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Original Research Article

A Comparative Study of Post Operative Pain Relief by Continuous Epidural Infusion of Bupivacaine with Fentanyl vs Ropivacaine with Fentanyl by Using Portable Elastomeric Infusion Pump

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Abstract

Background: Therefore anaesthetic and analgesic techniques should aim not only to provide optimal condition for surgery, but also reduce post operative morbidity and mortality thus improving the outcome. The stress response to surgery results in disturbances in body homeostasis. Many beneficial effects of continuous epidural analgesia during post operative period includes effective pain relief, fast recovery of gut functions, reduction in postoperative thrombo-embolic and cardio respiratory complications.

Material and Methods: The study was conducted on 50 patients of either sex aged between 30- 60 years with American society of Anaesthesia physical status grade I who were undergoing upper and middle abdominal surgery. Age of the patients ranged from 20 – 60years and weight between 40-70 kg and height ranging from 150 – 180 cm. All patients were thoroughly examined preoperatively.

Conclusion: By using portable, elastomeric epidural infusion pump for the purpose of post operative analgesia by continuous epidural infusion of Bupivacaine with Fentanyl provides superior analgesia compared to Ropivacaine with Fentanyl.

Keywords: Bupivacaine, Ropivacain, Fentanyl, Analgesia.

Introduction

Successful outcome is the most desirable end point of any surgical procedure.

Therefore anaesthetic and analgesic techniques should aim not only to provide optimal condition for surgery, but also reduce post operative morbidity and mortality thus improving the outcome. The stress response to surgery results in disturbances in body homeostasis. Many beneficial effects of continuous epidural analgesia during post operative period includes effective pain relief, fast recovery of gut functions, reduction in postoperative thrombo-embolic and cardio respiratory complications. Analgesia delivered through an indwelling epidural catheter is a safe and effective method for the management of post operative painrelief [1]. Post operative epidural anaesthesia provides superior analgesia compared with systemic opioids. Using combination of

local anaesthetic and opioids in epidural infusion is advantageous over infusion using local anaesthetics or opioids alone. A local anaesthetic–opioid combination provides superior post operative analgesia – improved dynamic pain relief, limits regression of sensory block, decreases the dose of local anaesthetic and decreases the incidence of side effects [2]. The choice of local anaesthetic for continuous epidural infusion varies. Because of differential sensory blockade with minimal impairment of motor function local anaesthetics like bupivacaine, ropivacaine, levobupivacaine are commonly used. Epidural infusion are usually given by intermittent boluses or by using syringe pumps or electronic epidural infusion pumps. These pumps are electrically driven and they have their own disadvantages. The newer portable elastomeric infusion pumps can also be used for this purpose [3]. They are safe, reliable, economic and easy to use. They operate by the action of elastomeric balloon and the drug is infused in a constant preset flow rate [4]. The present study was designed to compare the post operative pain relief by continuous epidural infusion of Bupivacaine with Fentanyl and Ropivacaine with fentanyl using portable elastomeric infusion pump[5].

Objectives

To compare the post operative pain relief by continuous epidural infusion of bupivacaine with fentanyl and ropivacaine with fentanyl by using portable elastomeric infusion pump.

Material and Methods

The study was conducted on 50 patients of either sex aged between 30- 60 years with American society of Anaesthesia physical status grade I who were undergoing upper and middle abdominal surgery. Age of the patients ranged from 20 – 60years and weight between 40-70 kg and height ranging from 150 – 180 cm. All patients were thoroughly examined preoperatively. In the assessment room, vital parameters like pulse, blood pressure and base line investigations like haemoglobin, urine analysis for albumin and sugar, blood sugar, urea and creatinine and chest X ray PA view, ECG were checked. Thorough examination of the all the systems and airway assessment was done.

Exclusion criteria including significant co – existing diseases, long term analgesic use, and contraindication to regional anaesthesia such as local infection and bleeding diathesis. Epidural infusion pump used in this study was DOSIFUSER portable, elastomeric pump with the capacity of 250 ml with the fixed infusion rate of 5.2 ml /hr.

Concentration of anaesthetic mixture used in this study.

