Effect of Combined Thoracic Epidural with General Anaesthesia vs General Anaesthesia alone on Intraoperative Hemodynamics and Postoperative Analgesia Requirement in Abdominal Surgeries

Veenita Sharma[1], Gurpinderbeer Singh[2], Amarjit Singh[3]

ABSTRACT

Introduction: The combined use of epidural and general anaesthesia provides better intraoperative hemodynamics and reduces the requirement of general anaesthetics by blocking the noxious stimulus originating from the surgical site at the spinal level. Epidural analgesia with local anaesthetic when combined with opioids has made it even more popular. The aim of this study was to evaluate the effect of combined thoracic epidural with general anaesthesia and general anaesthesia alone in abdominal surgeries on intraoperative hemodynamics and postoperative analgesic profile.

Material and Methods: This study was randomised prospective trial that included 40 patients of ASA grade I – III scheduled for abdominal surgeries. They were allocated in two groups. Group I – combined general epidural anaesthesia (CGEA), received thoracic epidural anaesthesia in addition to general anaesthesia. Group II received general anaesthesia only (GA). Perioperative hemodynamics i.e. pulse rate, systolic blood pressure and diastolic blood pressure were compared in two groups, also the duration of first rescue analgesic requirement and VAS at the time of first rescue analgesic was studied.

Results: With comparable demographic and baseline attributes there were statistically significant variations in heart rate, diastolic blood pressure, and systolic blood pressure between both the groups. The mean duration of first rescue analgesic was statistically significantly higher in group I when compared with group II. It was also seen that mean of VAS at the time of first rescue analgesic was significantly lower in group I as compared to group II.

Conclusion: Thoracic epidural anaesthesia when combined with general anaesthesia not only provides hemodynamic stability but also significantly enhances postoperative analgesia in patients undergoing abdominal surgeries.

Keywords: Epidural Anaesthesia, Local Anaesthetics, Opoid Analgesics, Hemodynamics, VAS

INTRODUCTION

Uninhibited perioperative surgical stress response and inadequate post operative analgesia can result in series of pathophysiological changes in all major systems. It is seen that severity of pain is higher in abdominal surgeries and if not controlled adequately results in restriction in movement of diaphragm thereby leading to respiratory complications, increased hospital stay and cost, and surgical morbidities[1]. Noxious stimuli to surgical injury are not abolished completely at hypothalamic level even in deeper planes of general anaesthesia[2]. The total prevention of nociceptive signals arising from the surgical area during stress response to surgery can be inhibited from reaching the CNS by neural blockade. The combined use of epidural and general anaesthesia reduces the requirement of general anaesthetics by blocking the noxious stimulus originating from the surgical site at the spinal level[3].

Epidural analgesia with local anaesthetics gives good pain relief and addition of various adjuvants have made it more popular[4, 5]. Among local anaesthetics ropivacaine is preferred due to its favourable sensory block profile and lower cardiovascular toxicity compared to others[6]. Epidural tramadol also provides prolonged postoperative pain relief with advantage of lack of respiratory depressant effect[7, 8]. It is an opioid with analgesic potency that has been shown in many studies to be approximately equal to that of pethidine[7, 9, 10]. It has been shown in animal studies that tramadol may have selective spinal action[11, 12].

The advantages of combined general and epidural analgesia (CGEA) are decrease in blood loss, cardiac dysrrhythmias, and ischemic events and reduced incidence of postoperative deep vein thrombosis[13]. Many clinical studies have revealed that epidural analgesia offers a pre-emptive analgesic effect. A pre-emptive analgesia technique prior to the initiation of painful surgical stimuli delays the onset of postoperative analgesic requirement beyond the expected duration of action of the local anaesthetic used[14-16]. The use of CGEA is increased because of the favourable recovery characteristics that facilitate early hospital discharge[17].

Thus the aim of our study was to evaluate the effect of combined thoracic epidural with general anaesthesia and general anaesthesia alone in abdominal surgeries on intraoperative hemodynamics and post operative analgesic profile.

MATERIAL AND METHODS

This study was a prospective randomized clinical trial.

[1]Associate Professor, [2]Senior Resident, [3]Professor, Department of Anesthesia and Intensive Care, Adesh Medical College and Hospital, Mohri, Shahabad, Kurukshetra, India

Corresponding author: Dr. Gurpinderbeer Singh, 1736 Nirvana Society, Sector 49 B, Chandigarh – 160047, India

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Approval from the institutional ethical committee and informed consent from patients was taken. Using convenient sampling technique, the study was carried out in 40 patients of either gender with age between 30 – 60 years. All the patients were randomly allocated into one of the two groups using computer generated random number table of 20 patients each. The patients with ASA physical status between I and III and Mallampati class I and II were taken. Patients with acute cardiovascular, respiratory, renal disease, history of drug sensitivity to local anaesthetics or tramadol, patients with bleeding or coagulation disorders, infection at epidural injection site (contraindications to epidural anaesthesia) were excluded.

