ORIGINAL ARTICLE

Dexmedetomidine and Fentanyl as Adjuvant to Bupivacaine for Epidural Analgesia in Gastrectomy Surgery

Md. Sanaul Hoque Masud[1], Md. Mostafa Kamal[2], Md. Moinuddin[3], Nasrin Sultana[4], Shahara Afroz[5], Sadia Afrin Mony[6], AKM Akhtaruzzaman[7]

DOI:https://doi.org/10.62848/bjpain.v3i1.8140

Received: 29 January, 2023
Accepted: 25 April, 2023

Abstract

Background: Opioids as epidural adjunct to local anaesthetics have been in use so long and the synergism between epidural local anaesthetic agents and opioids are well established. Dexmedetomidine (α-2 agonist) is being increasingly used for similar purpose but evidence for the combination of local anaesthetic agents with dexmedetomidine in epidural analgesia is limited. Gastic cancer is increasing day by day in our country and removal of tumor by gastrectomy surgery is choice of treatment. The present study was conducted to compare the analgesic, hemodynamic, sedative effects of epidurally administered dexmedetomidine and fentanyl when combined with bupivacaine in a patient undergoing gastrectomy surgery along with general anaesthesia.

Methods: This randomized controlled trial study was carried out in the Department of Anaesthesia, Analgesia and Intensive Care Medicine, BSMMU, Dhaka. The study was been conducted 12 month after obtaining approval from the institutional Review Board and informed written consent from the patient. About 40 patients aged between 40 and 70 years, posted for gastrectomy surgery were included in this study. The patients were randomly allocated into two equal groups. Group A received general anaesthesia along with epidural fentanyl and bupivacaine. Group B received general anaesthesia along with epidural dexmedetomidine and bupivacaine. During surgery, hemodynamic status of the patients had been carefully recorded. Following surgery, pain intensity was recorded using a visual analog scale (VAS) for 6 hours and observed for the time of first rescue analgesic requirement, post-operative sedation score by Ramsay sedation score, and surgeons satisfaction by likert scale. A statistical analysis was carried out by using the Statistical Package for Social Sciences version 23.0 for Windows. Chi-Square test used to analyze the categorical variables and student t-test used for continuous variables. P value <0.05 was considered as statistically significant.

Results: Age, height, and weight were almost identical between two groups. Duration of surgery and anaesthesia were almost similar between two groups. Systolic blood pressures, diastolic blood pressure, MAP were almost similar between two groups and were statically not significant ($p>0.05$). Mean heart rate of group B was significantly lower ($p<0.05$) than that of group A. Post-operative visual analog scale was reduced significantly ($p<0.05$) in group B than group A. The time of first analgesic requirement was significantly higher ($p<0.05$) in group B. The mean sedation score was also significantly higher ($p < 0.05$) in group B than group A.

Conclusion: Dexmedetomidine seems to be a better alternative to fentanyl as an epidural adjuvant to local anaesthetics as it decreases pain intensity during post-operative period, delayed time of first analgesic supplementation, provides better sedation level without harmful derangement on hemodynamics.

Keywords: Dexmedetomidine, Fentanyl, Bupivacaine, Epidural Analgesia, Gastrectomy, Post-operative analgesia

Citation: Masud MSH, Kamal MM, Moinuddin M, Sultana N, Afroz S, Mony SA, Akhtaruzzaman AKM. Dexmedetomidine and Fentanyl as Adjuvant to Bupivacaine for Epidural Analgesia in Gastrectomy Surgery. Bangladesh J. Pain 2023; 3(1): 29-37. doi.org/10.62848/bjpain.v3i1.8140

1. Assistant surgeon, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka-1000.

2. Anaesthesiologist, Shaheed Suhrawardy Medical College and Hospital, Dhaka-1207

3. Assistant surgeon, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka-1000.

4. Medical officer, Department of Obstetrics and Gynaecology, MMCH, Mymensingh

5. Registrar, Department of Anaesthesia and Pain Medicine, Evercare Hospital, Dhaka-1229

6. Medical Officer, Paediatric Cardiology, BSMMU, Dhaka-1000

7. Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, BSMMU, Dhaka-1000

Correspondence
Md. Mostafa Kamal
dr.mostafakamal85@gmail.com
ORCID ID: 0000-0002-4665-1904

