

COMPARISON OF MEAN DURATION OF POSTOPERATIVE ANALGESIA AMONG THE PATIENTS UNDERGOING LOWER ABDOMINAL SURGERY UNDER SPINAL ANESTHESIA WITH ADJUVANT DOSE OF DEXMEDETOMIDINE VS. DEXAMETHASONE

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Abstract

Introduction: Effective postoperative pain management can be crucial in improving outcomes of recovery and patient satisfaction. The use of adjuvants such as dexmedetomidine with local anesthetics like bupivacaine in spinal anesthesia has shown potential to enhance analgesic duration and efficacy.

Objectives: To compare the mean duration of postoperative analgesia among patients undergoing lower abdominal surgery under spinal anesthesia with adjuvant doses of dexmedetomidine versus dexamethasone.

Study Design: Randomized control trail.

Study Duration: March 08, 2024 to September 07, 2024.

Settings: Department of Anesthesia and pain medicine, GTTH, Lahore.

Material & Methods: A total of 60 patients undergoing elective lower abdominal surgery were randomly assigned to two groups: Group I and Group II. The primary outcome, the mean duration of postoperative analgesia, was measured in minutes, and statistical analysis was performed using SPSS version 21.

Results: Out of 60 patients, Group I comprised 33.3% males and 66.7% females, while Group II had 53.3% males and 46.7% females. The mean age in Group I was 39.63 years (SD = 12.59) and 36.47 years (SD = 11.40) in Group II, with no significant difference ($t = 1.021$, $p = .311$). The mean duration of postoperative analgesia was significantly longer in Group I (204.63 minutes, SD = 9.31) compared to Group II (190.03 minutes, SD = 11.70), with a statistically significant difference ($t = 5.350$, $p < .001$).

Conclusion: The addition of dexmedetomidine as an adjuvant to isobaric bupivacaine in spinal anesthesia significantly prolonged the duration of postoperative analgesia compared to dexamethasone alone in patients undergoing lower abdominal surgery.

INTRODUCTION

Spinal anesthesia is a type of regional anesthesia in which a local anaesthetic is injected directly into the cerebrospinal fluid that surrounds the spinal cord and nerve roots. It blocks pain from the lower region of a body, such as abdomen, pelvis, and lower limbs. Spinal anesthesia is part of the modern practice of anaesthesia because of its efficacy, predictability, increased patient satisfaction, low complication rate, better pain control than intravenous narcotics, earlier recovery of bowel function, less need for systemic Opioids, easy breathing resulting from better pain control, improved participation in physical therapy (1,2,3). According to a case report in US, postoperative pain is a common phenomenon however, often treated inadequately, presented that 80% of patients undergoing surgery experienced postoperative pain but less than 50% of these patients reported adequate pain relief. In addition, a national survey suggests that 39% of patients suffering from postoperative pain experience moderate to severe pain. This inadequate postoperative pain control results in increased risk of morbidity that leads to persistent postsurgical pain increased length of hospital stay and healthcare costs likewise. Pain management in the postoperative setting poses a great challenge as the development and severity of pain after surgery is dependent on various patient and procedural factors. Furthermore, opioid medication, the traditional mainstay of post-operative pain management, is associated with significant short- and long-term adverse effects (4,5,6).

Dexmedetomidine is a potent, highly selective α_2 adrenoceptor agonist, with sedative, analgesic, anxiolytic, sympatholytic, and opioid-sparing characteristics (7). Dexamethasone is a potent glucocorticoid with very little, if any, mineralocorticoid activity (8).

Elzayyat, et al. conducted a study which revealed that the mean duration of analgesia among the patients undergoing lower abdominal surgery under spinal anesthesia with adjuvant dose of dexmedetomidine vs. dexamethasone to be (4.02 $\pm$ 1.21 hours) vs. (2.80 $\pm$ 0.86 hours) respectively; $p < 0.001$ (9). While peer review found it to be 198.21 $\pm$ 21.22 mins in dexamethasone vs. 174.44 $\pm$ 16.3 minutes in dexmedetomidine; $p < 0.001$ (10).

The available literature on the use of adjuvants and its effects on spinal anesthesia is limited. It is the need of the hour to identify the effects of adjuvants on the longevity

of post-operative analgesia. Moreover, it will help in early mobility of the patient, save cost of post-operative hospital stay and in avoiding the adverse effects of analgesic drugs.