Patients fulfilling the inclusion criteria were divided into two equal groups of 20 patients each. Group I – The combined group received thoracic epidural anaesthesia in addition to general anaesthesia (CGEA)

Group II – received general anaesthesia only (GA)

All the patients were kept NPO overnight. Premedication was given with tablet alprazolam 0.25 mg and tablet ranitidine 150 mg orally at night before surgery and with a sip of water 2 hour before the procedure. After intravenous cannulation with 18 G veinflow patients were started normal saline at the rate of 10 ml/kg. All patients were monitored for noninvasive heart rate, blood pressure, electrocardiogram and oxygen saturation.

In operation theatre, premedication was given to all patients with injection glycopyrrolate 0.2mg i.v., injection ondansetron 4mg i.v. and injection midazolam 1 mg i.v.

In group I, for insertion of thoracic epidural patients were placed in the lateral decubitus position and under all aseptic precautions 18 G Tuohy needle was introduced at T_{10-11} intervertebral space in the midline. After locating the epidural space with loss of resistance technique epidural catheter was placed and advanced 5 to 7 cm into the epidural space. A test dose of 3 ml xylocaine containing epinephrine (1:200,000) was administered after ensuring for no cerebrospinal fluid or blood back flow. Thereafter the patients were turned back to supine position. 9 ml of 0.25% ropivacaine combined with 1 ml (50 mg) tramadol was administered as bolus via the epidural catheter.

Group II received injection tramadol 2mg/kg i.v.

All patients were preoxygenated with 100% oxygen for 3 – 5 minutes. Induction was done with injection propofol 2 mg/kg i.v. till the loss of eyelash reflex, injection scoline 1.5 mg/kg i.v. was given followed by IPPV with 100% oxygen. Endotracheal intubation was done by direct laryngoscopy. Tube was fixed after confirming bilateral air entry. Ventilation was controlled with a tidal volume of 10 ml/kg and respiratory rate was adjusted to maintain end tidal carbon dioxide between 30 – 35 mm Hg. Patients were maintained with O2 / N2O (50:50) with isoflurane 0.8 to 1.2 % and injection atracurium 0.5 mg/kg bolus followed by one fifth fraction dose of injection atracurium given at intervals of 30 to 35 minutes. Injection diclofenac 75 mg i.v. was given to all patients. After completion of surgery the patients were reversed with injection glycopyrrolate 0.008 mg/kg and injection neostigmine 0.05 mg/kg and extubated on full recovery. Thereafter patients were shifted to postoperative care unit.

Vital parameters like pulse rate, systolic and diastolic blood pressure, spo2 were monitored intraopertaively in both groups. The readings were taken preoperatively i.e. baseline, intraoperatively, immediately after extubation, when shifted in recovery, then after 3 and 12 hours. Duration of first rescue analgesia was defined as the time from bolus epidural injection in group I and intravenous tramadol injection in group II. Postoperatively pain was assessed using the 10 – points Visual Analogue Scale (VAS) on which 0 indicates 'no pain', 1–3 'mild pain', 4–7 'moderate pain' and 8-10 'severe pain'. Rescue analgesia was given at VAS > 4.

STATISTICAL ANALYSIS

Quantitative parameters were performed using students' t-test whereas qualitative parameters were compared using chi square test. *P* value as less than 0.05 was considered statistically significant.

RESULTS

The study groups were comparable in terms of demographic profile, ASA status, type of surgical procedures, baseline hemodynamic variables and duration of surgery (Table 1). Heart rate, diastolic BP and systolic BP in group I (CGEA) remained nearly same to the baseline values throughout surgery and in postoperative period whereas in group II (GA) there were higher mean values of heart rate, diastolic BP and systolic BP as compared to the baseline value

	Group CGEA	Group GA
Age (Years)	57.9±11.63	56.4±11.54.
Height (cm)	162.77±6.897	163.6±5.858
Weight (kg)	67±8.43	65.5±7.389
Duration of surgery (min)	152.5±4.50	160.8±3.60

Table-1: Demographic profile

	Group CGEA		Group GA		
Time Interval	Mean	SD	Mean	SD	**P value**
Wheeled in	84.93	2.031	85.13	1.363	>0.05
Intra operative	70.74	1.092	92.45	1.123	<O.05
Immediate after Extubation	84.90	1.42	102.47	0.805	0.007
Shifting in Recovery	82.67	1.49	90.33	1.11	0.0149
3 hr	83.30	1.126	92.87	1.22	<0.001
12hr	85.67	2.50	90.00	1.96	0.0312

