.2	0.73	-.818	.419	NS
SpO2	40	0.98	0.01	40	1.0	0.01	-.360	.721	NS
VAS	40	5.54	0.84	40	5.7	0.72	-1.553	.130	NS
SIDE EFFECTS	40	-	-	40	-	-			

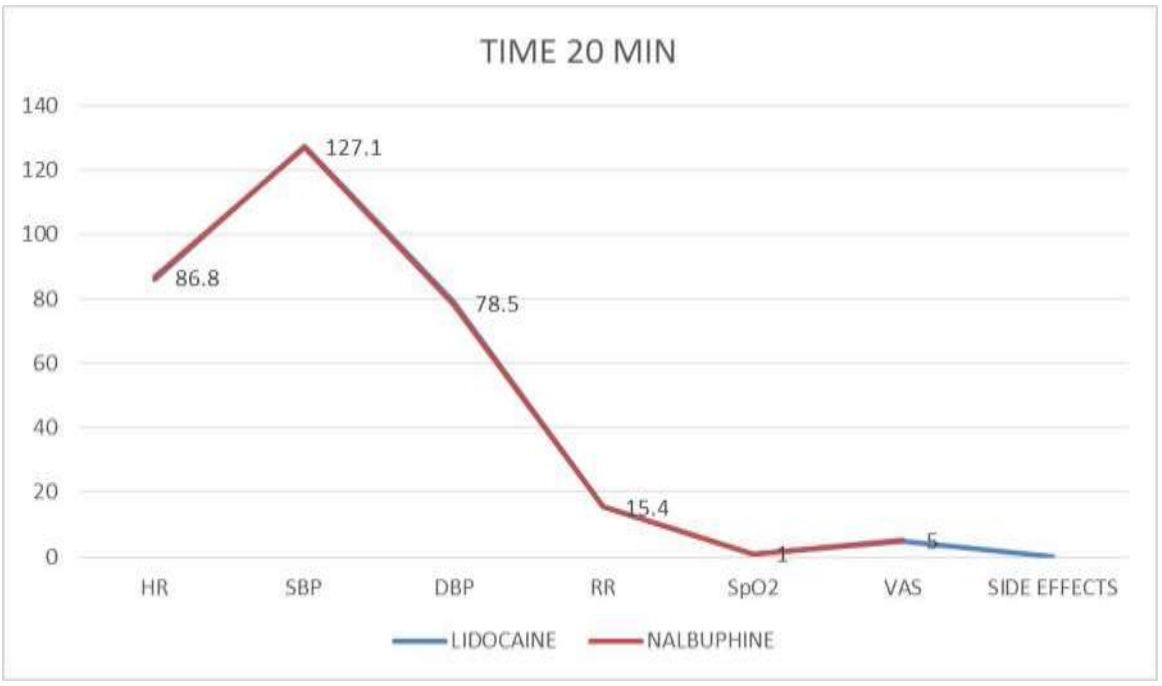


Graph 3: Time (15 min)

-The effect in patients after 20 min. in both the groups was comparable and statistically non-significant.

Table no- 6 [20-min effect]

TIME IN MIN	GROUP A			GROUP B			t	P VALUE	INFERENCE
	N	MEAN	SD	N	MEAN	SD			
HR	40	85.96	4.17	40	86.8	2.83	-.764	.450	NS
SBP	40	127.39	7.43	40	127.1	7.19	.475	.638	NS
DBP	40	79.37	8.15	40	78.5	6.57	.517	.609	NS
RR	40	15.48	0.94	40	15.4	0.82	.268	.790	NS
SpO2	40	0.98	0.01	40	1.0	0.01	-.312	.757	NS
VAS	40	4.91	0.41	40	5.0	0.39	-1.071	.292	NS
SIDE EFFECTS	40	-	-	40	-	-			