Introduction

Gastric carcinoma is the fourth most common malignancy worldwide and remains the second cause of cancer related death[1], the epidemiology of which has changed within last decades. A trend of steady decline in gastric cancer incidence rate is the effect of increased standards of hygiene, nutrition and H. pylori eradication. The incidence shows a wide geographical variation, more than half of the new cases occur in developing country[2]. Incidence of gastric carcinoma is increasing day by day in Bangladesh[3]. Surgical resection remains the gold standard in gastric cancer therapy. If a patient has a stage 0, I, II, III cancer and is healthy enough, surgery (often along with other treatment) offers the realistic chance for cure at this time. Different kinds of surgery can be used to treat stomach cancer, such as-total gastrectomy, partial gastrectomy, endoscopic resection, palliative surgery. The surgical procedure of gastric malignancy is frequently associated with perioperative bleeding, unstable haemodynamics, post-operative pain, nausea and vomiting, which leads not only to increase patient's suffering, but also to a prolongation of hospital stay and related costs. Intraoperative stable haemodynamics and optimum treatment for post-operative pain has been of fundamental importance in surgical patient care. The anaesthetic technique which is conventionally used for gastric malignancy is general anaesthesia which almost always combining intravenous and inhalational agents. The downside of general anaesthesia includes inadequate pain control due to lack of analgesia and high incidence of nausea vomiting, increasing the length of hospitalization[4]. Thoracic epidural analgesia along with general anaesthesia is an effective method for control of post-operative pain and component of the enhanced recovery after gastrectomy surgery protocol because it facilitates earlier mobilization and oral food intake leading to shorter hospital stay and accelerate convalescence[5].

Major abdominal surgery is associated with extensive tissue destruction and postoperative pain. Epidural analgesia is the most preferred technique among the various existing analgesic methods. It provides early mobilization, accelerates recovery of gastro-intestinal function and reduction of pulmonary and cardiovascular morbidity in early postoperative period after abdominal surgery[6]. Epidural analgesia decreases sympathetic outflow, preventing ileus and incidence of post-operative myocardial infraction by providing favorable redistribution of coronary blood flow, attenuating the stress response and hypercoagulability[7]. Administration of local anaesthetics at effective doses raise the concern about adverse events such as hypotension, bradycardia and motor weaknes. So several adjuvants such as morphine, fentanyl, clonidine, ketamine, neostigmine, magnesium, and dexamethasone have been introduced for epidural usages with varying degree of efficacy[8-10]. Opioids are considered the reference standards among those adjuvants. Unfortunately opioids carry risk for respiratory depression, delayed intestinal recovery, pruritus, nausea vomiting. Dexmedetomidine is α2 agonist used for intravenous sedation in intensive care setting[11]. The unique analgesic properties of dexmedetomidine have encouraged the anaesthesiologists to use it[12].

The dexmedetomidine is a potent and highly selective α-2 adrenoreceptor agonist with sedative, analgesic, anxiolytic, sympatholytic, amnestic properties[13]. Dexmedetomidine exerts analgesic effect on spinal and supraspinal level. Suggested mechanism is activation of α-2a receptors causing decrease in nor-epinephrine release from pre-synaptic neurons with inhibition of postsynaptic activation in the brain stem[14].

The dexmedetomidine has the ability to potentiate the effect of all intra operative anaesthetics. Scheinin et al. 1998 demonstrated that intraoperative administration of dexmedetomidine maintained haemodynamic stability by attenuating the stress-induced sympatho-adrenal responses for intubation, surgery and also emergence from anaesthesia[15]. Most of the previous studies are related to the intraoperative administration of dexmedetomidine to relief the surgery-induced acute pain relief. However, more studies are required to support its potential effect for postoperative pain relief and maintaining haemodynamic stability by using in epidural route.

Dexmedetomidine provides numerous beneficial effects when it is used through epidural route16. It acts on both pre and post synaptic sympathetic nerve terminal and central nervous system thereby decreasing the sympathetic outflow and nor-epinephrine

release causing sedative, anti-anxiety, analgesic, sympatholytic and haemodynamic effects[11]. Dexmedetomidine causes manageable hypotension and bradycardia but the striking feature of this drug is the lack of opioid related side effects like respiratory depression, pruritis, nausea, and vomiting[17].

Fentanyl has been used traditionally as an adjunct for epidural administration in combination with a lower dose of local anaesthetic to achieve the desired anaesthetic effect[18]. The addition of opioid provides a dose sparing effect of local anaesthetic and superior analgesia but there is always a possibility of an increased incidence of pruritis, urinary retention, nausea, vomiting and respiratory depression[19].