Methodology

This study was conducted at the department of anesthesia and pain medicine ghurki trust teaching hospital, Lahore after the approval of study from ethical committee of hospital. The study duration was around 6 months after the approval. The study type is randomized control trail and a sample size of 60 was calculated with 80% power of test and 95% confidence interval while taking expected mean duration of analgesia among the patients undergoing lower abdominal surgery under spinal anesthesia with adjuvant dose of dexmedetomidine vs. dexamethasone to be (4.02 $\pm$ 1.21 hours) vs. (2.80 $\pm$ 0.86 hours) respectively (9). Sampling technique was non-probability consecutive sampling. Patients aged between 18-60 years, who were admitted for lower abdominal surgery under spinal anesthesia and were able to provide informed written consent were included in this study and patients with any contraindication to spinal anesthesia along with those patients who refused to spinal anesthesia were excluded from the study.

After approval from ethical review committee of the hospital, 60 patients (30 in each group) who were admitted for elective lower abdominal surgery as per operational definition in Ghurki Trust Hospital, Lahore and who fulfill the above criteria were counseled and explained the details of the study. Written informed consent and detailed history were taken from each patient. These patients were then divided in to two groups using odd and even method. Group-I: Odd number assigned to dexmedetomidine. Group-II: Even number assigned to dexamethasone.

The patients in group-I received 10micogram dexmedetomidine adjuvant to isobaric bupivacaine under aseptic measures while patients in group-II received 4mg of dexamethasone adjuvant to isobaric bupivacaine. Duration of analgesia was noted as per operational definition. All neuraxial blocks were given by the same consultant of the anesthesia department to eliminate biasness and confounding variables were controlled by exclusion. All the collected data were entered and analyzed into SPSS version 21. Numerical variables i.e. age, BMI, duration of surgery and duration of postoperative analgesia were presented by mean $\pm$ SD

and range. T-test was applied to compare post-op analgesia duration in both groups. Categorical Variable i.e. gender was presented as frequency and percentage. Data were stratified for age, gender, BMI and duration of surgery. Post stratification independent sample T-test was applied taking p -value of ≤ 0.05 as statistically significant.

Results

Out of 60 patients. Group I (Dexmedetomidine + Isobaric Bupivacaine) had 33.3% males and 66.7% females, while Group II (Dexamethasone alone) had 53.3% males and 46.7% females. The mean age in Group I was 39.63 years (SD = 12.59), and in Group II, it was 36.47 years (SD = 11.40), with no significant age difference ($t = 1.021$, $p = .311$). The mean BMI in Group I was 26.03 kg/m², and in Group II, it was 26.45 kg/m², showing no significant difference in BMI ($t = -0.686$, $p = .495$). The mean surgery duration was 96.40 minutes for

Group I and 98.50 minutes for Group II, with no significant difference ($t = -1.066$, $p = .291$). The mean duration of analgesia was significantly longer in Group I (204.63 minutes, SD = 9.31) compared to Group II (190.03 minutes, SD = 11.70), with a statistically significant difference ($t = 5.350$, $p < .001$). (Table 1). Males in Group I experienced a significantly longer analgesia duration (205.60 minutes) than those in Group II (188.63 minutes, $t = 4.013$, $p = .001$). Females in Group I had a significantly longer duration of analgesia (204.15 minutes) compared to those in Group II (191.64 minutes, $t = 3.313$, $p = .002$) (Table 2). Additionally, Group I showed significantly longer analgesia in various subgroups, including age (18-35 years, $t = 3.579$, $p = .002$; 35-60 years, $t = 3.999$, $p < .001$), BMI (≤ 25 , $t = 3.406$, $p = .003$; > 25 , $t = 4.231$, $p < .001$), and surgery duration (80-100 minutes, $t = 4.516$, $p < .001$; > 100 minutes, $t = 2.792$, $p = .015$). (Table 3-5).

Table 1: Comparison of mean duration of analgesia of patients with lower abdominal surgeries between two groups (N=60)

Time (minutes)	Group I (n=30)	Group II (n=30)
Mean	204.63	190.03
SD	9.31	11.70

Group I: dexmedetomidine adjuvant to isobaric bupivacaine

Group II: Dexamethasone alone

Table 2: Comparison of mean duration of analgesia in both study groups with respect to Gender

Gender	n	Study groups	analgesia			
			Mean	S.D	t-test	p-value
Male	10	Group-I	205.60	8.72	4.013	.001
	16	Group-II	188.63	11.42		
Female	20	Group-I	204.15	9.77	3.313	.002
	14	Group-II	191.64	12.22		

Group I: dexmedetomidine adjuvant to isobaric bupivacaine

Group II: Dexamethasone alone

Table 3: Comparison of mean duration of analgesia in both study groups with respect to Age