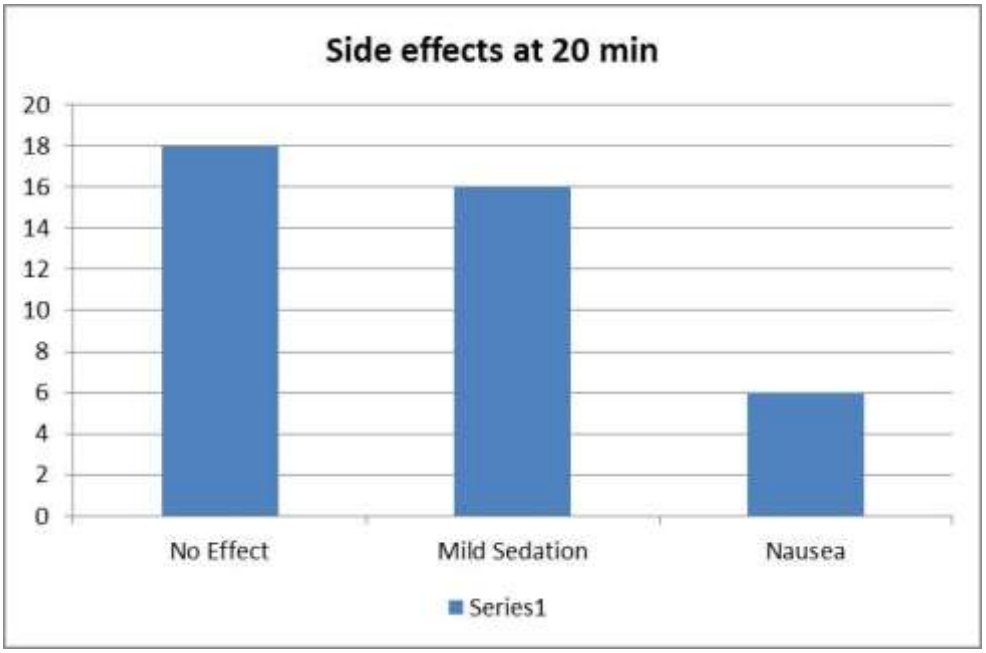


Graph 4: Time (20 min)

The side effect of nalbuphine in patients can be seen after 20 minutes. 45% patients have no side effect after 20 min, 40% patients have mild sedation, 15% have nausea.

Table 7: Side Effects (NALBUPHINE) (Time 20 min)

Side effects	NALBUPHINE	
	Number	**Percent**
No Effect	18	45.0
Mild Sedation	16	40.0
Nausea	6	15.0
Total	**40**	**100.0**

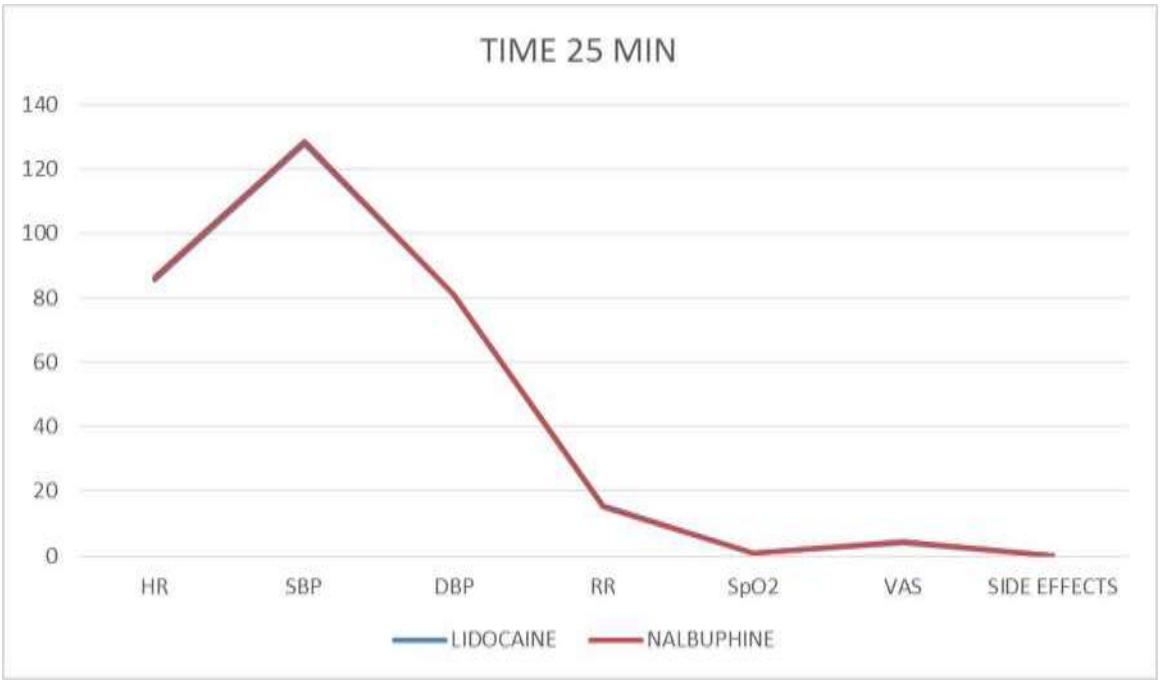


Graph 5: Side Effects (NALBUPHINE) (Time 20 min)

The effect in patients after 25 min. in both the groups are compared and are found that all hemodynamic parameters in group A are well maintained and are superior to group B but statistically non-significant between two groups ,drop in VAS score in group A is superior to group B which was also statistically significant.

