

Post Operative Outcome of Subarachnoid Block Alone with Subarachnoid Block and Intravenous Infusion of Injection Dexmedetomidine in Elective Infra-Umbilical Surgical Cases: A Hospital Based Comparative Study

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Abstract:

Objectives: The present study was to compare post operative outcome of the efficacy of SAB alone with the combination of SAB and intravenous infusion of dexmedetomidine in elective infra-umbilical surgeries.

Methods: A total of 80 patients were undergone elective infra umbilical surgeries. All the cases were categorized into two groups. Group A- cases underwent subarachnoid block alone and Group B cases underwent Subarachnoid block and intravenous infusion of injection Dexmedetomidine. A full anaesthetic checkup was done. Post operative pain was assessed by Visual Analogue Scale (VAS score). Post operative sedation was assessed by using Ramsay sedation score.

Results: Each group has 40 patients. Higher proportion of patients were in the age group of 46 to 60 years (40% in subarachnoid block versus 42.5% in SAB with dexmedetomidine). Mean NRS score was significantly lower among patients in SAB with dexmedetomidine group as compared to patients in subarachnoid block at 4 and 8 hours post-operatively ($p = 0.01$ and $p = 0.01$). VAS score was significantly lower among SAB with dexmedetomidine group at 4 hours post-operatively as compared to subarachnoid block group ($p = 0.02$). At 8 and 12 hours post-operatively, the difference was not statistically significant ($p = 0.17$ and $p = 0.72$). The mean Ramsay sedation score was significantly higher among patients in SAB with dexmedetomidine group (2.40 ± 1.06) as compared to patients in subarachnoid block (1.33 ± 0.53) ($p = 0.01$) at 4 hours post-operatively. At 8 hours post-operatively, the difference was also statistically significant ($p = 0.01$). At 12 hours postoperatively, it was not statistically significant ($p = 1$).

Conclusion: Postoperatively, the dexmedetomidine group patients experienced significantly lower pain scores and higher sedation levels, which indicates better post-surgical recovery. Hence, SAB with dexmedetomidine provides enhanced post-operative pain management and sedation without increasing complications, making it a promising option for elective infra-umbilical surgeries.

Keywords: Subarachnoid Block, Dexmedetomidine, Infra-Umbilical Surgery, Post Operative Outcome.

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Introduction

Infra-umbilical surgeries refer to surgical procedures performed below the umbilicus, including hernia repairs, caesarean sections, urological surgeries (such as transurethral resection of the prostate or bladder tumour), gynaecological procedures (such as hysterectomy), and orthopaedic procedures involving the lower limbs [1].

SAB alone is highly effective in providing surgical anaesthesia, the addition of intravenous dexmedetomidine infusion has been explored as a strategy to enhance intraoperative sedation, prolong analgesia, and improve hemodynamic stability. Dexmedetomidine is a highly selective alpha-2 adrenergic agonist that has sedative, anxiolytic,

analgesic, and sympatholytic properties without causing significant respiratory depression, making it an attractive adjunct in regional anaesthesia. When comparing SAB alone to SAB combined with intravenous dexmedetomidine infusion, several key differences emerge.

Firstly, intraoperative sedation is significantly improved with dexmedetomidine, as it provides a state of conscious sedation while preserving the patient's ability to maintain spontaneous ventilation. This is particularly beneficial in anxious patients or those who prefer to be lightly sedated during surgery. Dexmedetomidine acts on the locus coeruleus in the brainstem, reducing norepinephrine

release and thereby promoting a calm and cooperative state [2]. Secondly, the use of dexmedetomidine prolongs the duration of sensory and motor blockade. Studies have shown that patients receiving dexmedetomidine experience longer-lasting analgesia compared to those who receive SAB alone. This extended duration of spinal anaesthesia reduces the need for early postoperative opioid administration, thereby minimizing opioid-related side effects such as nausea, vomiting, respiratory depression, and ileus. Additionally, dexmedetomidine has been found to reduce the incidence of shivering, a common side effect of spinal anaesthesia [3]. Objective of the present study was to compare the post operative outcome of the efficacy of subarachnoid block alone and subarachnoid block along with intravenous infusion of injection dexmedetomidine in patients undergoing infraumbilical surgeries.