Although adjuvants like fentanyl have a dose-sparing effect and provide superior analgesia after major upper abdominal surgeries[5], there is always the possibility of an increased incidence of pruritus, urinary retention, postoperative nausea and vomiting and respiratory depression[19,20]. Recently, it is found that use of fentanyl could result in post-operative hyperalgesia with a paradoxical increase in the intensity of pain and subsequent fentanyl consumption due to opioid induced hyperalgesia[21].

Dexmedetomidine seems to be better alternative to fentanyl as an epidural adjuvant. It does not decrease gut motility, facilitates early enteral feeding, maintain cilliary function and blood flow of gut. It reduces time to anastomosis of gut, increases surgical compliance and reduces time of hospital stay[12,14,15]. Thus this study was designed to compare the analgesic efficacy of epidurally administered dexmedetomidine and fentanyl in combination with bupivacaine in gastrectomy surgery.

Methods

Study place, participants and design

This randomized controlled trial (RCT) was carried out in the Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka from May 2019 to April 2020. All adult patients aging 40-70 years with ASA physical status I and II who underwent gastrectomy surgery were included in this study. Patients with uncontrolled hypertension and diabetes mellitus, hypotension (SBP less than 90 mmHg), morbid obesity, severe psychiatric illness and patient with mental retardation, chronic alcoholism and chronic drug abusers were excluded from this study. The preliminary screening panel for each patient was included the complete history, physical examination and necessary laboratory test.

Study measures

A structured questionnaire was used for data collection. The questionnaire had two parts, demographic characteristics and outcome variables (Intra operative hemodynamic: Systolic blood pressure, Diastolic blood pressure, Mean arterial blood pressure and Heart rate; Pain intensity using a visual analog scale; Post-operative sedation using Ramsay sedation score; Post-operative first rescue analgesic requirement time and Intra operative surgeons satisfaction score).

Procedures of collecting data:

After approval from ethical committee of BSMMU, this prospective randomized study was conducted on 40 patients who were scheduled for gastrectomy surgery, age 40-70 years old of either sex or physical status ASA I, II. Informed written consent with full explanation of the procedure was obtained from the patient before starting. All patients underwent through preoperative evaluation on the day before surgery and were instructed about epidural infusion on post-operative period.

On arrival to the operation room, an 18-G intravenous cannula was secured and standard electrocardiograph, noninvasive blood pressure and pulse oximetry monitoring were well established. Baseline heart rate, systolic, diastolic, mean arterial pressure were obtained. A preload with Ringers lactate solution was done to every patient according to body weight before start of operation. Patient was supported in the sitting posture on the table, by the assistant. The thoracic area was prepared aseptically and draped. The intervertebral space at T10-11 was identified. The pick point was infiltrated with 2ml of 1% lignocaine. 18- G Tuohys needle was inserted into identified epidural space. Epidural space was confirmed by loss of resistance method and epidural catheter was threaded 3-4 cm inside epidural space and fixed, after institution of test dose (3ml lidocaine 2% with adrenalin).

According to randomization code , each patient of group A was received a bolus dose of 6 ml of 0.1% bupivacaine and 1µg/ml fentanyl via epidural catheter before skin incision, followed by a continuous epidural infusion of 6ml/h of 0.1% bupivacaine and 1µg/ml fentanyl through syringe pump for 24 hours . Each patient of group B was received a bolus dose of 6 ml of 0.1% bupivacaine and 0.5µg/ml dexmedetomidine via epidural catheter before skin incision, followed by a continuous epidural infusion of 6ml/h of 0.1% bupivacaine and dexmedetomidine 0.5µg/ml dexmedetomidine through syringe pump for 24 hours.

For group A, the epidural administered medication was prepared as, 10ml 0.5% bupivacaine+1ml (50µg) fentanyl+39ml normal saline to obtain bupivacaine concentration of 0.1% and fentanyl 1µg/ml.

The Dexmedetomidine vial contained 200µg/2ml. One vial dexmedetomidine was diluted in 0.9% normal saline to make it 8 ml solution containing dexmedetomidine 25µg/ml. Then epidural administered medication was prepared is prepared by, 10ml 0.5% bupivacaine + 1ml (25µg) dexmedetomidine + 39ml normal saline to obtain bupivacaine concentration of 0.1% and dexmedetomidine 0.5µg/ml.

In both the group, general anaesthesia was induced by using 1.5µg/kg fentanyl, 1.5mg/kg propofol and 2mg/kg suxamethonium. Appropriate size of endotracheal tube was used for tracheal intubation and correct position of the tube was determined by auscultation of breath sound. Mechanical ventilation was regulated under a maintained respiratory rate and end tidal C02 (35±5mmhg). After confirmation and fixation of the endotracheal tube, 0.1mg/kg vecuronium was given when patient respiration was restart. To maintain anaesthesia and analgesia, halothane 0.65%, N20 66%, 02 33% and 0.04 mg/kg vecuronium were given according to the anaesthesia status and muscle relaxation.