Table 8: Time (25 min)

TIME IN MIN	GROUP A			GROUP B			T	P VALUE	INFERENCE
	N	MEAN	SD	N	MEAN	SD			
HR	40	85.67	3.61	40	86.5	4.57	-1.446	.158	NS
SBP	40	127.61	6.73	40	128.5	8.57	-.584	.563	NS
DBP	40	81.09	6.74	40	81.2	7.29	.000	1.000	NS
RR	40	15.37	1.00	40	15.1	0.89	.255	.801	NS
SpO2	40	0.98	0.01	40	1.0	0.01	-1.986	.055	NS
VAS	40	3.85	0.76	40	4.2	0.61	-3.908	.000	S
SIDE EFFECTS	40	-	-	40	-	-			

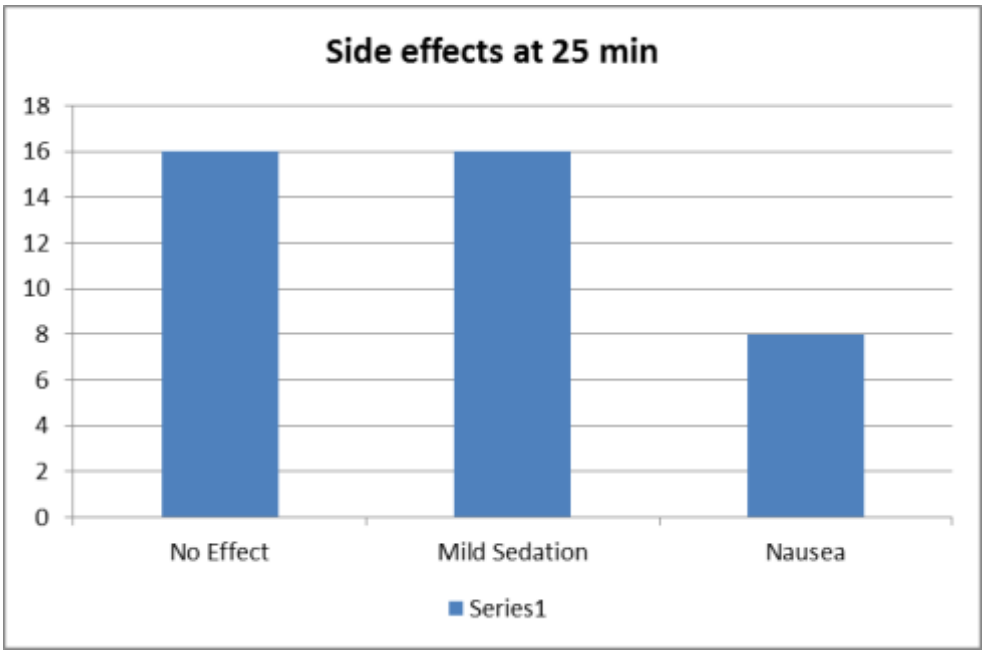


Graph 6: Time (25min)

The side effect of nalbuphine in patients can be seen after 25 minutes. 40% patients have no side effect after 25 min, 40% patients have mild sedation, 20% patients have nausea.

Table 9: Side Effects (NALBUPHINE) (Time 25 min)

Side effects	NALBUPHINE	
	Number	**Percent**
No effect	16	40.0
Mild Sedation	16	40.0
Nausea	8	20.0
Total	**40**	**100.0**