Material & Methods

The present study was conducted in the Department of Anaesthesiology, MGM Medical College, Navi Mumbai during the period from July 2023 to December 2024. Entire subjects signed an informed consent approved by institutional ethical committee of MGM institute of Health Sciences, Navi Mumbai was sought.

A total 80 participants with age group 18 to 60 years were randomly included for lower abdominal (infraumbilical) surgeries. All the cases were categorized into two groups (Group A & Group B). Each group had 40 cases.

Inclusion Criteria:

- Patients having ASA grade I and II

Exclusion Criteria:

- Patient having ASA grade 3 and above
- Patient having Heart Rate < 60/minutes (Reason: Dexmedetomidine causes bradycardia)
- Patients having Allergy to study drugs
- Patients with peripheral neuropathy or motor weakness.

Method: All the patients were undergone lower abdominal (infraumbilical) surgeries. Group A patients were received Subarachnoid block alone and group B patients were received Subarachnoid block and intravenous infusion of injection Dexmedetomidine

Procedure: A full anaesthetic checkup was done and patients accepted under ASA I & ASA II were taken up for the study. Skin was disinfected and 1-2 ml of local anaesthetic was injected into the skin around L3- L4 intervertebral space. The spinal needle was then be inserted in L3-L4 intervertebral space and pushed inside until free flow of CSF was

seen. The onset of sensory block was evaluated by the loss of pinprick sensation in the lower limbs and abdominal regions as per required level.

Intravenous infusion of maintenance dose of 0.2 mcg/kg Injection Dexmedetomidine was started for Group B patients immediately after giving spinal anaesthesia as per calculation according to body weight of patient, after giving the bolus dose of 0.5 mcg/kg Inj Dexmedetomidine over 10 mins intravenously. Rate of Dexmedetomidine infusion was adjusted according to the requirement and vital parameters of the patient. Duration of sensory and motor blockade was assessed every 2 hourly till recovery of sensations. Incidence of side-effects like bradycardia and hypotension was also recorded. If patients had bradycardia, Inj. Atropine was given to that patient. If patients had any episode of hypotension, Inj. Mephentermine or Inj. Phenylephrine was administered.

Study Parameters: Post operative pain was assessed by Visual Analogue Scale (VAS score). Post operative sedation was assessed by using Ramsay sedation score. Patients if had any complications were noted.

Statistical Analysis: The data was analyzed by using SPSS- version 25 software. Mean $\pm$ standard deviation was observed. Independent test and Chi-squared test were applied. P-value was taken less than or equal to 0.05 ($p \leq 0.05$) for significant differences.

Results

A total of 80 patients who undergone elective infra umbilical surgery were enrolled. Patients were divided into two groups of 40 patients each – Group A was administered with subarachnoid block only while group B was administered with subarachnoid block along with intravenous infusion of injection dexmedetomidine. Higher proportion of patients were in the age group of 46 to 60 years (40% in subarachnoid block versus 42.5% in SAB with dexmedetomidine). It was not statistically significant difference ($p = 0.96$). Out of total 80 cases, 37 cases were males and 43 cases were females.

In SAB with dexmedetomidine group, 23 patients had ASA I status while in subarachnoid block group, 25 patients had ASA I status. It was not statistically significant ($p = 0.65$).

At 4 hours postoperatively, the mean pulse rate was comparable between SAB with dexmedetomidine group and subarachnoid block, and the difference was not statistically significant ($p = 0.98$). At 8 and 12 hours post-operatively, the difference between the two groups was not statistically significant ($p > 0.05$).