Patients was reversed with neostigmine 0.05mg/kg and atropine 0.02 mg/kg and extubation was done when adequate spontaneous ventilation is resumed. Hemodynamic variables such as systolic, diastolic, mean arterial pressure and heart rate were monitored before administering anaesthesia and throughout intraoperative period. Hemodynamic variables were recorded at baseline, immediate after induction, every 15 minute thereafter till 30 minute and then 30 min there after till 120 min and till end of surgery. After completed surgery, patient were shifted to post-operative word, pain was assessed using 10 point visual analog scale (VAS) in which score 0 indicated no pain and score 10 indicated worst pain. Duration of analgesia was recorded when VAS score was more than 4 in post-operative period and rescue analgesic was given to patient. As rescue analgesics as 15mg/ kg acetaminophen intravenous injection was given in post-operative period. Level of sedation was assessed by ramsay sedation score with a score 1 anxious and 6 no response or unrousable.
Vomiting, shivering, hypotension, bradycardia were documented and managed.

- Adverse effect such as nausea, vomiting was treated with antiemetic drugs.
- Hypotension (defined by decreased in MAP below 20% of baseline or systolic blood pressure was less than 90 mmHg) was treated by ephedrine.
- Bradycardia (heart rate less than 60 bpm) was treated by atropine.

Statistical analysis:
Statistical analyses were carried out by using the Statistical Package for Social Sciences version 23.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The mean values were calculated for continuous variables. Chi-Square test with Yates correction was used to analyze the categorical variables like sex, ASA status and surgical compliance which were shown with cross tabulation. Student t-test was used for continuous variables like systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate (HR) at different interval. Student t-test was also be used for age, weight, height, duration of surgery and duration of anaesthesia. p values <0.05 was considered as statistically significant.

Results

A total of 40 patients were enrolled in this trial. They were randomized into two groups: Group A and Group B. It was observed that mean age was found 54.3±9.4 years in group A and 52.2±8.9 in group B. Male were predominate in this study patients in both

groups, which was 12(60.0%) in group A and 14(70.0%) in group B. Most of the patients 15(75.0%) in group A and 17(85.0%) in group B in ASA status I. The difference was statistically not significant (p>0.05) between two groups. Table I shows demographic variable of the study patients.

Table I: Demographic characteristics of the two studied groups

Demographic variable	Group-A (n=20)	Group-B (n=20)	P value
Age (in years)	54.3±9.4	52.2±8.9	0.472
Height (cm)	157.9±5.2	156.6± 6.9	0.505
Weight (kg)	58.8±9.8	56.5±7.1	0.401
Sex			
Male	12(60.0%)	14(70.0%)	
Female	8(40.0%)	6(30.0%)	0.507
ASA physical status			
Grade I	15 (75.0%)	17(85.0%)	
Grade II	5(25.0%)	3(15.0%)	0.429

Values are expressed as mean±sd and percentage (%), Data were analyzed by student 't' test and chi square test. p value <0.05 considered as significant.

Table II shows mean duration of anaesthesia and surgery of the study patients, it was observed that the mean duration of anaesthesia was found 149.8±12.5 mins in group A and 142.2 ±10.8 mins in group B. The difference was statically not significant (p>0.05) between two groups. Mean duration of surgery was found 107.4±10.3 mins in group A and 101.6±10.7 mins in group B. The difference was statistically not significant (p>0.05) between two groups

Table II: Comparison of two groups in term of duration of surgery and anaesthesia

Duration of anaesthesia and surgery	Group-A (n=20) Mean±SD	Group-B (n=20) Mean±SD	P value
Duration of anaesthesia (mins)	149.8±12.5	142.2 ±10.8	0.137
Range (min, max)	120-160	100-160	
Duration of surgery (mins)	107.4±10.3	101.6±10.7	0.088
Range (min, max)	90-130	70-140	

p value was reached from unpaired t-test

The time of first rescue analgesic requirement in post-operative period was showed in Table III; it was observed that mean time of first analgesic requirement was found 168.6±38.9 minutes in group A and 258.6±32.8 minutes in group B. The difference was statistically significant (p<0.05) between two groups.

