Original Research Paper

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Anesthesiology

COMPARITIVE STUDY OF PLAIN BUPIVACAINE AND BUPIVACAINE WITH DEXMEDITOMIDINE FOR CAUDAL BLOCK IN CHILDREN

Dr. I. Balasaraiah — Junior Resident, Dept. of Anaesthesiology & Critical care, Govt. General Hospital, Kurnool – 518002. Andhra Pradesh.

Dr. Radhavendra prasad* — Asst. Professor., Dept. of Anaesthesiology & Critical care, Govt. General Hospital, Kurnool – 518002. Andhra Pradesh. *Corresponding Author

Dr. S. Sudheer Kumar Goud — Senior Resident, Dept. of Anaesthesiology & Critical care, Govt. General Hospital, Kurnool – 518002. Andhra Pradesh.

KEYWORDS :

INTRODUCTION

"An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

Children receive significantly less medication regardless of the intensity of pain because round the clock opioid analgesics increase the risk for sedation and respiratory depression.

Postoperative pain control is important in pediatric patients because poor pain control may result in increased morbidity and mortality.

The management of acute postoperative pain in pediatric patients can be accomplished by using a multimodal approach.

Caudal analgesia is a relatively simple technique with a predictable level of blockade, and is by far the most common regional technique used in paediatric surgery for lower abdominal, urological, and lower limb operations.

Gradual offset usually provides analgesia beyond the duration of surgery, with a smooth recovery period and good postoperative pain control.

Several adjuvants have been used to prolong the duration of caudal analgesia such as Dexmeditomidine, clonidine, neostigmine, ketamine, opioids, and ephedrine.

METHODOLOGY

This study included 60 children, of either sex, coming for various elective infra-umbilical surgical procedures such as herniotomies circumcision, orchidopexy, perineal surgeries and minor procedures in lower extremities. The patients were randomly divided into 2 groups of 30 each.

Group A received 0.25% of Bupivacaine 1 ml/kg + 1ml normal saline
Group B received 0.25% of Bupivacaine 1 ml/kg + Dexmedetomidine 1µg/kg in 1 ml normal saline.

INCLUSION CRITERIA

Age group of 1-6 yrs
ASA grade I and II
Patients coming for elective infra umbilical surgeries

EXCLUSION CRITERIA

ASA grade III and IV
Infection at the site of injection
Coagulopathy or anticoagulation therapy
Congenital abnormalities of lower spine and meninges
History of developmental delay or mental retardation
History of allergy to local anaesthetics

STATISTICALANALYSIS

All the values observed are analysed and was expressed as mean± SD
Statistical comparisions were performed by student's t test.
A probability value (p) less than 0.05 was regarded as statistically significant.

Level of significance:
P> 0.05- statistically not significant
P< 0.05- statistically significant

EQUIPMENT

23G needle (hypodermic)
5 cc syringe (for whoosh test)
Sterile swabs, bowl, sponge holding forceps, sterile hole towel and spirit.
Drugs – Bupivacaine 0.5% vial, Dexmedetomidine 100 µg ampoule
Boyle's apparatus with Sevoflurane vaporizer, Jackson Rees circuit.
Patent IV line with infusion of crystalloid.
Working laryngoscope, with assorted blades
Endotracheal tubes of appropriate sizes
Appropriate airways with masks
AMBU bag of paediatric size
Suction apparatus
Pre anaesthetic assessment was done.
Lab investigations:
Blood & urine examination
BT, CT, CXR
HIV, HBsAg, HCV screening
Preoperative fasting.

All subjects received a conventional preoperative dose of oral midazolam (0.5 mg kg21) 20–30 min before anesthetic induction.

PROCEDURE

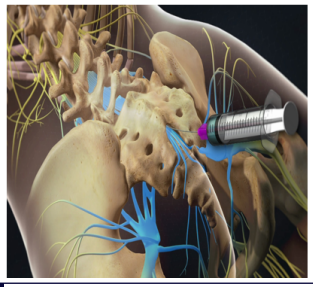
The anaesthetized patient was placed in left lateral decubitus position with legs flexed . Under strict aseptic conditions, Sacral hiatus was identified by running the thumb up from coccyx towards the sacrum.

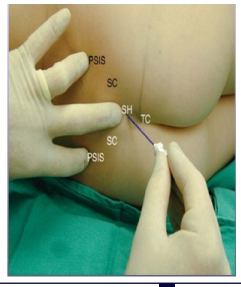
After identifying the sacral hiatus, a 23G hypodermic needle with its bevel facing anteriorly was inserted at an angle of 45° to the skin till the sacro-Coccygeal membrane was pierced, when a distinct "pop" was felt.