At 4, 8 and 12 hours postoperatively, the mean systolic blood pressure was lower in SAB with dexmedetomidine group as compared to subarachnoid block and the difference was statistically significant at all observed time intervals ($p < 0.05$).

The mean postoperative diastolic blood pressure was comparable in both groups and had no statistically significant difference between them ($p > 0.05$). The mean postoperative peripheral oxygen saturation (spO₂) was comparable in both groups and had no statistically significant difference between them ($p > 0.05$).

Table 1: Comparison of groups based on Postoperative Pain Assessment using NRS

Numerical Rating Scale (NRS) Score	Groups				p-value*
	Subarachnoid block		SAB with Dexmedetomidine		
	Mean	SD	Mean	SD	
4 hours	6.80	1.98	5.10	2.30	0.01
8 hours	6.03	2.02	4.88	1.55	0.01
12 hours	4.88	2.03	4.78	1.98	0.82

Mean NRS score was significantly lower among patients in SAB with dexmedetomidine group as compared to patients in subarachnoid block at 4 and

8 hours post-operatively ($p = 0.01$ and $p = 0.01$). The difference between two groups was not statistically significant at 12 hours post-operatively ($p = 0.82$).

Table 2: Comparison of groups based on Postoperative Pain Assessment using VAS.

Visual Analogue Scale (VAS) score	Groups				p-value*
	Subarachnoid block		SAB with Dexmedetomidine		
	Mean	SD	Mean	SD	
4 hours	6.45	2.17	4.85	2.25	0.02
8 hours	5.45	2.05	4.88	1.67	0.17
12 hours	4.65	1.86	4.80	1.83	0.72

VAS score was significantly lower among SAB with dexmedetomidine group at 4 hours post-operatively as compared to subarachnoid block group ($p = 0.02$). VAS scores were comparable between two groups at

8 and 12 hours post-operatively and the difference between them was not statistically significant ($p = 0.17$ and $p = 0.72$).

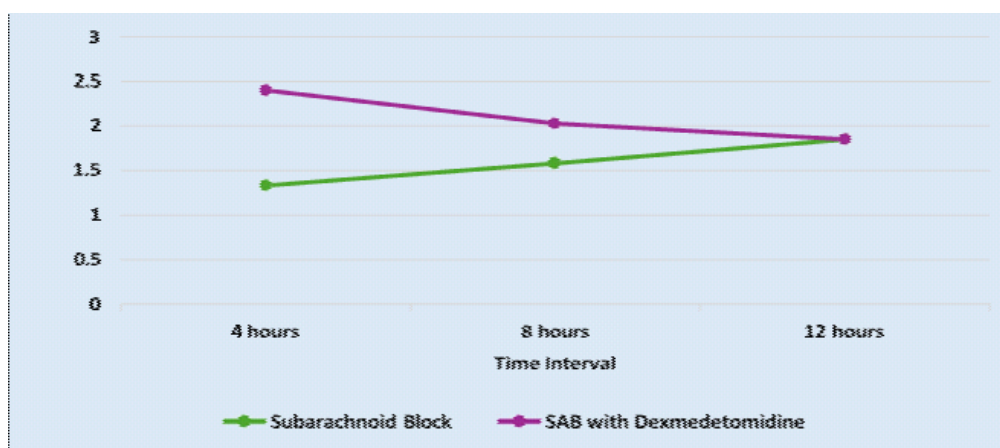


Figure 1: Comparison of groups based on Postoperative Ramsay Sedation Score

The mean Ramsay sedation score was significantly higher among patients in SAB with dexmedetomidine group (2.40 ± 1.06) as compared to patients in subarachnoid block (1.33 ± 0.53) ($p = 0.01$) at 4 hours post-operatively. At 8 hours post-operatively, the difference between the two groups was also statistically significant ($p = 0.01$) with

higher mean Ramsay sedation score (2.03 ± 0.83) among patients in SAB with dexmedetomidine group as compared to patients in subarachnoid block group ($p = 0.01$). The difference between the two groups at 12 hours postoperatively was not statistically significant ($p = 1$).