Table III: Comparison of two groups by time of first rescue analgesic requirement in post-operative period

Analgesic requirement	Group-A (n=20) Mean±SD	Group-B (n=20) Mean±SD	P value
Time of first rescue analgesic requirement (minutes)	168.6±38.9	258.6±32.8	0.001

p value was reached from unpaired t-test

Heart rate, blood pressure were recorded at regular interval in both groups. The differences between two groups were statistically not significant (p>0.05). Table IV shows mean arterial pressure at baseline, 15, 30, 60, 90, 120 minutes between two groups.

Table IV: Comparison of two groups in term of mean arterial pressure

Mean arterial pressure	Group-A (n=20) Mean±SD	Group-B (n=20) Mean±SD	P value
Baseline	109.40±7.3	106.0±4.30	0.080
During induction	111.70±8.60	107.30±11.3	0.173
At 15 minute	108.0±10.7	103.0±11.7	0.166
At 30 minutes	98.0±6.5	95.30±8.1	0.252
At 60 minutes	102.0±6.5	99.30±6.8	0.314
At 90 minutes	106.70±9.7	103.30±10.5	0.294
At 120 minutes	94.0±11.0	95.0±9.1	0.770

p value was reached from unpaired t-test

VAS score just after recovery and at 15 minutes in post-operative period revealed no statistically significant difference between two groups (p>0.05). But at 30, 60, 90, 120, 180, 240, 360 minutes in post-operative period the differences were statistically significant (p<0.05) (Fig. 1).

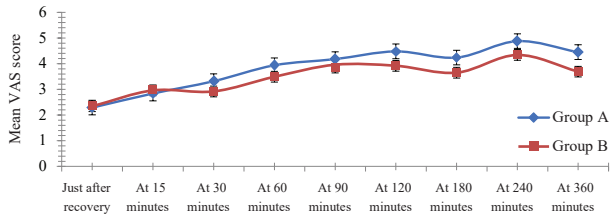

Fig I: Mean VAS score at different time intervals

It was observed that Ramsay sedation score at 30 min, 1 hour, 6 hours, 12 hours in post-operative period between two groups. The differences were statistically significant ($p < 0.05$) between two groups. Figure 2 showed mean sedation scores (Ramsay sedation score) of the two groups.

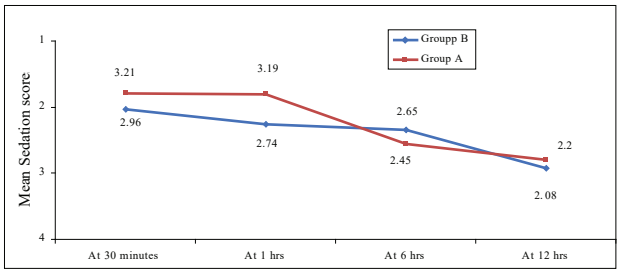

Fig II: Mean sedation scores (Ramsay sedation score) at different time intervals

Table V showed that majority (55.0%) of surgeons were very satisfied in group A and (65.0%) in group B. The difference was statistically not significant ($p > 0.05$) between two groups.

Table V: Surgeons satisfaction during operation between two groups

Surgeons satisfaction (Numerical rating scale)	**Group-A (n=20)**		**Group-B (n=20)**		**P value**
	n	**%**	**N**	**%**	
1 (Very dissatisfied)	0	0.0	0	0.0	
2 (Dissatisfied)	0	0.0	0	0.0	
3 (Neutral)	1	5.0	0	0.0	0.539
4 (Satisfied)	8	40.0	7	35.0	
5 (Very satisfied)	11	55.0	13	65.0	

p value reached from chi square test

Intraoperative and postoperative complications were presented in Table VI. The frequency of bradycardia, hypotension and shivering was 5% and vomiting was 10% in group A. In Group B, only 10% patient had bradycardia and hypotension.

Table VI: Intraoperative and postoperative complications between two groups

Complications	Group-A		Group-B	
	n	%	n	%
Bradycardia	1	5.0	2	10.0
Hypotension	1	5.0	2	10.0
Shivering	1	5.0	0	0.0
Vomiting	2	10.0	0	0.0
Respiratory depression	0	0.0	0	0.0

Values are expressed as percentage (%), Data were analyzed by chi square test

Discussion

Gastrectomy surgery is conventionally done under general anaesthesia. General anaesthesia has some drawbacks such as intra and post-operative hypertension, increasing blood loss, which may in turn lead to a prolonged surgical time, an increased need for blood transfusion and delayed wound healing[22]. General anaesthesia along with epidural is an alternative which carries more advantages. Epidural analgesia offers superior pain relief and early mobilization especially when local anaesthetic dose is combined with an adjuvant as compared to LA used alone. The administration of epidural opioids under general anesthesia was examined by Bourke et al. for laminectomy operation and they found that it provided better pain control with fewer doses required for analgesia. Opioids are usually associated with an increased incidence of, shivering, and pruritus. Recently, it was found that opioids could result in post-operative hyperalgesia with a paradoxical increase in the intensity of pain and subsequent opioid consumption[21].

