Quest Journals
Journal of Medical and Dental Science Research
Volume 8~ Issue 2 (2021) pp: 19-24
ISSN(Online) : 2394-076X ISSN (Print):2394-0751
www.questjournals.org

Research Paper

Caudal Clonidine: One Arrow Two Targets Postoperative Pain and Emergence Agitation

Dr Vishakha Khaparkar [1], Dr Avinash kamble[2],Dr Vrishali ankalwar[3]
1 Senior resident, government medical college, nagpur
2 Senior resident, government medical college, nagpur
3 Associate professor, government college,nagpur

ABSTRACT:
Background: *The aim of the study was to study the effect of caudal clonidine on the post operative pain and emergence agitation given via a single shot caudal epidural in pediatric patients.*
Material and Methods: *In the present observational study, 60 children of ASA-I aged 2-7 years with weight less than 20 kg posted for sub-umbilical surgical procedures under general anaesthesia received injection Bupivacaine 0.25% (0.75ml/kg) + Clonidine 1 mcg/kg caudally. Caudal block was performed after the induction of general anaesthesia . Postoperatively patients were observed for analgesia, hemodynamic stability, need of rescue medication, emergence delirium, side effects/complications.*
Result: *All the patients were heamodynamically stable during and after the procedure. Amongst the 60 patients observed about 38 , 18 and 4 pateints required one, two and three dose of rescue analgesic. Out of all, 3 patients had emergence agitation. None of patient had any side effects/ complications.*
Conclusions: *Clonidine in a dose of 1mcg/kg added to 0.25% bupivacaine for caudal analgesia and administered as a 0.75ml/kg in children for infraumbilical surgery , significantly prolongs the duration of postoperative analgesia and reduce incidence of EA, without any respiratory or hemodynamic side effects.*
KEYWORDS: *Caudal epidural, clonidine, postoperative analgesia, emergence agitation.*

Received 16 Feb, 2021; Revised: 28 Feb, 2021; Accepted 02 Mar © The author(s) 2021.
P*ublished with open access at www.questjournals.org*

I. INTRODUCTION:

Incidence of postoperative pain in children is 40% with upto 13% experiencing severe pain(1). Historically they were undertreated for pain due to misconceptions like Children do not feel pain and risk of addiction to powerful opioid analgesics(2). Alleviation of pain is a "basic human right", irrespective of age, medical condition and this undertreated pain may lead to Chronic pain conditions in future and also emergence agitation (EA) in immediate postoperative period (20-80%)(3,4), which may cause, parental apprehension and burden to caregivers and delayed recovery and discharge from the hospital. Now, postoperative pain management is becoming an integral part of anesthesia care in all major hospitals.various adjuvants such as Opioids (5), midazolam [2], tramadol(6), dexmedetomidine, clonidine(5,7–9), ketamine, (10), and have been used for caudal block with various results.Clonidine, an alpha-2 agonist has been studied as an adjuvant in caudal epidural block for prolonging the duration of analgesia and since pain is a risk factor for emergence agitation (EA)(7,8), caudal clonidine may reduce incidence of EA(11,12) too. Knowing the magnitude and impact of postoperative pain and emergence agitation or delirium in pediatric population, we planned to study the effects of clonidine as an adjuvant to bupivacaine in caudal block for prolongation of postoperative analgesia and to study incidence of emergence agitation in pediatric population. Another primary objective was to assess the requirement of postoperative rescue analgesics. Secondary objectives to be assessed included: Intraoperative hemodynamic changes and any post operative and intraoperative adverse events.

HYPOTHESIS –"use of single shot caudal clonidine is associated with prolonged duration of postoperative analgesia with prevention of EA in pediatrics patients"

II. MATERIAL AND METHOD

After obtaining Institutional Ethical Committee approval and written informed consent from the parents, this prospective observational, single centre study was conducted in 60 patients. The study included

patients with American Society of Anesthesiologists physical status I, age between 2 to 7years, weight less than 20kg who underwent sub-umbilical surgeries (urethroplasty) under general anesthesia. Children with local infection of the caudal area, history of allergic reactions to local anesthetics, bleeding diathesis, preexisting neurological or spinal diseases, mental retardation, and neuromuscular disorders were excluded from the study.