Table-2: Pulse rate Variation

	Group CGEA		Group GA		
Time Interval	**Mean**	**SD**	**Mean**	**SD**	**P-value**
Wheeled in	118.9	1.375	120.9	1.446	0.6902
Intra-op	112.6	1.424	132.9	0.568	0.0152
Immediate after Extubation	116.4	1.255	140.3	1.32	<0.001
Shifting in Recovery	114.2	1.47	133.4	0.769	0.0042
3 hr	116.6	1.217	132.2	1.13	0.003
12 hr	114.7	1.25	124.3	0.78	0.007

Table-3: Systolic blood pressure variations

	Group CGEA		Group GA		
Time Interval	**Mean**	**SD**	**MEAN**	**SD**	**P -value**
Wheeled in	71.33	1.39	70.67	1.37	0.0612
Intra-op	68.31	0.931	74.22	1.02	0.0326
Immediate after Extubation	72.8	1.01	76.53	0.80	0.0386
Shifting in Recovery	70.47	1.13	74.13	0.41	0.0035
3 hr	70.73	0.84	72.73	0.94	0.003
12 hr	70.8	1.012	71.87	0.75	0.0227

Table-4: Diastolic Blood pressure variation

	Group CGEA		Group GA		
Event	**Mean**	**SD**	**Mean**	**SD**	**P value**
VAS score (at 1st rescue analgesia in Group GA)	3.233	0.124	5.133	0.136	<0.05

Table-5: Analgesic Profile

	Group CGEA		Group GA		
Event	**Mean**	**SD**	**Mean**	**SD**	**P value**
Time of 1st Rescue Analgesia (in mins)	410.3	3.89	342.8	6.37	<0.0001

Table-6: Time of 1st rescue analgesia

There were statistically significant variations in heart rate, diastolic and systolic BP between both the groups. These value were persistently significantly low in CGEA group as compared to GA group (Table 2, 3, 4)

The mean duration of rescue analgesia was statistically significantly higher in group I (CGEA) when compared with group II (GA) (Table 6). In group II (GA) rescue analgesics was required early as compared to group I (CGEA). Mean VAS in group II at that time was 5.133 whereas VAS in group I was 3.233 and so no analgesia was required in group I. It was seen that mean of VAS at the time of first rescue analgesia was significantly low in group I as compared to group II (table 5)

DISCUSSION

We compared efficacy of tramadol when used intravenously in general anaesthesia and as adjuvant with ropivacaine in CGEA by evaluating the effect on hemodynamics and postoperative analgesia. This study demonstrated that CGEA provided better and longer duration of postoperative analgesia with better hemodynamic stability.

We compared the drug tramadol (50 mg) in combination with 0.25% ropivacaine in thoracic epidural block and in dose of 2 mg/kg as analgesic in patients receiving general anaesthesia only. Tramadol has been proved effective in prolonging postoperative analgesia when used epidurally. Prakash et al in their study have shown that addition of tramadol to caudal bupivacaine provided a dose related increase in post operative analgesia[18]. Also Chrubasik et al in their study concluded that tramadol provided effective post operative analgesia with lack of respiratory depression[19].

In this study along with tramadol ropivacaine was selected as local anaesthetic due to its lower cardiotoxicity potential and better sensory than motor block profile. Also in previous study by Scott et al 0.2% ropivacaine was demonstrated to provide the best balance between analgesia and motor block[20].

The CGEA group showed hemodynamic stability as compared to general anaesthesia only group. This was also shown by Doss NW et al that epidural anaesthesia with tramadol and ropivacaine provided hemodynamic stability and effective post operative analgesia as compared to general anaesthesia group[21]. They also concluded that epidural anaesthesia group facilitated post anaesthesia recovery and give more satisfaction than GA.

Epidural anaesthesia has proved its efficacy in maintaining stable hemodynamics when combined with general anaesthesia. Funayama et al found that MAP was depressed significantly in study group (CGEA) without depressing CO and pulmonary hemodynamics. They concluded that CGEA maintained systemic hemodynamics in thoracic surgery[22].

In the present study the first rescue analgesic requirement

was prolonged in the CGEA group. It was also concluded by Yeh CC et al in their study about decreased analgesic consumption and prolonged first rescue analgesia in epidural group in modified radical mastectomy surgeries. A worse VAS was observed in GA group and lower VAS was seen in CGEA group[23].

Our study had limitation that in different type of upper abdominal surgeries the handling of tissues and diaphragmatic irritation may vary and can result in different severity of pain which may result in difference in dose and frequency of dose requirement.

CONCLUSION

Our study shows that thoracic epidural anaesthesia when combined with general anaesthesia not only provides hemodynamic stability but also significantly enhances post operative analgesia in patients undergoing abdominal surgeries.