The needle was now lowered to an angle of 15° and advanced 1-2 cm to make sure that the entire bevel was inside the space.

Confirmation of the needle point being in the epidural space was done with the"whoosh" test and the lack of resistance encountered by injection of 2-3 ml of air.

Aspiration was done to exclude dural puncture or vessel puncture and the drug was injected.





POSTOPERATIVE PERIOD

Once the vitals were stable and the child was awake, the child was shifted and placed in semi-prone position in the recovery room and observed for every 15min up to first one hour for any,

Bradycardia (heart rate of <95th percentile for the age and sex)
Hypotension (systolic blood pressure < 95th percentile for the age and sex)

Respiratory depression (oxygen saturation <95%)
Later the subject was shifted to PACU and monitored for the next 24 hours i.e., every 4,8,12,16,20,and 24th hour for:
FLACC pain scale
Hypotention
Bradycardia
PONV
Urinary retention

RESULTS

AGE WISE DISTRIBUTION

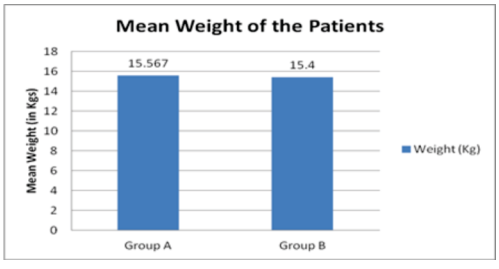
GROUP	No.of Patients	Mean Age(Yrs) ± SD	Mean difference	p value	
GROUP A	30	4 ± 1.78	0.1667	0.72	NS
GROUP B	30	3.8333 ± 1.76			

SEX WISE DISTRIBUTION

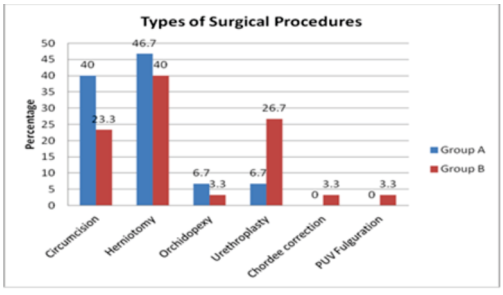
Gender	Group A n (%)	Group B n (%)	P value	Satistical significance
Male	29(97%)	30(100%)	0.33	NS
Female	1(3%)	0(0%)		
Total	30	30		

MEAN WEIGHT OF THE PATIENTS IN KG

Weight (kg)	Group A (Kg)	Group B (Kg)	Mean Difference	p value	Statistical significance
Mean Weight ± SD	15.567 ± 3.73	15.4 ± 3.587	0.167	0.86	NS
Range	10 - 21	10 - 21			