After doing pre anesthetic checkup and confirming that the patient fits in decided inclusion criteria, after obtaining proper informed consent from the concerned parents and ensuring patent IV access, the patients were then shifted to the operation theater and connected to monitors; electrocardiogram, noninvasive blood pressure and pulse oximeter and baseline values were recorded. Patients were pre-medicated with intravenous Glycopyrrolate 4mcg/kg and sedated with intravenous Midazolam 0.02mg/kg + Ketamine 0.5mg/kg. Induction was done by intravenous Propofol 2mg/kg followed by intravenous Atracurium 0.5mg/kg. Airway was secured with proseal LMA of appropriate size (1.5-2) depending on the weight of the patient. Anesthesia was maintained on 50% N_2O + 50%O_2 + Sevoflurane (2-3%) and Ringer lactate solution was administered as per the calculated fluid requirements. After induction, patients were placed in the lateral decubitus position and a single shot caudal epidural was performed under all aseptic precautions, using a 23G hypodermic needle, by an anesthesiologist who had two years of experience. Injection Bupivacaine 0.25% (0.75ml/kg) + Clonidine 1 mcg/kg was given caudally. The patients were extubated at the end of the procedure and the duration of anesthesia was noted in all the groups.

During intra-operative period, adequacy of analgesia was gauged by hemodynamic stability. Absence of rise of heart rate(HR) or mean arterial pressure (MAP) of more than 15% compared with baseline values recorded just before surgical incision was considered as adequate analgesia. An increase in HR or MAP (>15%), 15 min after administration of caudal anesthesia was defined as failure of analgesia. If HR, MAP increased 45 min after surgical incision it was considered as inadequate analgesia. Patients with failure of caudal analgesia or inadequate analgesia were given fentanyl 2 μg/kg intravenously. Patients, in whom caudal anesthesia failed or inadequate analgesia was present, were excluded from study. The patients were continuously observed for 24 h postoperatively.

Postoperative assessment was done by another anesthesiologist in the postanesthesia care unit (PACU) who was not aware of the drug administered and by a nurse in the ward. Pain score was assessed using the FLACC (F — face, L — leg, A — activity, C — cry,C — consolability) scale [Table 1]. Assessment of pain by FLACC scale was done at 0, 1, 2, 3, 4, 8, 12 and 24 h postoperatively. The time from caudal placement of drug to the first recording of a FLACC score ≥4 was taken as the duration of analgesia.

In the PACU, the necessity for rescue medicine was decided by the pain score. Rescue medication was administered when patients had score of ≥4 on at least 2 occasions or showed obvious signs of pain. Paracetamol suppository was used as rescue medicine with a loading dose of 40 mg/kg followed by20 mg/kg every 6 h . The number of doses of rescue medication required and the time to first administration of rescue medication were also noted. The HR and blood pressure were measured at intra-operatively and immediate postoperatively. Sedation scores were recorded at 0, 1,2, 4, 8, and 12 h after surgery using a 4 point sedation score [Table 2]. Children were also observed for occurrence of emergence delirium with Watcha's score after 1st postoperative hour. [table 3] In the postoperative period, patients were also monitored for adverse effects, including shivering, respiratory depression, vomiting ,urinary retention, hypotension and bradycardia. Respiratory depression was defined as a decrease in oxygen saturation <93%, requiring oxygen by face mask. Hypotension was defined as systolic blood pressure (SBP) <70 mm Hg and bradycardia was defined as a HR <80 beats/min.

Table 1. FLACC pain scale

Parameter	0	1	2
Face	No expression	Occasional grimace	Frequent to constant quivering chin
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quiet	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry	Moans or whimpers	Crying steadily
Consolability	Content, relaxed	Reassurance, hugging	Difficult to console

Table 2. Four (4) point sedation score

Sedation score	
Asleep, not arousable by verbal contact	1
Asleep, arousable by verbal contact	2
Drowsy not sleeping	3
Alert / Awake	4

Table 3. Watcha's Score

Behavior	Score
Asleep	0
Calm	1
Crying but can be consoled	2
Crying but cannot be consoled	3

III. RESULTS

In our study we observed 60 patients, undergoing infraumbilical surgeries(urethroplasty, herniotomy). Mean age of patients was 4.45yrs, mean weight being 14.19 and mean duration of surgery being 69min. There was no significant change in HR during intraoperative and postoperative period, as observed by mean sytolic blood pressure baseline was 90.56, intraoperative was 90.33 and postoperative was also 90.48 and change in systolic blood pressure baseline, intraoperatively and postoperatively was acceptable.