Table 3: Comparison of groups based on Complications

Complications	Groups		p-value*
	Subarachnoid block n (%)	SAB with Dexmedetomidine n (%)	
Bradycardia	05 (12.5)	12 (30)	0.06
Hypotension	08 (20)	14 (35)	0.13
Nausea	02 (05)	02 (05)	1
Headache	02 (05)	01 (2.5)	1
Hypoxia	00 (00)	00 (00)	-
Total	40 (100)	40 (100)	

Bradycardia was seen in 12 (30%) patients in SAB with dexmedetomidine group as compared to only 5 (12.5%) patients in subarachnoid block alone group and the difference was not statistically significant ($p = 0.06$). Hypotension was observed in 14 (35%) patients in SAB with dexmedetomidine group as compared to 8 (20%) patients in subarachnoid block alone group. The difference between the two groups was not statistically significant ($p = 0.13$). Nausea was reported by two (02) patients in both groups each and the difference between the two groups was not statistically significant ($p = 1$). Headache was observed in two (02) patients in subarachnoid block group as compared to one (01) patient in SAB with dexmedetomidine group. The difference between two groups was not statistically significant ($p = 1$). Hypoxia was not seen in any patient in either of the group.

Discussions

Patients receiving dexmedetomidine infusion tend to have prolonged postoperative analgesia and require fewer rescue analgesics in the immediate postoperative period. This leads to improved patient satisfaction, early mobilization, and faster recovery. Additionally, the anti-inflammatory properties of dexmedetomidine may contribute to better wound healing and reduced postoperative inflammatory responses [4].

Pulse Rate: At 8 and 12 hours postoperatively, the pulse rates between the groups were comparable, and the differences were not statistically significant ($p > 0.05$). In a study by Bhagavatha A et al, [5] it was observed that the trend of mean heart rate in the dexmedetomidine group appeared to be lower than that in the SAB group, but there was no statistically significant difference between the groups. The mean heart rates between the groups were maintained between 60 – 85 beats per minute, indicating hemodynamic stability in the dexmedetomidine group at the given dosage.

Blood Pressure: Postoperatively, at 4, 8, and 12 hours, the mean systolic blood pressure was consistently lower in the SAB with dexmedetomidine group compared to the subarachnoid block group, with the difference being statistically significant at all time points ($p < 0.05$). On the other hand, the mean postoperative diastolic blood pressure was similar between the two groups,

with no statistically significant difference observed ($p > 0.05$). In a study by Harsoor A et al, [3] a similar trend was observed in systolic, diastolic, and mean arterial pressures 60 minutes following SAB in the Dexmedetomidine + SAB group. The pressures in this group were lower compared to the only SAB group, indicating a notable difference in hemodynamic response during the intra-operative period.

Oxygen Saturation: The mean postoperative oxygen saturation was comparable in both groups and had no statistically significant difference between them ($p > 0.05$). In a study by Harsoor S et al, [3] oxygen saturation was comparable between the Dexmedetomidine + SAB group (98%) and the only SAB group (97.85%), with no statistically significant difference ($p = 0.153$).

Ramsay Sedation Score: Postoperatively, the mean Ramsay sedation score was significantly higher in the SAB with dexmedetomidine group (2.40 ± 1.06) compared to the subarachnoid block group (1.33 ± 0.53) at 4 hours ($p = 0.01$). Similarly, at 8 hours postoperatively, the difference remained statistically significant ($p = 0.01$), with the mean Ramsay sedation score being higher in the SAB with dexmedetomidine group (2.03 ± 0.83) compared to the subarachnoid block group. However, at 12 hours postoperatively, the difference between the two groups was not statistically significant ($p = 1$).