Dexmedetomidine causes a manageable hypotension and bradycardia, but the striking feature of this drug is the lack of opioid related side effects such as respiratory depression, pruritus, nausea, and vomiting[17]. With this background, the present study was carried out to investigate the efficacy of epidural dexmedetomidine versus epidural fentanyl with bupivacaine in gastrectomy surgery.

In this study, it was observed that mean age group of group A was 54±9.4 and group B was 52.2±8.9. It was also observed that majority of the patients (60%) belonged to age > 50 years and the difference in the mean age between two groups was not statically significant ($p > 0.05$). The majority of the patients (65%) were male. The difference of sex between two

groups was not statically significant (p >0.05). Similar findings were also observed in a study conducted by Cho et al[23]. The reason of male preponderance among study population was due to male were suffering from gastric cancer more than female due to more environmental exposure.

In this current study, it was found that most of the patients of both groups belonged to ASA I. In group A 75% patients were ASA I and in group B 85% were ASA I. The difference of ASA physical status between two groups statically not significant. (p>0.05). The mean duration of anesthesia in group A was 107.4±10.3 and group B was101.6±10.7. Though the duration of anaesthesia was more in fentanyl group than dexmedetomidine group but it was not statistically significant (p>0.05). Bharti et al 2018 showed in their study that mean surgery time was less in dexmedetomidine group than fentanyl group[24]. But it was not statically significant (p>0.05). They compared the analgesic efficacy between epidural dexmedetomidine and fentanyl in upper abdominal surgery.

In our study systolic, diastolic and mean arterial pressures were lower in group B then group A at different times but it was not statically significant (P>0.05). But another study showed conflicting results where systolic pressure was lower in fentanyl group than dexmedetomidine group[25]. They compared epidural fentanyl and epidural fentanyl along with bupivacaine in lower limb surgeries. Most of the patients were young (20-40years) in this study. Concentration and dosages of bupivacaine, fentanyl and dexmedetomidine were different from our study. They used higher concentration of these drugs and also epidural anaesthesia was given at L2-L3 level which was also different from our study. Dexmedetomidine provided better hemodynamic stability than fentanyl when it was used as adjuvant in epidural route in hysterectomy surgery[26].

In this study, first resque analgesic ttime was more in group B than group A. Ayub et al 2019 showed that rescue analgesic time was more in fentanyl than dexmedetomidine group[27]. The difference was statistically significant (P<0.05). In this study, epidural fentanyl and epidural dexmedetomidine along with bupivacaine was administered before and after knee amputation surgery to assess time of rescue analgesics, VAS, sedation score. Most of patients were suffering pain before surgery, so their pain threshold level were less due to central sensitization. Fentanyl can prevent central sensitization and increase threshold level for pain. For the patients who were undergoing knee amputation surgery fentanyl provided long pain free post-operative period than dexmedetomidine[27]. So this study showed conflicting result about the time for first rescue analgesic in comparison to our study.

Our study showed VAS score is lower in dexmedetomidine group than fentanyl group. The mean VAS score in post-operative period was similar to group A and group B. The difference was not statistically significant (p>0.05). Then VAS score reduced more in group B than group A and the differences were statistically significant in 30, 60, 90, 120, 180, 240, 360minutes (p<0.05).

Bharti et al 2018 also showed the analgesic efficacy of dexmedetomidine and fentanyl in thoracic epidural in upper abdominal surgery[24]. The post-operative VAS score is less in dexmedetomidine than fentanyl group. Elfawal et al. 2016 also compared dexmedetomidine and fentanyl along with levobupivacaine in caudal anaestheia in children for lower limb surgeries[28]. They have found that the mean pain score was significantly lower in dexmedetomidine group than fentanyl group.

In our study, during the post-operative period patients were calm and sedated in both groups. Sedation score was significantly higher in group B than group A (p<0.05). Other studies showed similar findings that sedation was significantly more in dexmedetomidine group than fentanyl group (p<0.001)[6,16,26]. Ayub et al 2019 compared epidural dexmedetomidine and epidural fentanyl in knee amputation surgery[27]. The satisfaction score was better in dexmedetomidine group than fentanyl group which was similar to our study. We have found that most of the surgeons were very satisfied, 55% in group A and 65% in group B. The satisfaction level is better in dexmedetomidine group due to overall well maintained hemodynamics and less complication with better surgical compliance.