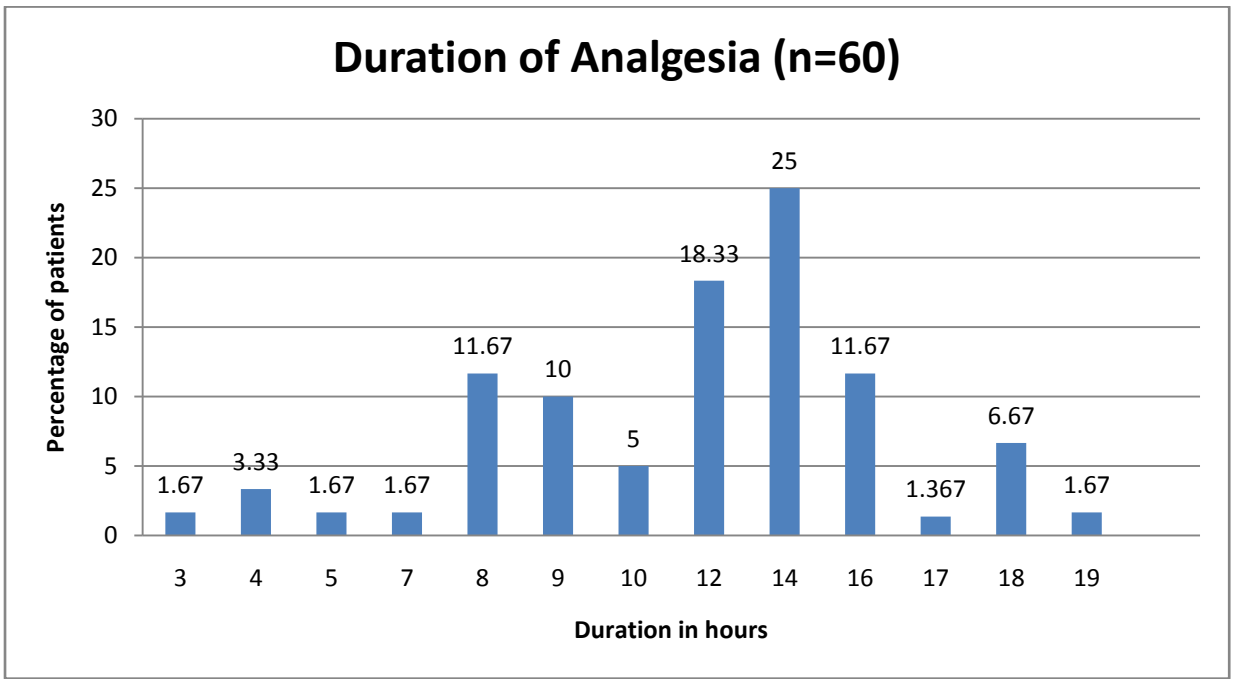
Surgical analgesia in all patients was found to be adequate, as indicated by absence of an increase in MAP or HR of >10% Of baseline .

Table 4: Demographic and clinical data

Parameters	Mean
Age (years)	4.45(±0.9)
Weight (kg)	14.19(±1.67)
Duration of Surgery (min)	69.16
Duration of analgesia (hrs)	12.08(±0.95)
Baseline: HR (beats/min)	98
Baseline: SBP (mmHg)	90

Data shown as mean ± SD. SD = Standard deviation, HR = Heart rate, SBP = Systolic blood pressure

The pain score was assessed using the FLACC pain scale .The FLACC pain score never reached ≥4 during the first 3 h in any of the patients. Mean duration of postoperative analgesia (FLACC score <4) 12.08±0.95 hours with 95% confidence interval.