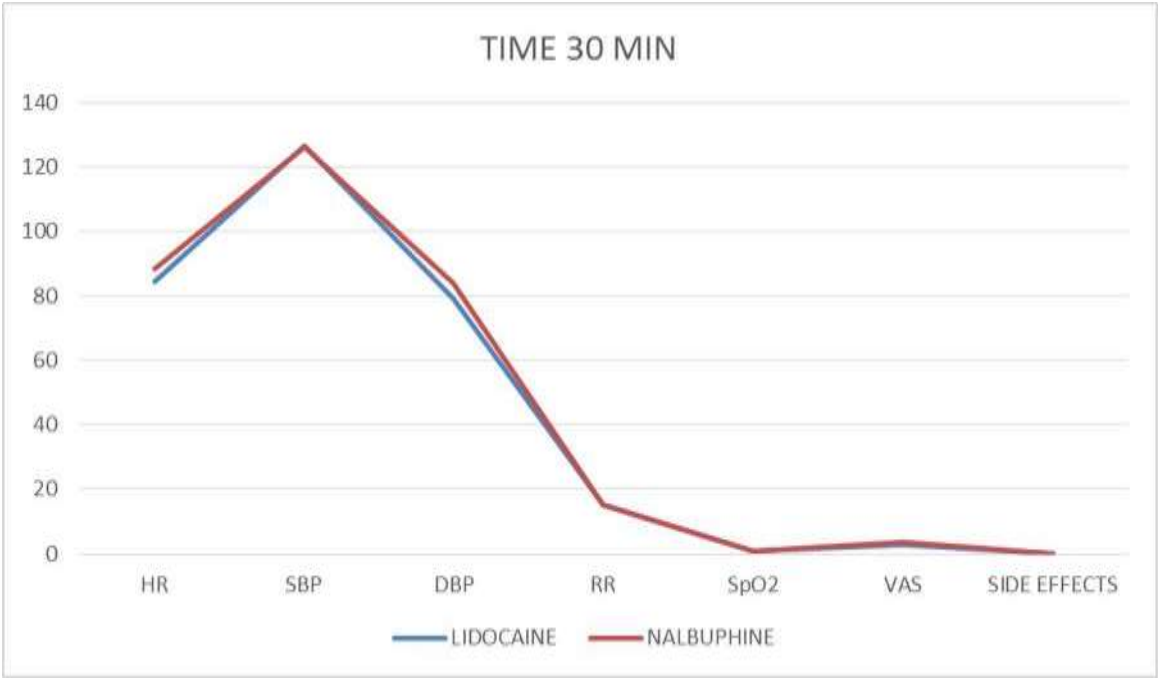


Graph 7: Side Effects (NALBUPHINE) (Time 25 min)

The effect in patients after 30 min. in both the groups are compared and all hemodynamic parameters in group A are well maintained than in group B but found to be statistically non-significant; drop in VAS scores in group A is found to be more significant which is also statistically significant.

Table 10: Time (30 min)

TIME IN MIN	GROUP A			GROUP B			T	P VALUE	INFERENCE
	N	MEAN	SD	N	MEAN	SD			
HR	40	84.37	5.28	40	88.5	5.12	-4.135	.057	NS
SBP	40	126.74	7.62	40	126.2	6.97	.360	.721	NS
DBP	40	79.35	7.12	40	84.1	6.09	-4.055	.423	NS
RR	40	15.22	0.73	40	15.3	0.53	-1.421	.165	NS
SpO2	40	0.98	0.01	40	1.0	0.01	.000	1.000	NS
VAS	40	2.93	0.88	40	3.5	0.86	-5.374	.000	S
SIDE EFFECTS	40	-	-	40	-	-			

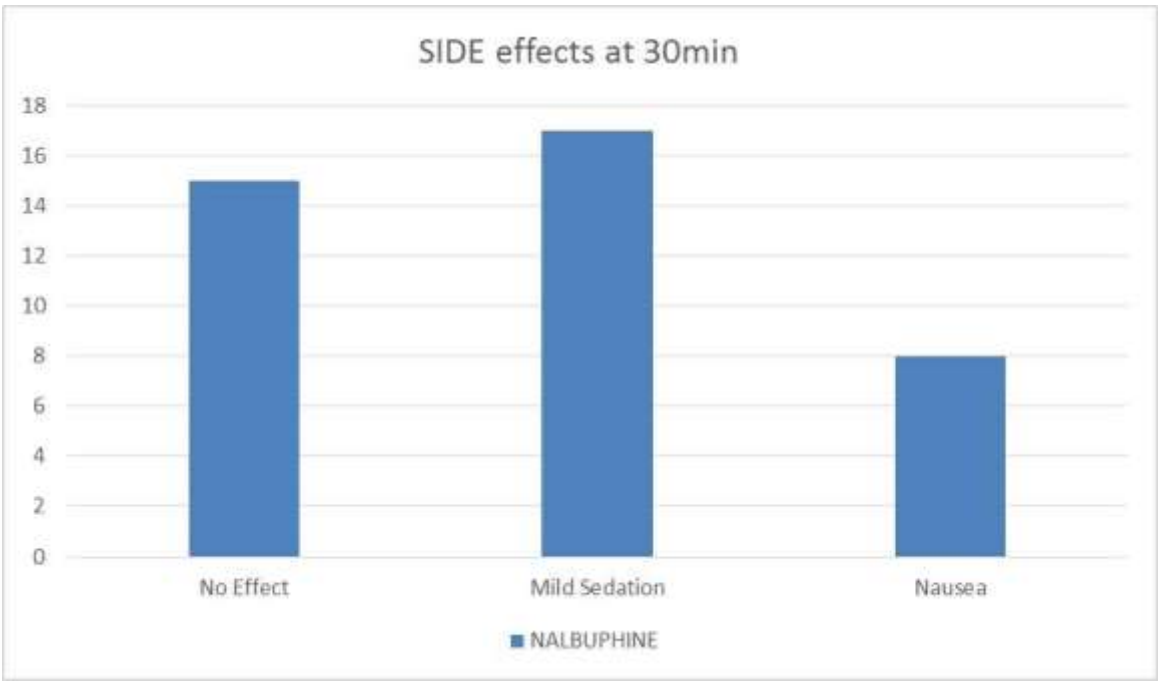


Graph 8: Time (30min)