In this study, in group A 10% patients had vomiting,

5% patient had bradycardia, hypotension, shivering. In group B, 10% patients suffered from bradycardia and hypotension. It was showed that vomiting is more in fentanyl group but hypotension and bradycardia were higher in dexmedetomidine group as intra and post-operative complication. Other studies also showed the similar findings[6,16,26-28]. No case of respiratory depression were reported in either group.

Conclusion

Epidural analgesia with dexmedetomidine and bupivacaine is effective and safe, reduces post-operative pain, produce better sedation and keeps the hemodynamic status more stable than epidural fentanyl and bupivacaine during intraoperative period in patient undergoing gastrectomy surgery.

Declaration

Ethics approval

The study was approved by the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. Informed written consent was taken from the participants before inclusion.

Author contributions

Conception and development of the idea *MSHM, AKMA*
Writing *MSHM, NS*
Data analysis *SAM, SA, MMK, MSHM*
Data collection *MM, MSHM*
Review and Editing *MMK, AKMA*

Funding This study was funded by a research grant provided by Bangabandhu Sheikh Mujib Medical University, Dhaka-1000, Bangladesh.

Conflict of interests None

References

1 Jemal, A., Bray, F., Center, M.M., Ferlay, J., Ward, E. and Forman, D. Global cancer statistics. CA: Cancer journal for clinicians 2011; 61(2): 69-90

2 Robert. J. Mayer, Charles S, Fuchs. Gastric carcinoma. The New England Journal of Medicine 1995; 41:32-42

3 Islam, S. M. J., Ali, S. M., Ahmed, S., Afroz and Huda, M. Histopathologic pattern of gastric cancer in Bangladesh. Journal of Armed Forces Medical College, Bangladesh 2009; 5(1): 21-24.

4 Oddby-Muhrbeck, E., Jakobsson, J., Andersson, L. and Askergren, J. Postoperative nausea and vomiting. A comparison between intravenous and inhalation anaesthesia in breast surgery. Acta anaesthesiologica scandinavica 1994; 38(1): 52-56.

5 Niemi, G. and Breivik, H. Epidural fentanyl markedly improves thoracic epidural analgesia in a low-dose infusion of bupivacaine, adrenaline and fentanyl: A randomized, double-blind crossover study with and without fentanyl. Acta anaesthesiologica scandinavica 2001; 45(2): 221-232.

6 Mohamad, M.F., Mohammad, M.A., Hetta, D.F., Ahmed, E.H., Obiedallah, A.A. and Elzohry, A.A.M. Thoracic epidural analgesia reduces myocardial injury in ischemic patients undergoing major abdominal cancer surgery. Journal of pain research 2017; 10: 887-895

7 Siriussawakul A, Suwanpratheep A. Epidural Analgesia for Perioperative Upper Abdominal Surgery [Internet]. Epidural Analgesia - Current Views and Approaches. InTech; 2012. Available from: http://dx.doi.org/10.5772/34039

8 Subramaniam, B., Subramaniam, K., Pawar, D.K., Sennaraj, B. Preoperative epidural ketamine in combination with morphine does not have a clinically relevant intra- and postoperative opioid-sparing effect. Anesth Analg 2001; 93(5): 1321–26.

9 Farouk, S. Pre-incisional epidural magnesium provides pre-emptive and preventive analgesia in patients undergoing abdominal hysterectomy. British journal of anaesthesia 2008; 101(5): 694-99..

10 Thomas, S. and Beevi, S. Epidural dexamethasone reduces postoperative pain and analgesic requirements. Canadian Journal of Anesthesia 2006; 53(9): 899-905.

11 Bhana, N., Goa, K.L. and McClellan, K.J. Dexmedetomidine. Drugs 2000; 59(2): 263-68.

12 Fritsch, G., Danninger, T., Allerberger, K., Tsodikov, A., Felder, T.K., Kapeller, M., Gerner, P. and Brummett, C.M. Dexmedetomidine added to ropivacaine extends the duration of interscalene brachial plexus blocks for elective shoulder surgery when compared with ropivacaine alone: a single-center, prospective, triple-blind, randomized controlled trial. Anesth Pain Med 2014; 39: 37-47

13 Carollo, D.S., Nossaman, B.D. and Ramadhyani, U. Dexmedetomidine: a review of clinical applications. Current Opinion in Anesthesiology 2008; 21: 457-61.