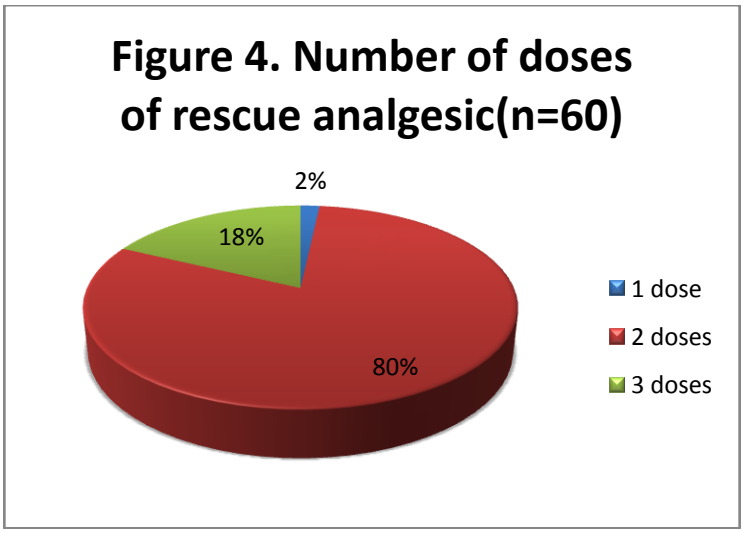


Amongst the 60 patients observed about 63.33% required single dose of rescue analgesic,30% required two doses of rescue analgesic and about 6.66% required three doses of rescue analgesic.

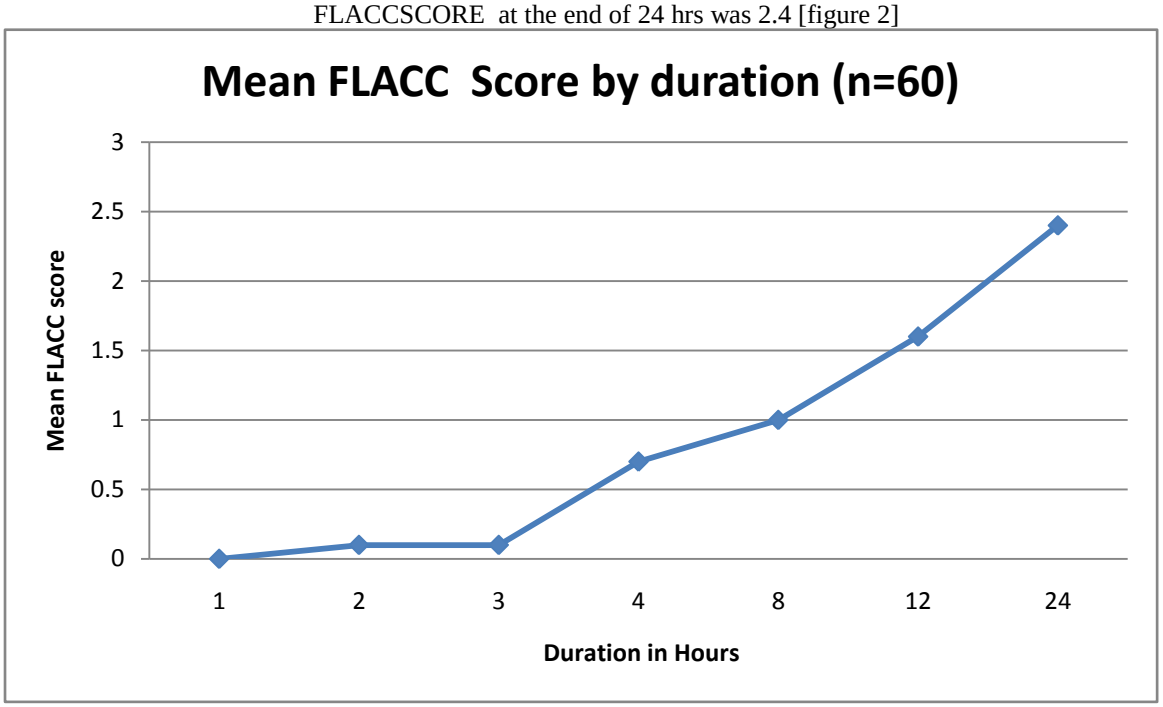
1 doses of rescue analgesic – 38 pts, (63.33%)

2 doses of rescue analgesic-18 pts (30%)

