

Analgesic efficacy of bupivacaine alone versus bupivacaine plus dexmedetomidine in penile block for hypospadias surgery

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Abstract

Introduction: Hypospadias is a common pediatric surgical procedure. Early postoperative pain management is essential to inhibit pain impulses and endocrine responses; leading to decreased mortality and morbidity and lower rate of agitation and faster return to normal functional status. This study evaluates the analgesic efficacy of bupivacaine alone versus bupivacaine plus dexmedetomidine in penile block for hypospadias surgery.

Materials and Methods: In this randomized clinical trial, 64 children undergoing hypospadias surgery in a referral center in Tehran, Iran during 2018 were enrolled and randomly assigned to receive either bupivacaine 0.25% alone 0.2 ml/kg or bupivacaine 0.25% 0.2 ml/kg plus dexmedetomidine 0.3 µg/kg. After performing penile block, reversion of anesthesia was carried out and patients were extubated after regaining complete consciousness. Patients were monitored for 24 hours for pain according to FLACC scale and also the analgesia and block duration was determined.

Results: Mean analgesia duration was 2.63±0.9 and 2.03±0.5 hours in the combination group and alone group respectively which was significant (P=0.003). The mean duration of block was significantly longer in the combination group (P=0.001).

Conclusions: According to the results it may be concluded that addition of dexmedetomidine to bupivacaine in hypospadias surgeries would result in longer analgesia and block duration; without addition of adverse effects.

Keywords

- Hypospadias
- Penile Block
- Pediatric Surgery

Introduction

Hypospadias surgery is a common pediatric surgery procedure.¹ Postoperative pain management is an important step for better convalescence and reduction of nociceptive and endocrinological responses as well as reduction of mortality and morbidity. With a lower agitation rate normal functional status will be regained faster.² Sufficient postoperative pain management is important and necessary; but there are some difficulties in the pediatric settings.^{3,4} Opioids usually may result in some adverse effects in patients including itching, vomiting, nausea, respiratory suppression, and decreased levels of consciousness.⁵ Also non-steroidal anti-inflammatory drugs (NSAID) may result in platelet dysfunction, bleeding, and renal dysfunction.⁶ Regional anesthetic methods are usually accompanied with a lower rate of therapeutic adverse effects.⁷ Bupivacaine has a short acting duration as a local anesthetic and dexmedetomidine is a highly selective alpha-1 agonist that is used as an adjunctive agent in regional anesthesia which as well as increasing the block duration, would result in a better pain control during and after procedures.⁸⁻¹⁰ There are few studies about efficacy of dexmedetomidine an adjunctive agent for bupivacaine to increase the penile block. Accordingly in this study the analgesic efficacy of bupivacaine alone versus bupivacaine plus dexmedetomidine in penile block for Hypospadias surgery was determined.

Materials and methods

In this randomized clinical trial, 64 consecutive children undergoing hypospadias surgery in a referral training center in Tehran, Iran during

2018 were enrolled in to two groups of 32. The inclusion criteria were age less than 7 years and elective surgeries and the exclusion criteria was complicated surgeries lasting over three hours. Initially the study protocol and conditions was explained for all parents and then informed consents were signed. Helsinki Declaration was respected across the study and the study was approved by the local ethical committee.

All standard monitoring approaches including ECG, Non-invasive Blood Pressure (NIBP), and O₂ saturation were recorded at entry to the operation room. Then dextrose-saline solution was infused for the patients. The general anesthesia was induced by fentanyl 2 µg/kg plus propofol 2 mg/kg plus atracurium 0.5 mg/kg. Laryngeal mask airway (LMA) was used to maintain the airway. Patients were randomly assigned by computer (systematic) to receive either bupivacaine 0.25% alone 0.2 ml/kg or bupivacaine 0.25% with a dose of 0.2 ml/kg plus dexmedetomidine 0.3 µg/kg. After termination of surgery and before extubation of patients the penile block was carried out. Subsequent to performing penile block, reversion of anesthesia was carried out, and patients were extubated after regaining complete consciousness. Patients were monitored for 24 hour for pain (hours 2, 4, 6, 8, 10, 12, 18, and 24) according to FLACC (face, legs, activity, cry, and consolability). Also need for analgesia and duration between block and first analgesic administration was recorded. The analgesic agent used was paracetamol 10 mg/kg. If paracetamol was not effective, pethedine with a dose of 1mg/kg was administered. Analgesic was used for patients with a FLACC score of more than 5 points. Total used analgesic doses were also recorded.

Data analysis was performed using SPSS (version 24.0). Kolmogorov-Smirnov, Independent-Sample-T, and repeated-measure ANOVA tests were used. Differences were considered statistically significant at P values less than 0.05.