In a study by Bhagavatha A et al, [5] the mean Ramsay Sedation Score (RSS) was higher in the Dexmedetomidine + SAB group (3.83 ± 0.329) compared to the only SAB group (1.83 ± 0.407), which was statistically significant ($p < 0.001$). In a study by Harsoor S et al, [3] the mean intra-operative Ramsay Sedation Score (RSS) in the Dexmedetomidine + SAB group was 2.34 ± 1.1 , whereas in the only SAB group, it was 2.0 ± 0.0 , with a statistically significant difference ($p = 0.034$). However, the RSS was comparable between the two groups during the post-operative period. Al-Mustafa et al. [6] and Hong et al. [7] used higher doses of dexmedetomidine and noted excessive sedation in 3 out of 25 and 2 out of 26 patients respectively in their study. In a study by Kumari R et al, [8] Intraoperative Ramsay Sedation Scores were significantly higher in the dexmedetomidine group

(mean - 3.4 ± 0.7 , range 2– 4) compared to control group (mean- 2.9 ± 0.3 , range 2–4) with a p-value of

Postoperative Pain Assessment: In our study, the comparison of groups based on postoperative pain assessment using the NRS revealed that the mean NRS score was significantly lower in the SAB with dexmedetomidine group compared to the subarachnoid block group at 4 and 8 hours postoperatively ($p = 0.01$ and $p = 0.01$, respectively). However, the difference between the two groups was not statistically significant at 12 hours postoperatively ($p = 0.82$). Similarly, when comparing groups based on postoperative pain assessment using the VAS, the mean VAS score was significantly lower in the SAB with dexmedetomidine group at 4 hours postoperatively compared to the subarachnoid block group ($p = 0.02$). At 8 and 12 hours postoperatively, the VAS scores were comparable between the two groups, and the difference between them was not statistically significant ($p = 0.17$ and $p = 0.72$, respectively). In a randomized controlled trial by Liu S et al, [9] comparing subarachnoid block (SAB) alone (control group) with SAB plus intravenous dexmedetomidine, VAS scores were measured at various postoperative time points. At 5 hours postoperatively, the VAS score in the intravenous dexmedetomidine group was lower than in the SAB-alone (control) group, indicating better pain control with dexmedetomidine. However, the lowest VAS scores were observed in the intrathecal dexmedetomidine group, followed by the intravenous group, with the control group having the highest VAS scores at this time point. At 24 hours postoperatively, the VAS score in the intravenous dexmedetomidine group was not significantly lower than the control, while the intrathecal group maintained a significantly lower VAS compared to control. In a study by Chaitanya S et al, [10] Patients were asked to rate their pain on 11-point scale (NRS) ranging from No pain to worst possible pain in post anaesthesia care unit. It was found that NRS scores were significantly lower in patients who are given with dexmedetomidine i. e. Group BD as compared to Group B. Similarly, Hong et al. [7] and Lugo et al. [11] found that in the dexmedetomidine group, postoperative pain intensity was lower and the mean time to first request for postoperative analgesia was longer than in the control group (6.6 h vs. 2.1 h).

Complications

Bradycardia occurred in 12 (30%) patients in the SAB with dexmedetomidine group, compared to 5 (5%) patients in the subarachnoid block group, with the difference not being statistically significant ($p = 0.06$). Hypotension was observed in 14 patients in the SAB with dexmedetomidine group, compared to 6 patients in the subarachnoid block group, but this difference was also not statistically significant ($p = 0.13$). Nausea was reported by 2 patients in each

group, and the difference between the groups was not statistically significant ($p = 1$). Headache was noted in 2 patients in the subarachnoid block group, compared to 1 patient in the SAB with dexmedetomidine group, with no statistically significant difference between the groups ($p = 1$). Hypoxia was not observed in any patient in either group.

Conclusions

The present study concluded that the Postoperatively, the dexmedetomidine group patients experienced significantly lower pain scores and higher sedation levels, which indicates better post-surgical recovery. Hence, SAB with dexmedetomidine provides enhanced post-operative pain management and sedation without increasing complications, making it a promising option for elective infra-umbilical surgeries.

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