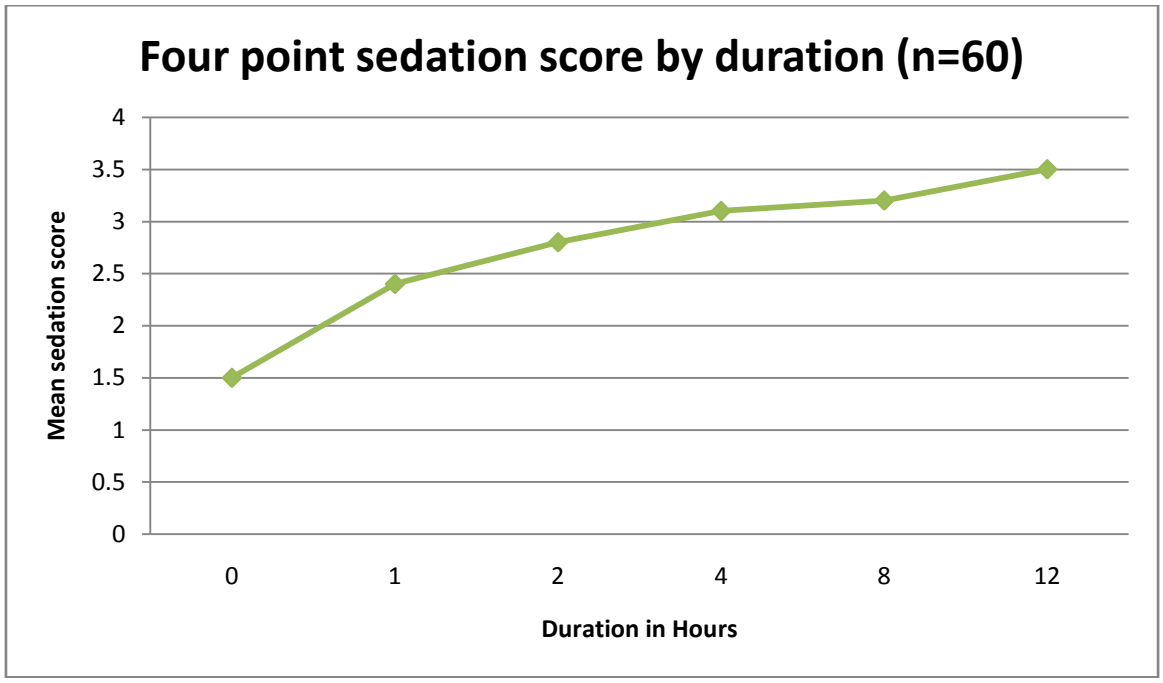
3doses of rescue analgesic-4 pts. (6.66%)



None of patients had score >=4 during first 3 hours and 66% patients <4 in first 12 hours. Mean FLACCSCORE at the end of 24 hrs was 2.4 [figure 2]



Four point sedation score of the patients ,Mean sedation score in immediate postoperative period was1.5(+- 0.5) at 30 min. Thereafter there was gradual rise in mean sedation score in all the patients(figure 1)



Out of the 60 patients observed 3 patients had emergence agitation, i.e. Emergence agitation as observed by Watch's scale, overall incidence was 5%.

None of patient had any episode of shivering, respiratory depression, Postoperative nausea and vomitting ,hypotension , bradycardia or urinary retention.

IV. DISCUSSION

Caudal epidural anesthesia is a relatively simple, frequently used technique, caudal clonidine when used epidurally provides very effective analgesia intra and postoperatively in pediatric patients undergoing infra-umbilical surgeries2021/3/3. Clonidine was demonstrated to have an analgesic action when administered via epidural route(17). Caudal clonidine, combined with bupivacaine has been used in varying doses and it was found that increasing the dose of clonidine from 1 µg/kg to 2 µg/kg did not enhance its efficacy(15,18,19),and when 1 µg/kg clonidine was used as an adjuvant for epidural caudal blocklesser incidence of hypotension, bradycardia(20) and respiratory depression (21).clonidine 1µg /kg provided increased duration and better quality of pain relief with no motor blockade and sedation when added to 0.1% ropivacaine compared to plain 0.1% ropivacaine and 0.2% ropivacaine as demonstrated by Dr. Manickam et al(22).Thus, we used 1 µg/kg clonidine as an adjuvant to 0.25% bupivacaine.