Table 11: Time wise progression of VAS score

TIME	Group A		p-value	Group B		p-value
	MEAN	SD		MEAN	SD	
5min	7.43	0.50	0.527	7.5	0.51	0.527
10min	6.61	0.61	0.001	6.8	0.61	0.002
15min	5.54	0.84	0.000	5.7	0.72	0.00
20min	4.91	0.41	0.000	5.0	0.39	0.00
25min	3.85	0.76	.000	4.2	0.61	0.00
30min	2.93	0.88	0.000	3.5	0.86	0.00

-The side effect of nalbuphine in patients can be seen after 30 minutes. 37.5% patients have no side effect after 30 min and 42.5% patients have mild sedation and 20% patients have nausea.



Graph 9: Side Effects (NALBUPHINE) (Time 30 mins)

Discussion-

Our study was done to find out a good analgesic agent for management of acute pain in upper extremity fractures (Distal end of radius fracture), which is a very severe kind of acute pain. Keeping in mind the various side effects associated with opioid agents against the unparalleled efficacy of pain relief, we sought to compare an opioid agonist – antagonist Nalbuphine with an amide local anaesthetic, Lidocaine.

The study was done at Bokaro General Hospital in Jharkhand in Department of Anaesthesiology during the period of September 2019 - March 2021. This is Randomised prospective triple blinded study in which 80 patients of age group between 20-65 yrs., patients belonging to both ASA 1 and ASA 2 were taken up.

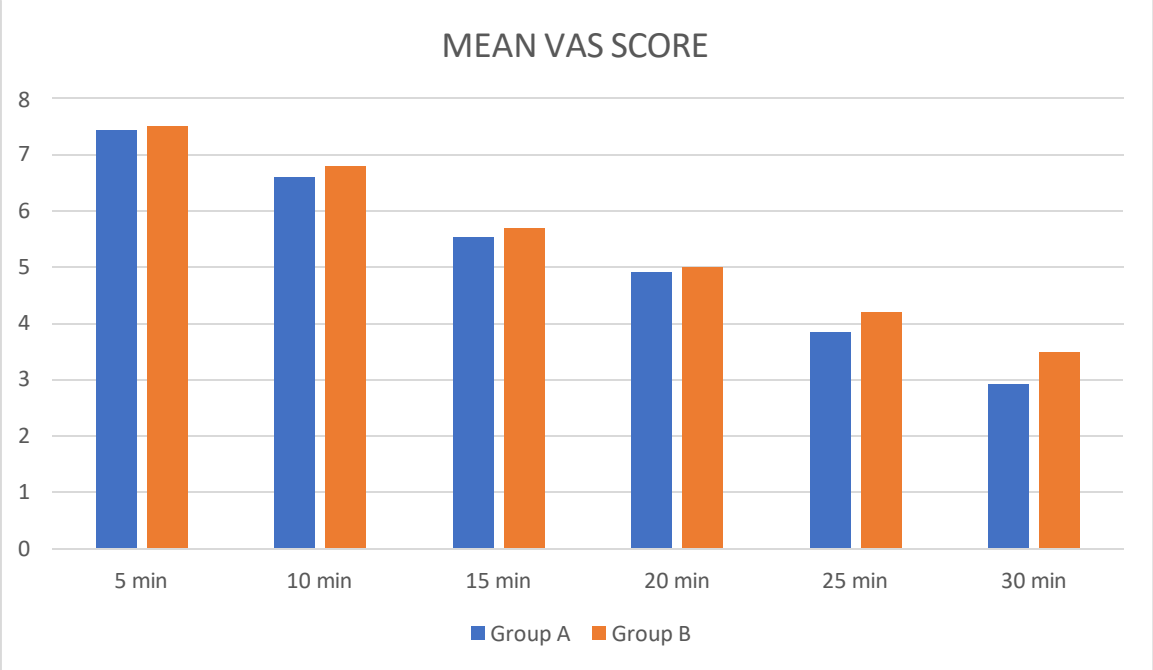
-The patients who were accepted for the study were in age group 20-65 years. With reference to Table no 1, there was no significant difference (p = 0.257) in age in Group A and Group B.

