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## Evaluation of addition of dexmedetomidine to bupivacaine in caudal anaesthesia in patients undergoing hemorrhoidectomy

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### Abstract

**Background:** Hemorrhoidectomy is one of the most commonly performed surgeries done for hemorrhoids. However this procedure entails perioperative pain. This study aimed at evaluating the effect of addition of dexmedetomidine to bupivacaine on the onset, duration of analgesia as well as post operative analgesia.

**Methods:** 60 adult patients were randomly divided into two groups. Group B received 10 ml of 0.5% bupivacaine plus 5 ml saline (total 15ml). Group BD received 10ml of 0.5% bupivacaine plus 5ml of 1µg/kg dexmedetomidine (total 15ml). Heart rate, blood pressure were noted intraoperatively. Also the onset and duration of sensory block and duration of analgesia were noted.

**Results:** The onset of sensory block was faster and duration of sensory block was also longer in group BD. The duration of analgesia also lasted longer in group BD. There was no episode of hypotension or bradycardia.

**Conclusion:** Dexmedetomidine produces a faster onset and a longer duration of sensory block without any haemodynamic instability caused to any patient.

**Keywords:** Bupivacaine, caudal anaesthesia, dexmedetomidine, hemorrhoidectomy.

### Introduction

Hemorrhoidectomy is a surgical procedure done for hemorrhoid disease. The procedure entails intense peri-operative pain which causes discomfort to the patient. Adequate pain control is important as it improves the early rehabilitation of the patient by providing a pain free post operative period.

Single shot caudal anaesthesia is easy to perform and provides adequate analgesia and relaxation of the anal sphincter [1]. Prolonging the duration of analgesia would be extremely desirable especially in hemorrhoidectomy patients. A number of adjuvants when added to local anaesthetics can increase the duration of block like fentanyl [2], ketamine [3], midazolam [4] and morphine [5]. Each of these adjuvants display side effects unique to them. Behavioural changes have been seen with caudal ketamine, opioids cause respiratory depression and there is still controversy over neurotoxicity of midazolam. So choosing an adjuvant which provides the desired effect with minimal complications is of utmost importance.

Dexmedetomidine is a selective alpha-2 receptor agonist that has sedative, analgesic, anti-anxiety and anti-inflammatory properties. When administered as an adjuvant in epidural space it has been shown to reduce analgesic requirements [6] and have a profound analgesic effect [7].

Thus, this study was designed to assess the effect of addition of dexmedetomidine to bupivacaine in caudal anaesthesia for hemorrhoidectomy.

### Materials and methods

After obtaining approval from hospital ethical committee informed consent was taken from all 60 patients who were a part of the study. Inclusion criteria were – age 18 to 60 years, BMI <40 kg/m<sup>2</sup> ASA 1 and 2 patients posted for hemorrhoidectomy. Patients aged <18 and >60 years, allergy to local anaesthetics, BMI > 40kg/ m<sup>2</sup> with coagulation defects, infection at puncture site, any neurological or spine deformity, and any severe cardiac, respiratory, hepatic or renal disease were excluded from the study. The patients were randomly divide into two groups- group B received 10 ml of 0.5% bupivacaine plus 5 ml saline (total 15ml).

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Group BD received 10ml of 0.5% bupivacaine plus 5ml of 1µg/kg dexmedetomidine.

All the patients underwent standard pre anaesthetic check up on the night prior to surgery. On the day of the procedure patients were shifted to the operating room and all the routine monitoring was started namely pulse oximetry (SpO<sub>2</sub>), Non invasive blood pressure (NIBP), and electrocardiography (ECG) was started. An iv line was secured with 20G cannula and ringer lactate infusion was started while the patient was kept in left lateral position. Under all aseptic precautions, the caudal space was identified with help of standard landmarks and a 22G needle was inserted into caudal epidural space. After negative aspiration for blood and CSF and confirmation of caudal space by modified swoosh test, the study drugs were injected in the epidural space.

Demographic parameters of all patients including age, sex, weight, gender, block administration time and duration of surgery were recorded. Intra operatively heart rate and blood pressure were recorded at baseline after administration of block and then every 5 minutes upto the end of surgery. Perioperative bradycardia (fall of > 20% from baseline) and hypotension (systolic BP < 20% from baseline) were recorded.

Sensory block was assessed using pin prick sensation every 2 min for first 10 min and every 5 min thereafter. Loss of sensation to pinprick was taken as endpoint of attainment of complete sensory block. The onset of sensory block (time between administration of block and complete loss of pinprick sensation) was noted.

Duration of analgesia (taken as the time from onset of sensory block to the first complain of pain – visual analogue scale grade 4 or more) was also noted.

