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POSTOPERATIVE ANALGESIA IN CHILDREN;

COMPARISON OF MEAN DURATION OF PAIN RELIEF USING CAUDAL BUPIVACAINE WITH AND WITHOUT NEOSTIGMINE FOR POSTOPERATIVE ANALGESIA IN CHILDREN UNDERGOING INFRA-UMBILICAL SURGERY.

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ABSTRACT... Objectives: To compare the mean duration of pain relief using caudal bupivacaine with and without neostigmine for postoperative analgesia in children undergoing infra-umbilical surgery. **Study design:** Randomized Controlled trial. **Settings:** Department of Anaesthsia Children Hospital/Institute of child health Faisalabad& Independent university hospital Faisalabad. **Duration of Study:** Six months from July 2017 to December 2017. **Methods:** 60 patients (30 in each group) were included in this study. Group-A given 1ml/kg of 0.25% caudal bupivacaine and Group-B given 1ml/kg of 0.25% caudal bupivacaine and 2μg/kg neostigmine. **Results:** Mean age was 4.20±1.09 and 4.13±1.07 years in group-A and B, respectively. Sex distribution shows, 22 patients (73.3%) in group-A and 9 (30.0%) in group-B were male while 8 patients (26.7%) of group-A and 11 patients (36.7%) of group-B were female. Mean duration of relief of pain (hours) in group-A was 6.70±2.12 hours and in group-B was 11.97±3.80 hours. Difference between group-A and group-B was considered statistically significant (P<0.001). **Conclusion:** Neostigmine with bupivacaine caudally in paediatric patients increases the duration of analgesia. However, neostigmine may be used for prolongation of caudal analgesia.

Key words: Caudal Bupivacaine, Neostigmine, Infraumbilical Surgery.

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INTRODUCTION

Untreated pain after surgical trauma in children is a potential cause of morbidity and mortality. Proper assessment of postoperative pain in various age groups and effective management is under research while other new drugs.[1] In pediatric practice, the use of regional anesthesia as postoperative analgesia, primary anesthetics or as adjuncts is common.[2]

Caudal block is the commonly performed regional anesthetic technique.[3] Caudal analgesia is administered through injection of local anesthesia in the caudal space which blocks sacral and lumber nerve roots. Caudal blockade affects the lower limb infrequently and has a low risk of dural puncture.[4]

Short duration of post-operative analgesia is a common limitation of single injection technique, however, the use of long-acting local anesthetics is inevitable. The commonly used method for further prolongation of postoperative analgesia after caudal block is to use some other adjunct agent in local anesthetic drugs.

The commonly used method to prolong postoperative analgesia following caudal block is to combine adjunct drugs to the local anaesthetics.

Neostigmine is one of the adjuncts which is used to prolong the duration of caudal analgesia.[5-6]

In a previous study duration of analgesia was 6.0±10.03 hours with bupivacaine-neostigmine (2μg/kg) used in caudal block.[7]

The rationale of this study was to make an assessment and justification of the approach taken towards the use of neostigmine with bupivacaine in pediatric caudal anaesthesia.

PATIENTS AND METHODS

In this study, 60 children (30 in each group) of either gender, between 2-5 years and ASA I or II, undergoing infraumblical surgeries were selected. General anaesthesia administered by using sodium pentothal 4-6mg/kg and endotracheal tube intubation done after using 1.mg/kg succinylcholine. The caudal block was performed with 23 gauge needle while patients in left lateral position under aseptic measures. We randomized cases by adopted computer generated tables and numbers.

Patients receiving 1 ml/kg of 0.25% caudal bupivacaine alone were allotted group-A. Group-B was allotted to the cases receiving 1 ml/kg of 0.25% caudal bupivacaine combined with neostigmine in a dose of 2μg/kg.

During surgery, we observed arterial pressure, heart rate and SpO2 at baseline. The children were followed in the recovery room till they awake, the duration of relief of pain was recorded by trainee researcher who was blind regarding the anaesthetic group using. Behavioral observational pain score (BOPS) used and the child was considered having pain when BOPS is >2.

RESULTS

In group-A, 7 patients (23.3%) were between 2-3 years old while 23 patients (76.7%) in group-A and 21 patients (70.0%) in group-B were between 4-5 years of age. Mean age of the patients was 4.20±1.09 and 4.13±1.07 years in group-A and B, respectively (Table-I).

Sex distribution shows, 22 patients (73.3%) in group-A and 9 patients (30.0%) in group-B were male while 8 patients (26.7%) of group-A and 11 patients (36.7%) of group-B were female (Table-II).