- With reference to Table no 3, both groups were compared in terms of gender distribution. The apparent difference between the two groups was not significant (p>0.05).

-With reference to the Table no.4, Group A has 45% of ASA 1 patients whereas Group B has 55%; Group A has 55% of ASA 2 patients and Group B has 45%. The apparent difference between two groups was not significant (p=1.000). Hence, both the groups were comparable in all respects except the analgesic used for acute pain management. Therefore, it is reasonable to presume that any difference in the two groups with regards to the incidence of pain, haemodynamic variation from baseline and complications was basically a result of the choice of analgesic drug adopted for each group.

-Both the individual drugs were effective at progressively reducing the VAS scores for pain beginning 5 minutes after drug administration, which was statistically highly significant

Also, according to the findings of our study, all the patients were respondents, both the drugs provided good pain relief with VAS score < 5beginning at 25 min after drug administration. However the VAS score in Lidocaine group was significantly lesser at both 25 and 30min when compared to Nalbuphine.



With reference to Table no. 6, drop in VAS between both the two groups was non-significant (p = 0.53) at 5 minutes of giving the analgesic drug. The difference in VAS between both the groups became significant from 25 minutes to 30 minutes (p< 0.05).

The findings of my study are in accordance with study of Clattenberg et al (2019)[14]; Arash Foroucan et al(2017)[15]; Soleimanpour et al (2012)[16]; Anca Grigoraetalin (2012)[17]; Vigneault et al(2010)[18].

Akhgar et al (2021)[19] showed that IV lidocaine can be a good choice in pain management in biliary colic and can reduce pain in less time than morphine sulfate (in 10 min) without adding significant side effects; however, primary outcome was the

comparison of these two drugs after 60 min of drug administration in pain reduction which showed no significant difference between two groups. The findings of this study are in concurrence with our study and we have used a synthetic opioid instead of morphine here.

REQUIREMENT OF RESCUE ANALGESIA:

-lesser patients in Group A required rescue analgesia compared to patients in Group B, which was found statistically non- significant.

Numerous studies have shown the efficacy of intravenous lidocaine for effective pain management and its role in reducing the demand for opioids or need for rescue analgesia. Clatternberg et al (2019)[14]; Arash Foroucan et al (2017)[15], which are in concurrence with our findings.

COMPARISION OF HAEMODYNAMIC MONITORING BETWEEN TWO GROUPS:

-There were no statistically significant difference in systolic blood pressure, diastolic blood pressure, heart rate ,respiratory rate and oxygen saturation in both the group throughout the course of observation shows that both the drugs have good hemodynamic stability.

El-Tahan et al 2009's[20] clinical study found that giving IV lidocaine before caesarean section surgery reduces the rise in heart rate, average arterial pressure, and plasma cortisol levels. Their results showed that intravenous lidocaine may be regarded a safe and effective option for decreasing the mother's stress reaction to surgery during caesarean birth.

COMPARISION OF SIDE EFFECTS:

-side effects in both the groups were compared and found that no side effects were observed in Group A and mild sedation, nausea were observed at 20min, 25min, 30min in Group B.

Our study was the first of its kind to evaluate the role of intravenous nalbuphine administration in managing fracture pain. Due to the lack of studies on nalbuphine for acute pain management in fracture pain, we have reviewed the literature for other routes of its administration. Intrathecal nalbuphine, as an adjuvant to bupivacaine, has been found to pro duration of analgesia without increasing the incidence of side effects (Mukherjee et al, 2011)[21].However, Etches et al,(1991) [22]found that epidural nalbuphine failed to provide a analgesia in patients undergoing thoracotomy. The lack of effectiveness of nalbuphine may be attributed to the difference in the type of surgery and routes to the administration. Nalbuphine has as potent an analgesic effect as morphine, but with a better safety and fewer side effects such as pruritus, respiratory depression, and PONV (Zeng et al 2015)[23]. Indeed, our study that the side effects in the nalbuphine group were without significant differences compared lidocaine group. Furthermore, epidural nalbuphine in 10 mg dose with lidocaine revealed none of the following side effects: PONV, sedation, pruritus, or respiratory depression (Camann et al, 1991)[24]. Fewer side effects of nalbuphine may be attributed to its central antagonist activity mu receptors. The exact mechanism of the peripheral action of nalbuphine is not well known. Different theories were postulated to explain the analgesic action of the opioids in IVRA; opioids might exert their peripheral action through peripheral opioid receptors. Also, opioids may have their own local anesthetic effect by blocking sodium channels at the peripheral nerve endings (Armstrong et al, 1993)[25].