14 Yoshitomi, T., Kohjitani, A., Maeda, S., Higuchi, H., Shimada, M. and Miyawaki, T. Dexmedetomidine enhances the local anesthetic action of lidocaine via an α-2A adrenoceptor. Anesthesia & Analgesia 2008; 107(1): 96-101.

15 Scheinin, H., Aantaa, R., Anttila, M., Hakola, P., Helminen, A. and Karhuvaara, S. Reversal of the sedative and sympatholytic effects of dexmedetomidine with a specific α2-adrenoceptor antagonist atipamezolea pharmacodynamic and kinetic

study in healthy volunteers. Anesthesiology: The Journal of the American Society of Anesthesiologists 1998; 89(1): 574-84.

16 Bajwa, S.J.S., Arora, V., Kaur, J., Singh, A. and Parmar, S.S. Comparative evaluation of dexmedetomidine and fentanyl for epidural analgesia in lower limb orthopedic surgeries. Saudi journal of anaesthesia 2011; 5(4): 365-370

17 Venn, R.M., Bradshaw, C.J., Spencer, R., Brealey, D., Caudwell, E., Naughton, C., Vedio, A., Singer, M., Feneck, R., Treacher, D. and Willatts, S.M. Preliminary UK experience of dexmedetomidine, a novel agent for postoperative sedation in the intensive care unit. Anaesthesia 1990; 54(12): 1136-42.

18 Benzon HT, Wong HY, Belavic AM Jr, Goodman I, Mitchell D, Lefheit T. A randomized double-blind comparison of epidural fentanyl infusion versus patientcontrolled analgesia with morphine for postthoracotomy pain. Anesth Analg 1993; 76: 316-22.

19 Lorenzini, C., Moreira, L.B. and Ferreira, M.B.C. Efficacy of ropivacaine compared with ropivacaine plus sufentanil for postoperative analgesia after major knee surgery. Anaesthesia 2002; 57(5): 424-28.

20 Amr, Y.M., Yousef, A.A.A.M., Alzeftawy, A.E., Messbah, W.I. and Saber, A.M. Effect of preincisional epidural fentanyl and bupivacaine on postthoracotomy pain and pulmonary function. The Annals of thoracic surgery 2010; 89(2): 381-85.

21 Fletcher, D. and Martinez, V. Opioid-induced hyperalgesia in patients after surgery: a systematic review and a meta-analysis. British Journal of Anaesthesia 2014; 112(6): 991-1004.

22 Gulur, P., Nishimori, M. and Ballantyne, J.C. Regional anaesthesia versus general anaesthesia, morbidity and mortality. Best practice & research Clinical anaesthesiology 2006; 20(2): 249-63.

23 Cho JS, Kim HI, Lee KY. Comparison of the effects of patient-controlled epidural and intravenous analgesia on postoperative bowel function after laparoscopic gastrectomy: a prospective randomized study. Surg Endosc 2017 Nov; 31(11): 4688-4696

24 Bharti, N., Pokale, S.N., Bala, I. and Gupta, V. Analgesic efficacy of dexmedetomidine versus fentanyl as an adjunct to thoracic epidural in patients undergoing upper abdominal surgery: a randomized controlled trial. Southern African Journal of Anaesthesia and Analgesia 2018; 24(1): 16-21.

25 Sarkar, A., Bafila, N.S., Singh, R.B., Rasheed, M.A., Choubey, S. and Arora, V. Comparison of epidural bupivacaine and dexmedetomidine with bupivacaine and fentanyl for postoperative pain relief in lower limb orthopedic surgery. Anesthesia, essays and researches 2018; 12(2): 572-580.

26 Karhade, S.S., Acharya, S.A. and Harnagale, K. Comparative analysis of epidural bupivacaine versus bupivacaine with dexmedetomidine for vaginal hysterectomy. Anesthesia, essays and researches 2015; 9(3): 310-313

27 Ayoub, S.N. and Hakim, K.Y. Comparative study of dexmedetomidine or fentanyl as an adjuvant to epidural bupivacaine for prevention of stump and phantom pain in adult patients undergoing above-knee or below-knee amputation: a randomized prospective trial. Research and Opinion in Anesthesia and Intensive Care 2019; 6(3): 371.

28 Elfawal, S.M., Abdelaal, W.A. and Hosny, M.R. A comparative study of dexmedetomidine and fentanyl as adjuvants to levobupivacaine for caudal analgesia in children undergoing lower limb orthopedic surgery. Saudi journal of anaesthesia 2016; 10(4): 423-27