Majority of the patients in both groups were having ASA-II status (Table-III).

Age (Year)	Group-A		Group-B	
	No.	%	No.	%
2-3	07	23.3	09	30.0
4-5	23	76.7	21	70.0
Total	30	100.0	30	100.0
Mean±SD	4.20±1.09		4.13±1.07	

Table-I. Distribution of patients by age (n=60)

Sex	Group-A		Group-B	
	No.	%	No.	%
Male	22	73.3	19	63.3
Female	08	26.7	11	36.7
Total	30	100.0	30	100.0

Table-II. Distribution of patients by sex (n=60)

ASA Status	Group-A		Group-B	
	No.	%	No.	%
I	12	40.0	14	46.7
II	18	60.0	16	53.3
Total	30	100.0	30	100.0

Table-III. Distribution of patients by ASA status (n=60)

Relief of Pain (Hours)	Mean	S.D
Group-A	6.70	2.12
Group-B	11.97	3.80
T value	-6.628	
P value	P<0.001	

Table-IV. Duration of pain relief (hours) n=60

Mean duration of relief of pain (hours) in group-A was 6.70±2.12 hours and in group-B was 11.97±3.80 hours. (P<0.001) (Table-IV).

DISCUSSION

The prime objective of postoperative analgesia is to relieve pain as well as to inhibit trauma induced nociceptive impulses to blunt autonomic reflexes. It helps improve function restoration by allowing the patients to move freely.[8]

Use of enteral and parenteral analgesics are correlated with side effects including gastro-intestinal bleeding, thrombocytopenia, respiratory depression, nausea, vomiting, sedation, nephrotoxicity, hepatotoxicity etc. The regional technique e.g. caudal block, avoids various issues and provides the opportunity of a better analgesia with lower dose of drug and risk of complications.[9]

Adjuncts like morphine, midazolam, clonidine[10] and ketamine[11] are used with local anesthetic agents for prolongation of analgesia duration and reduction of individual dose of the drug.[12]

Neostigmine inhibits the breakdown of acetylcholine which produces analgesia.[13] Increased accumulation of acetylcholine at cholinergic receptors in the spinal cord may produce analgesia.[14]

In our study, neostigmine was used in the dose of 2μg/kg and found significant prolongation of analgesia 11.97±3.80 hours as compared to those were received caudal bupivacaine alone (6.70±2.12 hrs) (p<0.001). These findings are comparable with study of Kaushal et al.[6]

Lee et al studied 46 patients, aged 1-10 years, undergoing elective orthopedic surgery. They were randomly allocated to two equal groups to receive 0.25% bupivacaine 1ml/kg with either normal saline 1ml (group A) or clonidine 2μg/kg in 1 ml normal saline (group B). It was found that addition of clonidine improved the efficacy of caudal analgesia significantly compared to that provided by bupivacaine alone (9.2 hours vs 5.2 hours, p<0.0001).[21]

Caudal epidural analgesia is most commonly used in paedriatic infraumblical surgeries. This techniques is performed with or without adjuncts for postoperative analgesia for lower abdominal, genital and other infraumblical surgeries.[15]

Caudal additives that are commonly used are Morphine, Fentanyl, Midazolam, Ketamine, Tramadol, Neostigmine and Clonidine.[16]

Neostigimine when used as an adjunct showed effectively counteracting the effect of bupivacaine on sympathetic nervous system.[17]

Neostigmine has been shown to be effective alternative to anti-nociceptive drugs due to safe hemodynamic and respiratory profile.[18]

In clinical practice, the use of neostigmine as an analgesic agent is not widely accepted yet and it is being used for an off-label indication.[19]

A previous study showed a relatively frequent incidence of vomiting and nausea with the use of intrathecal neostigmine in a dose of 6.25-50ug/kg.[20]

CONCLUSION

Caudal bupivacaine in combination with 2μg/kg neostigmine produced a dose-independent analgesic effect (11.97±3.80 hrs) in children as compared to those receiving caudal bupivacaine alone (6.70±2.12 hrs). In conclusion, addition of neostigmine with bupivacaine administered caudally in paediatric patients significantly increases the duration of analgesia. Therefore, caudal neostigmine in combination with a local anesthetic may be used as the drug of choice to prolong the duration of postoperative analgesia.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Shumyala Maqbool	Data collection, Manuscript writing, Proof reading.	
3	Muhammad Afzal Mirza	Data analysis, References, Proof reading.	
4	Muhammad Rauf	Drafting, Supervision.	