According to the results of this study, IV lidocaine seems to be helpful in pain management in upper extremity fractures. It seems that since the majority of the participants in the current research were either young or in their forties, the likelihood of experiencing cardiac adverse effects was inherently reduced. It appears more reasonable to make a decision on the negative effects of injecting the medication after doing research on different age groups and taking into account their varied underlying diseases.

In the present study the findings suggested that, both the drugs provided good pain relief which was significant from 10min of administration of the drugs with VAS score <5 at 25 and 30 min. However the VAS score in Lidocaine group was significantly lesser at both 25 and 30 min when compared to Nalbuphine. There were no medication side effects seen in patients receiving IV Lidocaine but mild sedation and nausea were observed in patients receiving IV Nalbuphine. And the important thing was that the chance of not managing pain in the lidocaine group vs the nalbuphine group was less than one, confirming its superior efficacy, although it is statistically non-significant.

Conclusion-

We compared the analgesic efficacy, total requirement of rescue analgesia and side effects of Lidocaine (IV) with Nalbuphine (IV) in acute fracture pain management in patients of upper extremity fractures-Distal end of radius fracture. Based on the results of the present study, both the drugs provided good pain relief which was significant from 10min of administration of the drugs with VAS score <5 at 25 and 30 min. However the VAS score in Lidocaine group was significantly lesser at both 25 and 30 min when compared to Nalbuphine. There were no medication side effects seen in patients receiving IV Lidocaine but mild sedation and nausea were observed in patients receiving IV Nalbuphine. Our study confirmed that both the drugs are haemodynamically stable and safe. And the important thing was that the chance of not managing pain in the lidocaine group vs the nalbuphine group was less than one, confirming its superior efficacy, although it is statistically non- significant. Inj. Lidocaine IV at a dose of 1.5mg/kg (bolus) followed by infusion at a dose of 0.5-2mg/kg could be considered as a reasonable alternative choice for acute pain management in upper extremity fractures-Distal end of radius fractures.

References-

1. Koewler NJ, Freeman KT, Buus RJ, Herrera MB, Jimenez-Andrade JM, Ghilardi JR, Peters CM, Sullivan LJ, Kuskowski MA, Lewis JL, Mantyh PW. Effects of a monoclonal antibody raised against nerve growth factor on skeletal pain and bone healing after fracture of the C57BL/6J mouse

femur. Journal of Bone and Mineral Rese Graven-Nielsen T, Arendt-Nielsen L. Assessment of mechanisms in localized and widespread musculoskeletal pain. Nature Reviews Rheumatology. 2010 Oct;6(10):599-606.

2. Jimenez-Andrade JM, Martin CD, Koewler NJ, Freeman KT, Sullivan LJ, Halvorson KG, Barthold CM, Peters CM, Buus RJ, Ghilardi JR, Lewis JL. Nerve growth factor sequestering therapy attenuates non-malignant skeletal pain following fracture. PAIN®. 2007 Dec 15;133(1-3):183-96.
3. Graven-Nielsen T, Arendt-Nielsen L. Assessment of mechanisms in localized and widespread musculoskeletal pain. Nature Reviews Rheumatology. 2010 Oct;6(10):599-606.
4. Arendt-Nielsen L, Nie H, Laursen MB, Laursen BS, Madeleine P, Simonsen OH, Graven-Nielsen T. Sensitization in patients with painful knee osteoarthritis. Pain. 2010 Jun 1;149(3):573-81.
5. Woolf CJ. Central sensitization: implications for the diagnosis and treatment of pain. Pain. 2011 Mar 1;152(3):S2-15.arch. 2007 Nov;22(11):1732-42.11 Wasiak J, Mahar P, McGuinness SK, Spinks A, Danilla S, Cleland H. Intravenous lidocaine for the treatment of background or procedural burn pain. Cochrane database of systematic reviews. 2012(6).
6. Wasiak J, Mahar P, McGuinness SK, Spinks A, Danilla S, Cleland H. Intravenous lidocaine for the treatment of background or procedural burn pain. Cochrane database of systematic reviews. 2012(6).
7. Farag E, Ghobrial M, Sessler DI, Dalton JE, Liu J, Lee JH, Zaky S, Benzel E, Bingaman W, Kurz A. Effect of perioperative intravenous lidocaine administration on pain, opioid consumption, and quality of life after complex spine surgery. Anesthesiology. 2013 Oct;119(4):932-40.
8. Beaudoin FL, Haran JP, Liebmann O. A comparison of ultrasound-guided three-in-one femoral nerve block versus parenteral opioids alone for analgesia in emergency department patients with hip fractures: a randomized controlled trial. Academic Emergency Medicine. 2013 Jun;20(6):584-91.