Age (years)	n	Study groups	analgesia			
			Mean	S.D	t-test	p-value
18-35	10	<i>Group-I</i>	206.30	9.26	3.579	.002
	13	<i>Group-II</i>	191.08	10.70		
35-60	20	<i>Group-I</i>	203.80	9.46	3.999	.000
	17	<i>Group-II</i>	189.24	12.67		

Group I: dexmedetomidine adjuvant to isobaric bupivacaine

Group II: Dexamethasone alone

Table 4: Comparison of mean duration of analgesia in both study groups with respect to BMI

BMI (kg/m2)	n	Study groups	analgesia			
			Mean	S.D	t-test	p-value
≤25	12	<i>Group-I</i>	202.92	8.67	3.406	.003
	8	<i>Group-II</i>	187.11	12.63		
>25	18	<i>Group-I</i>	205.78	9.78	4.231	.000
	21	<i>Group-II</i>	191.29	11.36		

Group I: dexmedetomidine adjuvant to isobaric bupivacaine

Group II: Dexamethasone alone

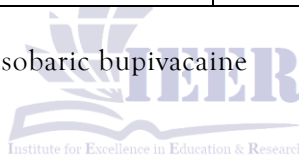


Table 5: Comparison of mean duration of analgesia in both study groups with respect to surgery duration

Surgery duration (mins)	n	Study groups	analgesia			
			Mean	S.D	t-test	p-value
80-100	23	Group-I	204.26	8.50	4.516	.000
	22	Group-II	191.41	10.53		
>100	7	Group-I	205.86	12.32	2.792	.015
	8	Group-II	186.25	14.56		

Group I: dexmedetomidine adjuvant to isobaric bupivacaine

Group II: Dexamethasone alone

Discussion

Adjuvants to local anesthetics is a fast-changing and interesting area of anesthesia, the new technologies promising to increase patient pleasure and safety. While opioids are still the most widely used local anesthetic adjuvants in clinical practice, α_2 receptor antagonists, particularly dexmedetomidine, have been found to augment the efficacy of local anesthetics while maintaining a safe profile (11).

Dexamethasone was also administered to decrease postoperative shivering and is known to be effective; there was no significant difference between the three groups of dexamethasone, pethidine, and normal saline receivers concerning the reduction of shivering in the study done to compare the dexamethasone with pethidine in the control of perioperative shivering during transurethral prostatectomy (12).

In our study, the mean duration of postoperative analgesia was significantly longer in Group I (204.63 minutes, SD = 9.31) compared to Group II (190.03

minutes, SD = 11.70), with a statistically significant difference ($t = 5.350$, $p < .001$).

Elzayyat et al. conducted a study that revealed that the mean duration of analgesia among the patients undergoing lower abdominal surgery under spinal anesthesia with an adjuvant dose of dexmedetomidine vs. dexamethasone to be (4.02±1.21 hours) vs. (2.80 ±0.86 hours) respectively; $p < 0.001$ (13). While peer review found it to be 198.21 ± 21.22 minutes in dexamethasone vs. 174.44 ± 16.3 minutes in dexmedetomidine; $p < 0.001$ (14).

The findings were consistent with a study by Shukla et al (15) that evaluated the effects of dexmedetomidine and magnesium sulfate added to intrathecal bupivacaine and discovered that the former shortened the duration of spinal anesthesia and increased its onset. Additionally, the study by Solanki et al (16), demonstrated the superiority of intrathecal dexmedetomidine over fentanyl and clonidine. It minimized the need for additional analgesics and produced a longer motor and sensory block.

According to the Makhni et al (17) study, dexmedetomidine was linked to quicker motor and sensory blockages. Additionally, compared to the magnesium sulfate group, the overall duration of analgesia was noticeably longer. Whether given intravenously or intrathecally as an adjuvant to spinal bupivacaine anesthesia, dexmedetomidine has been shown to be safe and hemodynamically stable in nearly all of the investigations above as well as the current investigation.

One possible explanation for the analgesic effects of intrathecal dexamethasone is that it affects prostaglandin synthesis. By inhibiting phospholipase A2 through the formation of calcium-dependent phospholipid-binding proteins known as annexins and by inhibiting cyclooxygenases during inflammation, corticosteroids can lower the synthesis of prostaglandins.

Conclusion

It is concluded that the addition of dexmedetomidine as an adjuvant to isobaric bupivacaine in spinal anesthesia significantly prolonged the duration of postoperative analgesia compared to dexamethasone alone in patients undergoing lower abdominal surgery. The longer duration of analgesia that dexmedetomidine has been shown to produce may lessen the need for rescue analgesics, enhance patient comfort, and accelerate recovery.

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