Our study indicates that addition of clonidine to bupivacaine for epidural caudal block as an adjuvant is safe and efficacious in prolonging the duration of postoperative analgesia in children undergoing lower abdominal surgeries comparable to other studies. Furthermore, postoperative rescue analgesic requirements decreased with the use of clonidine with no side-effects(23,24). In terms of Mean duration of analgesia (12.21 hour) and doses of rescue analgesics in first 24 hours(6% -3doses, 32% -2 doses, and 62%-1 dose) our finding s were comparable to those observed by Sanwatsarkar et al(5). Although authors have studied various doses (1-3mcg/kg) , in our study dose of 1mcg/kg provided longer duration of analgesia as only 3 patients required 3 doses of rescue analgesics. Antinociceptive action is due to the direct suppression of spinal cord nociceptive neurons by epidural clonidine.

In this study we found that addition of clonidine prolongs duration of analgesia and reduce EA as reported by Saxena A, Sethi A et al(8,25).We used Watcha's scale to quantify severity of EA. Delayed onset of analgesia has association with EA. But, EA can occur after non-painful procedures or diagnostic anesthetics e.g. MRI studies, which is attributable to inhalational agent itself that has some neuropharmacological stimulus to postoperative agitation in immature nervous system(26). Alpha 2 agonist by reducing secretion of noradrenalin from the locus cerulus, facilitate release of inhibitory neurons, such as those of gamma-aminobutyric acid system, thereby reducing incidence of EA(27).

V. CONCLUSION

Clonidine in a dose of 1mcg/kg added to 0.25% bupivacaine for caudal analgesia and administered as a 0.75ml/kg in children for infraumbilical surgery , significantly prolongs the duration of postoperative analgesia and reduce incidence of EA, without any respiratory or hemodynamic side effects.

REFRENCES:

[1]. Kozlowski LJ, Kost-Byerly S, Colantuoni E, Thompson CB, Vasquenza KJ, Rothman SK, et al. Pain Prevalence, Intensity, Assessment and Management in a Hospitalized Pediatric Population. Pain Manag Nurs. 2014 Mar 1;15(1):22–35.

[2]. Wang XS, Tang JY, Zhao M, Guo H, Mendoza T, Cleeland CS. Pediatric Cancer Pain Management Practices and Attitudes in China. J Pain Symptom Manage. 2003 Aug 1;26(2):748–59.

[3]. Mehrotra S. Postoperative anaesthetic concerns in children: Postoperative pain, emergence delirium and postoperative nausea and vomiting. Indian J Anaesth. 2019 Sep;63(9):763–70.

[4]. Luo J, Min S. Postoperative pain management in the postanesthesia care unit: an update. J Pain Res. 2017 Nov 16;10:2687–98.

[5]. Sanwatsarkar S, Kapur S, Saxena D, Yadav G, Khan NN. Comparative study of caudal clonidine and midazolam added to bupivacaine during infra-umbilical surgeries in children. J Anaesthesiol Clin Pharmacol. 2017 Apr 1;33(2):241.

[6]. Prakash S, Tyagi R, Gogia AR, Singh R, Prakash S. Efficacy of three doses of tramadol with bupivacaine for caudal analgesia in paediatric inguinal herniotomy. BJA Br J Anaesth. 2006 Sep 1;97(3):385–8.

[7]. Sinha C, Kumar B, Bhadani UK, Kumar A, Kumar A, Ranjan A. A comparison of dexamethasone and clonidine as an adjuvant for caudal blocks in pediatric urogenital surgeries. Anesth Essays Res. 2016;10(3):585–90.

[8]. Saxena A, Sethi A, Agarwal V, Godwin RB. Effect of caudal clonidine on emergence agitation and postoperative analgesia after sevoflurane anaesthesia in children: Randomised comparison of two doses. Indian J Anaesth. 2014;58(6):719–25.