In the operating theatre the Boyles apparatus, emergency drugs and airway devices were kept ready. Patients were shifted to operating table. NIBP, ECG, Pulse oximetry were connected to the patients. Preoperative baseline systolic and diastolic blood pressure, Pulse rate, oxygen saturation were recorded. Patients were cannulated with 18 g IV cannula and IV fluid RL started. The patients were placed in right lateral position. The skin over the back was prepared with antiseptic solution and draped with sterile towel. After infiltrating skin and subcutaneous tissue with local anaesthetic, 17 G Tuohy needle inserted either in T12 –L1 or L1-L2 or L2-L3 space according to nature of the surgery. Epidural space was located with loss resistance to air and 19 Gauge epidural catheters inserted and placed at depth of 5 cm after giving test dose of 3 ml of 2 % lignocaine with 1:200000 dilution of adrenaline, All patients in both group received General anaesthesia as intraoperative anaesthesia. General anaesthetic technique was similar in both the groups. Intraoperatively all patients were managed depending upon the patients preoperative status and type of the surgery. IV fluids & blood transfusions were given according to haemodynamic monitoring and blood loss. 30 min before the end of the

surgery epidural infusion was started, and time was noted. At the end of surgery neuromuscular blockade was antagonised and tracheal extubation was done provided the patients were conscious, haemodynamically stable and maintained adequate ventilation. All the patients were shifted to post-operative surgical ward. Each patient's post operative course was followed for the 48 hours since activation of continuous epidural infusion. Patients pulse rate, blood pressure. Respiratory rate, SpO2, Pain score using Visual Analogue Scale, Sedation score using Ramsay scale, Motor block using bromage scale and any complications were noted every 8 hourly. Break through pain was managed with Inj Tramadol 50 mg IV. After 48 hours infusion pumps were stopped and epidural catheter was removed.

Results

This study comprised two groups. The patients in *group BF* received 0.5 % Bupivacaine 60 ml + 10 mlFentanyl (100 µg) +180 ml Normal Saline. In *group RF* received 60 ml of 0.5 %Ropivacaine + 10 ml Fentanyl +180 ml Normal Saline Age distribution in the group BF varied from 26 years to 60years with mean age of 43 years and standard deviation of 13. In group RF age varied from 25 years to 60 years with mean value of 42 years and standard deviation of 10. Height of the patients in the group BF had a mean value of164 cm with the standard deviation of 6. In group RF had a mean value of 160 cm with standard deviation of 6.4. Weight of the patients in the group BF had a mean value of 64.7 kgs with standard deviation of 5. In group RF had mean value of 61.28 kgs with standarddeviation of 7.

Demographic Data

Factors	Bupivacanie-Fentanyl	Ropivacaine -Fentanyl
Age	43 ± 13	42 ± 10
Height	164 ± 6	160 ± 6.4
Weight	64.7 ± 5	61.28 ± 7

In the BF group mean preoperative pulse rate was 81with standard deviation of 5. The post operative mean pulse rate was 81 with standard deviation of 4.25. The p value between two was 0.54, that was not statistically significant. In the RF group mean preoperative pulse rate was 80 with standard deviation of 6.29. The mean post operative pulse rate was 92.9 withstandard deviation of 8.36. The p value between two was < 0.0001, that was statistically significant. In BF group mean preoperative systolic BP was 121 with standard deviation of 3.04. The mean post operative systolic BP was 123 with standard deviation of 4.24. The p value between two was 0.484 that not significant. In the RF group the mean preoperative systolic BP was 121.52with standard deviation of 4.51. The mean post-operative systolic BP was 127.68 with standard deviation of 3.68. The p-value < 0.0001 was statistically significant. In the BF group mean preoperative diastolic BP was 70 with standard deviation of 4.24. The mean post operative diastolic BP was 71 with standard deviation of 4.62. The p value is 0.429 that is not significant. In the RF group the mean preoperative diastolic blood pressure was 77.012 with standard deviation of 5.83. The mean post operative diastolic BP was 82.21 with standard deviation of 3.20. The p-value 0.0004 which was highly significant.

Blood Pressure:

	Bupivacaine		Ropivacaine	
	Systolic	Diastolic	Systolic	Diastolic
PreOp	121 ± 3.04	70 ± 4.24	121.52 ± 4.51	77.1 ± 5.83
PostOp	123 ± 2.18	71 ± 4.62	127.68 ± 3.68	82.21 ± 3.20
P value	0.484	0.429	<0.0001	<0.0004

The mean pain score in the BF group was 2 with standarddeviation of 0.29.In the RF group the mean pain score was 2.17 with standarddeviation of 0.706. The p value between two was 0.0204 that was statisticallysignificant.