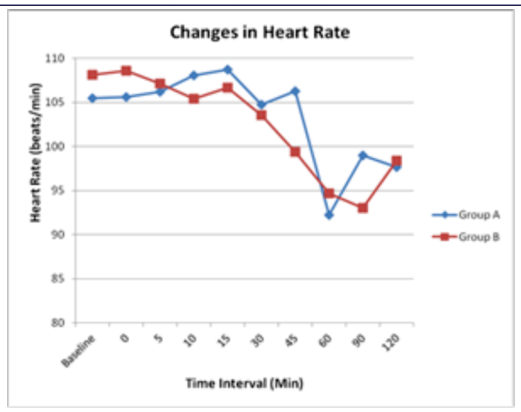


TYPES OF SURGICAL PROCEDURES



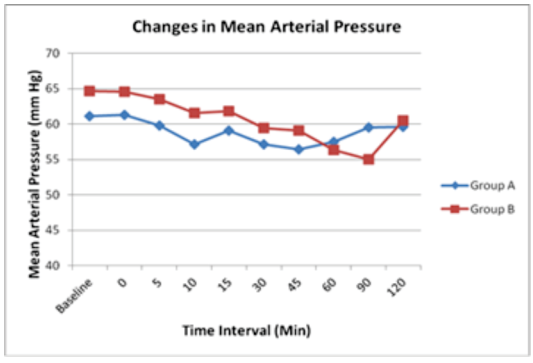
CHANGES IN HEART RATE

Time Interval in minutes	Group A Mean ± SD/minute	Group B Mean ± SD/minute	p Value	Statistical Significance
Baseline	105.47 ± 15.77	108.13 ± 17.12	0.53	NS
0	105.57 ± 15.75	108.57 ± 17.36	0.49	NS
5	106.17 ± 14.96	107.1 ± 14.06	0.8	NS
10	108.07 ± 16.52	105.43 ± 14.03	0.51	NS
15	108.7 ± 17.21	106.67 ± 14.24	0.62	NS
30	104.73 ± 14.96	103.57 ± 12.33	0.74	NS
45	106.25 ± 14.62	99.39 ± 14.63	0.16	NS
60	92.25 ± 20.27	94.7 ± 15.73	0.81	NS
90	99 ± 18.39	93 ± 7.64	0.48	NS
120	97.67±10.32	98.37±9.46	0.78	NS



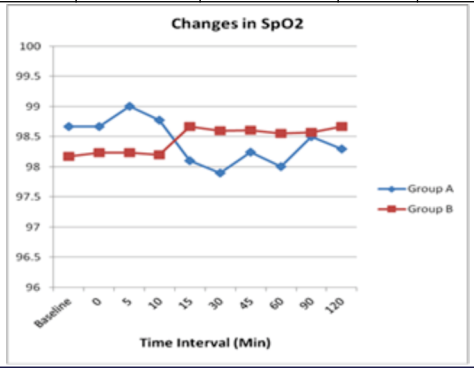
CHANGES IN MAP IN mmHg

Time Interval in minutes	Group A Mean ± SD	Group B Mean ± SD	p Value	Statistical Significance
Baseline	61.1 ± 8.31	64.63 ± 7.42	0.09	NS
0	61.33 ± 8.38	64.57 ± 7.43	0.12	NS
5	59.77 ± 7.44	63.53 ± 8.39	0.07	NS
10	57.1 ± 6.4	61.57 ± 7.45	0.02	S
15	59.1 ± 7.46	61.8 ± 7.41	0.17	NS
30	57.17 ± 8.23	59.45 ± 6.56	0.24	NS
45	56.47 ± 7.44	59.09 ± 6.14	0.23	NS
60	57.5 ± 9.03	56.3 ± 4.57	0.74	NS
90	59.5 ± 0.7	55 ± 3.6	0.14	NS
120	59.57 ± 6.6	60.48 ± 6.13	0.58	NS



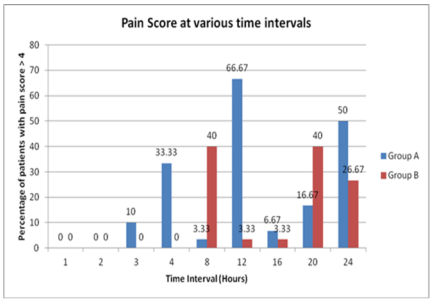
CHANGES IN SPO2 IN PERCENTAGE

Time Interval in minutes	Group A Mean ± SD	Group B Mean ± SD	p Value	Statistical Significance
Baseline	98.67 ± 1.24	98.17 ± 1.51	0.17	NS
0	98.67 ± 1.24	98.23 ± 1.55	0.24	NS
5	99 ± 0.74	98.23 ± 1.4	0.01	S
10	98.77 ± 0.9	98.2 ± 1.45	0.07	NS
15	98.1 ± 0.89	98.67 ± 1.18	0.04	S
30	97.9 ± 1.24	98.6 ± 1.04	0.02	S
45	98.24 ± 1.09	98.61 ± 0.99	0.27	NS
60	98 ± 0.81	98.55 ± 1.44	0.49	NS
90	98.5 ± 0.71	98.57 ± 2.15	0.96	NS
120	98.3 ± 0.79	98.67± 0.84	0.84	NS



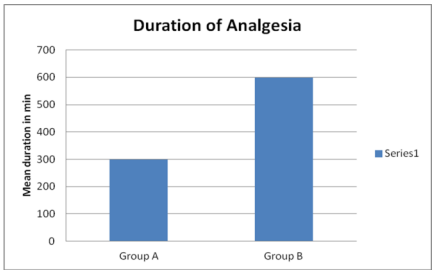
CHANGES IN FLACC SCORES

Time Interval in hours	Group A n (%)	Group B n (%)	p Value
1	0	0	
2	0	0	
3	3 (10%)	0	0.001
4	10 (33.33%)	0	0.001
8	1(3.33%)	12(40%)	0.001
12	20(66.67%)	1(3.33%)	0.001
16	2(6.67%)	1(3.33%)	0.923
20	5(16.67%)	12(40%)	0.027
24	15(50%)	8(26.67%)	0.05