Results

The mean age was 11.8 ± 1.6 and 11.5 ± 0.8 in

the combined group and the bupivacaine alone groups, respectively ($P=0.297$). Mean analgesia duration was 2.63 ± 0.9 and 2.03 ± 0.5 hours in the combined group and the bupivacaine alone groups, respectively with a significant difference ($P=0.003$). As shown in **Figure 1**, the mean duration of block was significantly longer in the combination group ($P=0.001$).

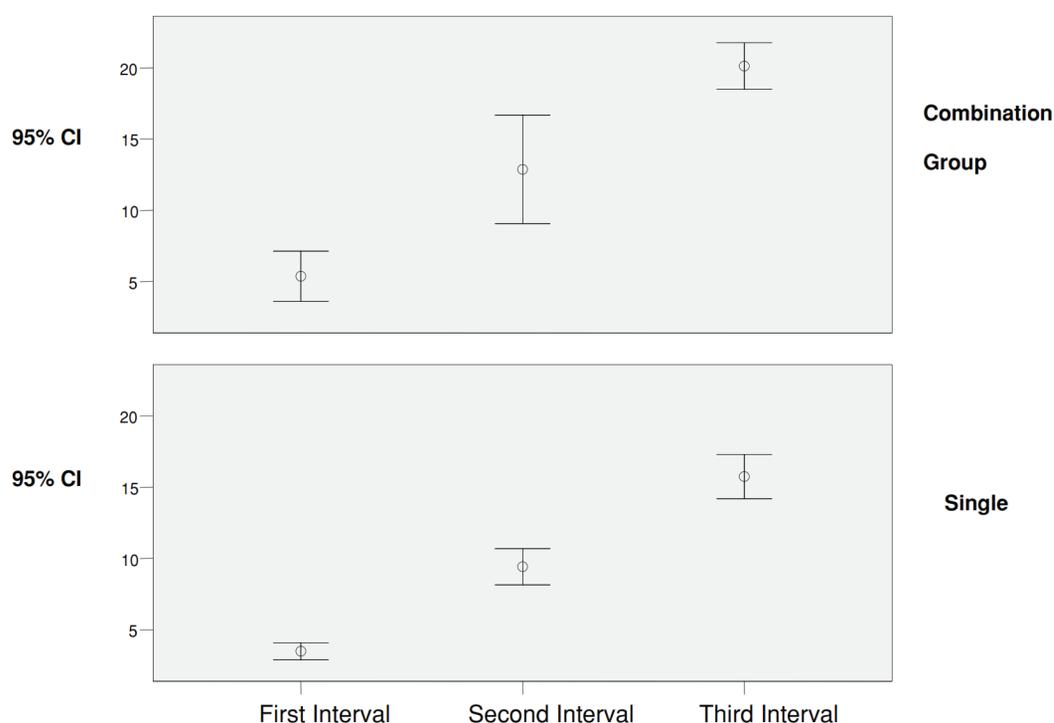


Figure 1: Block duration across the groups during the study

Discussion

In this study the analgesic efficacy of bupivacaine alone versus bupivacaine plus dexmedetomidine in penile block for hypospadias surgery was determined. Addition of dexmedetomidine resulted in a longer analgesia and penile block duration in

patients, along with a high safety profile. Karkera et al¹¹ assessed 849 children in a retrospective cohort and found that use of bupivacaine without intravenous fentanyl would have minimal effect on the analgesic dose.

Goyal et al¹² assessed children undergoing surgeries

in the infra-umbilical region and compared caudal block with bupivacaine alone versus in combination with dexmedetomidine and reported better pain control in the combination group during 24 hours after surgery with good hemodynamic stability. Due to some limitations we were not able to monitor the homodynamics of our patients. But similarly in our study the combination therapy had better outcomes. The study by Raof et al¹³ revealed that addition of dexmedetomidine 0.125% to bupivacaine 0.125% would result in decreased bupivacaine requirement and use of morphine for analgesia was significantly decreased in the combination group which was similar to our study.

Jarineshin et al¹⁴ compared combination of dexmedetomidine and bupivacaine versus fentanyl and bupivacaine versus bupivacaine alone. They found that the group who received combination of dexmedetomidine and bupivacaine had lower analgesic requirement after surgery similar to our study. The study by Kamal et al¹⁵ demonstrated that

rupivacaine in combination with dexmedetomidine would result in better analgesic effects and lower the need for analgesic use similar to our result.

Conclusion

According to the results it may be concluded that addition of dexmedetomidine to bupivacaine in hypospadias surgeries would result in longer analgesia and block duration; without addition of adverse effects. Hence use of this combination method is recommended to improve the analgesia in children under hypospadias surgery.

Conflict of Interest

There is no conflict of interest.

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