[9]. Ropivacaine- clonidine combination for caudal blockade in children - Ivani - 2000 - Acta Anaesthesiologica Scandinavica - Wiley Online Library [Internet]. [cited 2020 Jun 29]. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1034/j.1399-6576.2000.440415.x

[10]. Comparison of the effects of adrenaline, clonidine and ketamine on the duration of caudal analgesia produced by bupivacaine in children. | BJA: British Journal of Anaesthesia | Oxford Academic [Internet]. [cited 2020 Jun 29]. Available from: https://academic.oup.com/bja/article/75/6/698/261293

[11]. Silva LM da, Braz LG, Módolo NSP. Emergence agitation in pediatric anesthesia: current features. J Pediatr (Rio J). 2008 Mar 27;84(2):107–13.

[12]. Mason LJ. Emergence Delirium. :13.

[13]. Lönnqvist PA. Adjuncts to caudal block in children—Quo vadis? BJA Br J Anaesth. 2005 Oct 1;95(4):431–3.

[14]. El-Hennawy AM, Abd-Elwahab AM, Abd-Elmaksoud AM, El-Ozairy HS, Boulis SR. Addition of clonidine or dexmedetomidine to bupivacaine prolongs caudal analgesia in children. BJA Br J Anaesth. 2009 Aug 1;103(2):268–74.

[15]. Caudal Additives in Pediatrics: A Comparison Among Midazolam... : Anesthesia & Analgesia [Internet]. [cited 2020 Jun 29]. Available from: https://journals.lww.com/anesthesia-analgesia/FullText/2005/07000/Caudal_Additives_in_Pediatrics__A_Comparison_Among.13.aspx

[16]. Yildiz TS, Korkmaz F, Solak M, Toker K. Clonidine addition prolongs the duration of caudal analgesia. Acta Anaesthesiol Scand. 2006;50(4):501–4.

[17]. Tamsen A, Gordh T. EPIDURAL CLONIDINE PRODUCES ANALGESIA. The Lancet. 1984 Jul 28;324(8396):231–2.

[18]. Caudal Clonidine in Day-Care Paediatric Surgery [Internet]. [cited 2020 Jun 29]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2894500/

[19]. Klimscha W, Chiari A, Michalek-Sauberer A, Wildling E, Lerche A, Lorber C, et al. The Efficacy and Safety of a Clonidine/Bupivacaine Combination in Caudal Blockade for Pediatric Hernia Repair. Surv Anesthesiol. 1999 Apr;43(2):90–91.

[20]. Eisenach J, Lysak S, Viscomi C. Epidural Clonidine Analgesia following Surgery: Phase I. Anesthesiology. 1989 Nov;71(5):640–6.

[21]. Lak M, Araghizadeh H, Shayeghi S, Khatibi B. Addition of Clonidine in Caudal Anesthesia in Children Increases Duration of Post-Operative Analgesia. Trauma Mon. 2012;16(4):170–4.

[22]. Manickam A, Vakamudi M, Parameswari A, Chetan C. Efficacy of clonidine as an adjuvant to ropivacaine for caudal analgesia in children undergoing subumbilical surgery. J Anaesthesiol Clin Pharmacol. 2012;28(2):185–9.

[23]. Tripi PA, Palmer JS, Thomas S, Elder JS. Clonidine increases duration of bupivacaine caudal analgesia for ureteroneocystostomy: a double-blind prospective trial. J Urol. 2005 Sep;174(3):1081–3.

[24]. Priolkar S, D'Souza SA. Efficacy and Safety of Clonidine as an Adjuvant to Bupivacaine for Caudal Analgesia in Paediatric Infra-Umbilical Surgeries. J Clin Diagn Res JCDR. 2016 Sep;10(9):UC13–6.

[25]. Bajwa SJS, Kaur J, Bajwa SK, Bakshi G, Singh K, Panda A. Caudal ropivacaine–clonidine: A better post-operative analgesic approach. Indian J Anaesth. 2010;54(3):226–30.

[26]. Misal US, Joshi SA, Shaikh MM. Delayed recovery from anesthesia: A postgraduate educational review. Anesth Essays Res. 2016;10(2):164–72.

[27]. Giovannitti JA, Thoms SM, Crawford JJ. Alpha-2 Adrenergic Receptor Agonists: A Review of Current Clinical Applications. Anesth Prog. 2015;62(1):31–8.