REFERENCES

1. Singh AP, Singh D, Singh Y, Jain G. Postoperative analgesic efficacy of epidural tramadol as adjutant to ropivacaine in adult upper abdominal surgeries. Anesth Essays Res 2015;9:369-73.
2. Atia AM, Abdel-Rahman KA. Combined Thoracic Epidural with General Anaesthesia vs. General Anaesthesia Alone for Major Abdominal Surgery: Anesthetic Requirements and Stress Response. J Anesth Clin Res 2016; 7: 616.
3. Hodgson PS, Liu SS. Epidural lidocaine decreases sevoflurane requirement for adequate depth of anaesthesia as measured by the Bispectral Index monitor. Anesthesiology 2001; 94: 799-803.
4. Rosenberg PH, Heinonen E. Differential sensitivity of A and C nerve fibres to long-acting amide local anaesthetics. Br J Anaesth 1983;55:163-7.
5. Semsroth M, Gabriel A, Sauberer A, Wuppinger G. Regional anesthetic procedures in pediatric anaesthesia. Anaesthesist 1994;43:55-72.
6. McClellan KJ, Faulds D. Ropivacaine: An update of its use in regional anaesthesia. Drugs 2000;60:1065-93.
7. Vickers MD, O'Flaherty D, Szekely SM, Read M, Yoshizumi J. Tramadol:Pain relief by an opioid without depression of respiration. Anaesthesia 1992;47:291-6.
8. Senel AC, Akyol A, Dohman D, Solak M. Caudal bupivacaine-tramadol combination for postoperative analgesia in pediatric herniorrhaphy. Acta Anaesthesiol Scand 2001;45:786-9.
9. O'Flaherty D, Szekely S, Vickers MD. Tramadol versus pethidine analgesia in postoperative pain. Pain 1990;5:179.
10. Lehman KA, Jung C, Hoeckle W. Tramadol and pethidine in postoperative pain therapy: A randomised double-blind trial with intravenous on-demand analgesia. Schmerz Pain Douleur 1985;6:88-100.
11. Mattia A, Vanderah T, Raffa RB, Vaugt JL, Porreca P. Tramadol produces antinociception through spinal sites, with minimal tolerance, in mice. FASEB J 1991;5:A473.
12. Bernatzky G, Jurna I. Intrathecal injection of codeine, buprenorphine, tilidine, tramadol and nefopam depresses the tail-flick response in rats. Eur J Pharmacol 1986;120:75-80.
13. Rodgers A, Walker N, Schug S, McKee A, Kehlet H, et al. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. BMJ 2000; 321:1493.
14. Wong, C.S., Lu, C.C., Cherng, C.H., Ho, S.T.: Pre-emptive analgesia with ketamine, morrphine and epidural lidocaine prior to total knee replacement. Can. J. Anaesth. 1997; 44:31.
15. Mcquay, H.J., Carroll, D., Moore, R.A.: Postoperative orthopaedic pain—the effect of opiate premedication and local anesthetic blocks.Pain 1988; 33:291.
16. Abram, S.E.: Importance of preincisional analgesia. Reg. Anesth. 1996; 21:117.
17. Senagore AJ, Whalley D, Delaney CP, Mekhail N, Duepree HJ, et al. Epidural anaesthesia-analgesia shortens length of stay after laparoscopic segmental colectomy for benign pathology. Surgery 2001; 129: 672-676.
18. Prakash S, Tyagi R, Gogia AR, Singh R, Prakash S. Efficacy of three doses of tramadol with bupivacaine for caudal analgesia in paediatric inguinal herniotomy. Br J Anaesth 2006;97:385-8.
19. Chrubasik J, Warth L, Wust H, Zindler M. Analgesic potency of epidural tramadol after abdominal surgery. Pain 1987;Suppl 4:296.
20. Scott DA, Emanuelsson BM, Mooney PH, Cook RJ, Junestrand C. Pharmacokinetics and efficacy of long-term epidural ropivacaine infusion for postoperative analgesia. Anesth Analg 1997;85:1322-30.
21. Doss NW, Ipe J, Crimi T, Rajpal S, Cohen S, Fogler RJ, Michael R, Gintautas J.Continuous thoracic epidural anaesthesia with 0.2% ropivacaine versus general anaesthesia for perioperative management of modified radical mastectomy. Anesth Analg. 2001;92:1552-7.
22. Funayama T, Aida S, Matsukawa T, Okada K, Kumazawa T. Systemic, but not pulmonary, haemodynamicss is depressed during combined high thoraco-cervical epidural and general anaesthesia in dogs. Can J Anaesth. 2003;50:454-9.
23. Yeh Chun-Chang Yu, Jyh-Cherng Wu, Ching-Tang Ho, Shung-Tai Chang, Tzu-Ming Wong, Chih-Shung Thoracic Epidural Anaesthesia for Pain Relief and Postoperation Recovery with Modified Radical Mastectomy World J. Surg. 1999;23: 256.

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