Group	Pain Score
Bupivacaine - Fentanyl	2 ± 0.29
Ropivacaine- Fentanyl	2.17± 0.706
P value	0.0204

Adjuvants Needed:

BF group needed 6 times of rescue analgesia RF group needed 22 times of rescue analgesia

Group	No of Times Adjuvant
BupivacaineFentanyl	6
Ropivacaine-Fentanyl	22

Discussion

Portable, elastomeric epidural infusion pumps is an economical and more reliable mode of delivering the drugs. [5] It was available in various volume, and variable flow rates. It provides continuous delivery of drug according to the flow rate for fixed hours. For continuous epidural analgesia local anaesthetics with opioids combination were commonly used. Bupivacaine, Ropivacaine, levobupivacaine are the commonly used local anaesthetics, because of their differential blockade of sensory fibres rather than motor fibres [6]. Local anaesthetics are used in the concentration of <0.125 to 0.2 % Opioids commonly used are Fentanyl, Sufentanil, morphine, hydromorphine. Local anaesthetic and opioid combination in epidural infusion provides superior post operative analgesia, decreases the dose of local anaesthetic and reduces the side effects [7]. By statistical analysis of two groups the age distribution in both groups was statistically not significant with a p value of 0.8 When comparing the weight of the patient in two groups it was statistically not significant with p value 0.78 There was no statistically significant differences between the two groups as regards to sex distribution 0.89. Mean preoperative pulse rate in BF group was 81 ±5 and postoperative pulse rate was 81 ±4.25. The difference between two was statistically not significant (p> 0.54) Mean preoperative pulse rate in RF group was 80 ± 6.29 and post operative pulse rate was 92.9 ± 8.36. The difference between two was statistically significant (p < 0.0001)

Blood pressure – systolic; Mean preoperative systolic BP in BF group was 121 ± 3.04, and mean post operative blood pressure was 123 ± 2.18. The difference between two was statistically not significant (p 0.484) Mean preoperative systolic BP in RF group was 121.54± 4.51, and mean post operative systolic BP was 127.68 ± 3.68. The difference between two was statistically significant with p value of < 0.0001. Blood pressure – diastolic Mean diastolic BP in BF group was 70 ±4.24 and mean post operative diastolic BP was 71 ± 4.62. The difference between two was statistically not significant with a p value 0.429. Mean diastolic BP in RF group was 77.12 ± 5.83 and mean post operative diastolic BP was 82.21 ± 3.20. The difference between two was statistically significant with p value < 0.0004.

Post operative pain score; Mean post operative pain score in the BF group was 2±0.29 andin RF group it was 2.17 ± 0.706. The difference between two was statistically significant with p value of 0.0204. Number of time adjuvants needed; Adjuvants are needed 6 times in BF group. In RF group adjuvants was used in 22

times. **Postoperative** sedation score was equal in both groups. **Postoperative** respiratory rate and Sp02 was equal in both group. No significant complication between two groups. Fernandes et al [8] have done a study to compare the analgesic efficacy and degree of motor blockade achieved with epidural infusion of 0.625 % Bupivacaine (group B) Vs 0.1 % Ropivacaine (Group R) both with Fentanyl 2 µg /ml in labouring patients. A prospective double blind study was performed in 98 ASA physical status I – II parturient who were divided randomly in to 2 group to receive either Bupivacaine and Ropivacaine after catheter location has been tested with an initial bolus of lidocaine and fentanyl. Infusion rate was 15 ml/ hour in every case. When pain was perceived, 5 ml bolus of assigned epidural analgesics were administered every 10 min until analgesia was achieved [9]. They recorded pain intensity, level of sensory block, degree of motor block, haemodynamic variables, secondary effects, mode of delivery, neonatal outcome, patient satisfaction. There were no statistically significant difference in any of the factors analysed. Highly effective analgesia was achieved in both groups with a small incidence of motor block. These finding suggested that bupivacaine may be more potent than ropivacaine. Hudgson PS, Liu SS [10] have done a study, A comparison of ropivacaine to bupivacaine with fentanyl for post operative patient controlled epidural analgesia. Scott DA et al [11] have done a study on post operative analgesia using epidural infusion of fentanyl with bupivacaine – A prospective analysis of 1014 patients. Cooper DW, Turner G have done a study on patient controlled extradural analgesia to compare bupivacaine, fentanyl, bupivacaine with fentanyl in the treatment of post operative pain. Zaric D, Nydahl PA et al, [12] have done a study to investigate the dose response of sensory and motor block during continuous epiduralinfusion of 0.1%,0.2% or 0.3 % ropivacaine in volunteers in a double blinded manner [13]. Bupivacaine 0.25 % and isotonic saline were used as reference and control respectively. David A Sidebottom, Kevin Russel et al [14] have done a retrospective study to assess the clinical efficacy of addition of low concentration of fentanyl to bupivacaine 0.125 % which infused epidurally for postoperative analgesia [15,16].

Conclusion

By using portable, elastomeric epidural infusion pump for the purpose of post operative analgesia by continuous epidural infusion of Bupivacaine with Fentanyl provides superior analgesia compared to Ropivacaine with Fentanyl.

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