### Statistical analysis

Statistical analysis were performed using SPSS 16.0 software for windows. Numerical data (expressed as mean and SD) were analysed using student *t* test. Categorical variables (expressed as frequencies and percentages) were analysed using chi square test or Fischer exact test.

### Results

Patients in both the groups were comparable with respect to demographic characteristics - age, sex, weight and BMI. The block performance times and surgery times were comparable in both the groups (Table 1).

The onset of block was significantly faster in group BD than in group B. The duration of analgesia was also significantly longer in group BD as compared to group B (Table 2).

The heart rates and BP of all the patients were lower in group BD than in group B. However, none of the patients developed significant bradycardia and hypotension.

**Table 1:** Demographics

	Group B	Group BD	P value
age	45.30	46.30	0.704
Weight	74.80	75.81	0.547
ASA( 1/2)	19/11	18/12	0.532
Sex( F/M )	17/13	14/16	0.452

**Table 2:** Block characteristics

	Group B	Group BD	P value
Onset of sensory block(min)	10.2	7.8	<0.0001
Sensory block duration(min)	180.6	270.8	<0.0001

### Discussion

Our study showed that addition of dexmedetomidine to bupivacaine not only speeds the onset of sensory block; but also the duration of analgesia. Dexmedetomidine provided all these advantages without causing haemodynamic instability in any patient.

Peri operative pain in hemorrhoidectomy is quite prevalent and intense. If left unattended, it can adversely affect the postoperative outcome and act as a huge deterrent to early rehabilitation of the patient. Single shot caudal anaesthesia is an acceptable and easy technique that provides pain relief as well as the necessary sensory and motor block required for surgery. Hence, we chose single shot caudal anaesthesia as the anaesthetic technique for hemorrhoidectomy in our study.

A number of studies have been conducted which evaluate the addition of different drugs called as adjuvants to local anaesthetics like morphine, ketamine, midazolam and many more. These adjuvants enhance the effect of local anaesthetics but also display side effects unique to their structure and mechanism of action.

Dexmedetomidine is an alpha 2 agonist with sedative and analgesic properties; has been found to be an excellent adjuvant found to reduce post operative pain and thus the post operative analgesic requirement.

In our study dexmedetomidine was shown to reduce the latency period for the onset of block. Our findings are similar to those seen by Deming Xu et al.,<sup>[8]</sup> who evaluated the addition of dexmedetomidine to ropivacaine in caudal anaesthesia for hemorrhoidectomies. Similar results were also seen by Makhni *et al.*,<sup>[9]</sup> who found that dexmedetomidine when used as intrathecal adjuvant with ropivacaine was better than magnesium in providing a faster onset of block.

Another important observation in our study was the significantly prolonged duration of analgesia afforded by dexmedetomidine. Similar results were seen by Koraki E *et al.*,<sup>[10]</sup> who studied the efficacy of dexmedetomidine as adjuvant in brachial plexus block and found dexmedetomidine to not only speed the onset of sensory and motor block but also prolong the duration of analgesia. Dexmedetomidine was also shown to have a greater analgesic and local anaesthetic sparing effect than fentanyl in children undergoing lower extremity orthopaedic procedures<sup>[11]</sup>. Goyal *et al.*,<sup>[12]</sup> reported that DEX as adjuvant to bupivacaine increases duration of caudal analgesia and improves hemodynamic stability in children undergoing infraumbilical surgeries.

The inhibition of substance P release in the nociceptive pathway at the level of dorsal root neuron and by the activation of α<sub>2</sub>-adrenoceptors in the locus coeruleus may be responsible for the analgesia caused by dexmedetomidine.

Bradycardia and hypotension are considered to be the main side effects of dexmedetomidine. In our study, heart rate and blood pressure were lower in the dexmedetomidine group. However, significant bradycardia and hypotension were not seen in any patient. Our results are similar to those seen by Deming Xu et al.<sup>[8]</sup> who studied the addition of dexmedetomidine to ropivacaine for hemorrhoidectomies. On the other hand, Esmoglu et al<sup>[13]</sup> and Neerja *et al.*,<sup>[14]</sup> found significant hypotension and bradycardia when dexmedetomidine was added to local anaesthetic for axillary brachial plexus block and supraclavicular brachial plexus block respectively.

Thus, our study showed that dexmedetomidine can act as a highly effective adjuvant for hemorrhoidectomies that not only speeds up the onset of sensory and motor block but also prolongs the analgesia. All these advantages are afforded in the absence of any haemodynamic instability which further adds to the safety profile for a wider use of dexmedetomidine.

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