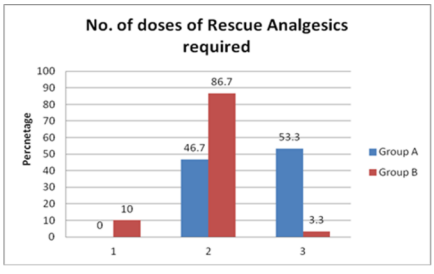
DURATION OF POSTOPERATIVE ANALGESIA

Group	Mean duration of Analgesia	SD	Range (Min)	p value	Statistical Significance
Group A	298.17	± 44.58	230 - 405	0.001	HS
Group B	598.17	± 78.33	485 - 755		



NUMBER OF RESCUE ANALGESICS

No.of doses of Rescue Analgesic	Group A n(%)	Group B n(%)	p Value	Statistical Significance
1	0(0%)	3(10%)	0.001	HS
2	14(46.7%)	26(86.7%)		
3	16(53.3%)	1(3.3%)		

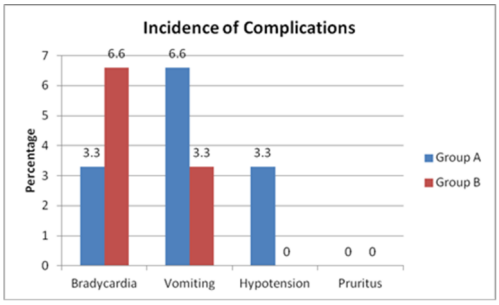


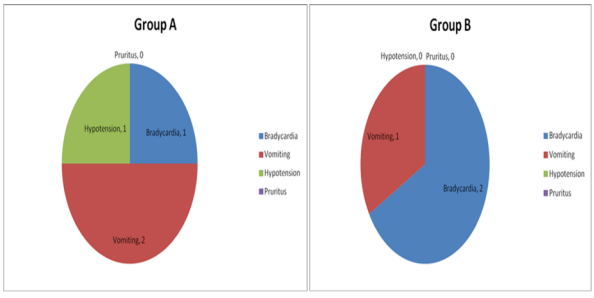
NUMBER OF PATIENTS REQUIRING RESCUE ANALGESICS

Time Interval in hours	Group A n (%)	Group B n (%)	p Value
1	0	0	
2	0	0	
3	3 (10%)	0	0.001
4	10 (33.33%)	0	0.001
8	1(3.33%)	12(40%)	0.001
12	20(66.67%)	1(3.33%)	0.001
16	2(6.67%)	1(3.33%)	0.923
20	5(16.67%)	12(40%)	0.027
24	15(50%)	8(26.67%)	0.05

INCIDENCE OF COMPLICATIONS

Complications	Group A n(%)	Group B n (%)
Bradycardia	1(3.3%)	2(6.6%)
Vomiting	2(6.6%)	1(3.3%)
Hypotension	1(3.3%)	0
Pruritus	0(0%)	0(0%)





Discussion

None of the 60 attempted caudal blocks was perceived as being a failed attempt. There was no statistically significant difference in the demographic profile of the children, duration of surgeries performed in the children and distribution of the various types of surgeries performed in the children in the study groups.

NUMBER OF RESCUE ANALGESICS:

- In bupivacaine group **14 (46.7%)** children required 2 doses and **16 (53.3%)** children required three doses of rescue analgesics respectively.
- Where as in dexmedetomidine group, **3 (10%)** required 1 dose, **26 (86.6%)** children required 2 doses and **1 (3.3%)** child required 3 doses of rescue analgesics respectively. The difference is statistically highly significant.

DURATION OF POSTOPERATIVE ANALGESIA:

The total duration of post-operative analgesia in bupivacaine group was **4.96 ± 0.74 h (3.83-6.75)**, while in dexmedetomidine group; it was **9.96 ± 1.33 h** (8.08 – 12.58 h). This difference between the two groups was highly significant

Conclusion

Dexmedetomidine , 1mcg/kg safely prolongs the duration of post-operative analgesia & reduces postoperative analgesia requirement, with minimum Hemodynamic derangements when it is added to Bupivacaine during caudal block for infra umbilical paediatric surgeries.

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