9. Sahota O, Rowlands M, Bradley J, Van de Walt G, Bedforth N, Armstrong S, Moppett I. Femoral nerve block Intervention in Neck of Femur fracture (FINOF): study protocol for a randomized controlled trial. Trials. 2014 Dec;15(1):1-6

10. Gordon D. Intravenous lidocaine for postoperative analgesia: renewed interest in an old strategy, 2008.

11. Insler SR, O'Connor M, Samonte AF, Bazaral MG. Lidocaine and the inhibition of postoperative pain in coronary artery bypass patients. Journal of cardiothoracic and vascular anesthesia. 1995 Oct 1;9(5):541-6.

12. Striebel HW, Klettke U. Is intravenous lidocaine infusion suitable for postoperative pain management?.Schmerz (Berlin, Germany). 1992 Dec 1;6(4):245-50.

13. Dollery CS, editor. Therapeutic drugs. Churchill Livingstone; 1999.

14. Clattenburg EJ, Nguyen A, Yoo T, Flores S, Hailozian C, Louie D, Herring
AA. Intravenous lidocaine provides similar analgesia to intravenous morphine for undifferentiated severe pain in the emergency department: a pilot, unblinded randomized controlled trial. Pain Medicine. 2019 Apr 1;20(4):834-9

15. Forouzan A, Barzegari H, Motamed H, Khavanin A, Shiri H. Intravenous lidocaine versus morphine sulfate in pain management for extremity fractures; a clinical trial. Emergency. 2017;5(1)

16. Soleimanpour H, Hassanzadeh K, Vaezi H, Golzari SE, Esfanjani RM, Soleimanpour M. Effectiveness of intravenous lidocaine versus intravenous morphine for patients with renal colic in the emergency department. BMC urology. 2012 Dec;12(1):1-5

17. Grigoras A, Lee P, Sattar F, Shorten G. Perioperative intravenous lidocaine decreases the incidence of persistent pain after breast surgery. The Clinical journal of pain. 2012 Sep 1;28(7):567-72

18. Louise Vigneault, MD , Alexis F. Turgeon, MD , Dany Co ˆte ´, MD,Franc¸oisLauzier, MD , Ryan Zarychanski, MD , Lynne Moore, PhD

,Lauralyn A. McIntyre, MD , Pierre C. Nicole, MD , Dean A. Fergusson, PhD,Perioperative intravenous lidocaine infusion for postoperative pain control: a meta-analysis of randomized controlled trials (2011) 58:22–37.

19. Akhgar A, Pouryousefi T, Nejati A, Rafiemanesh H, Hossein-Nejad H. The efficacy of intravenous lidocaine and its side effects in comparison with intravenous morphine sulfate in patients admitted to the ED with right upper abdominal pain suspected of biliary colic. The American Journal of Emergency Medicine. 2021 Jun 1;44:300-5

20. El-Tahan MR, Warda OM, Diab DG, Ramzy EA, Matter MK. A randomized study of the effects of perioperative iv lidocaine on hemodynamic and hormonal responses for cesarean section. Journal of anesthesia. 2009 May;23(2):215-21.

21. Mukherjee A, Pal A, Agrawal J, Mehrotra A, Dawar N. Intrathecal nalbuphine as an adjuvant to subarachnoid block: What is the most effective dose?. Anesthesia, essays and researches. 2011 Jul;5(2):171.

22. Etches RC, Sandler AN, Lawson SL. A comparison of the analgesic and respiratory effects of epidural nalbuphine or morphine in postthoracotomy patients. Anesthesiology. 1991 Jul 1;75(1):9-14

23. Zeng Z, Lu J, Shu C, Chen Y, Guo T, Wu QP, Yao SL, Yin P. A comparison of na-lbuphine with morphine for analgesic effects and safety: Meta-analysis of randomized controlled trials. Sci Rep 2015; 5:10927

24. Camann WR, Hurley RH, Gilbertson LI, Long ML, Datta S. Epidural nalbuphine for analgesia following caesarean delivery: dose-response effect of local anaesthetic choice. Canadian journal of anaesthesia. 1991 Sep;38(6):728-32

25. Armstrong PJ, Morton CP, Nimmo AF. Pethidine has a local anaesthetic action on peripheral nerves in vivo: addition to prilocaine 0.25% for intravenous regional anaesthesia in volunteers. Anaesthesia. 1993 May;48(5):382-6.