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Original Research

Combined Thoracic Epidural with General Anesthesia Vs General Anesthesia Alone for Major Abdominal Surgery: Anesthetic Requirements and Stress Response

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***ABSTRACT*:**
Background: Epidural analgesia (EA) is a key adjuvant therapy for effective postoperative pain control after abdominal surgery. Major surgery induces profound physiological changes in the perioperative period, characterised by increases in sympathoadrenal and other neuroendocrine activity and also increased cytokine production. Because epidural anaesthesia can attenuate this "stress response" to surgery, improve the quality of postoperative analgesia in comparison with systemic opioids, and hasten recovery of gut function, it has been suggested that conducting surgery under epidural anaesthesia (either as the sole anaesthetic or in combination with general anaesthesia) may reduce perioperative morbidity and mortality compared with general anaesthesia alone. **Aim of the study:** To evaluate the effect of General anaesthesia with epidural analgesia(EA-GA) use vs General anaesthesia for major abdominal surgeries. **Materials and methods:** The study was conducted in the Department of Anesthesiology of the Medical Institution. For the study, a total of 60 patients of both genders scheduled for major abdominal surgeries with age ranging between 18-75 years were included in the study. Patients with metabolic diseases, drug abuse, severe cardiovascular diseases, and having contraindications to neuraxial blockade as hypersensitivity were excluded from the study. The patients were randomly equally grouped into two groups, Group 1 and Group 2. Patients in group 1 received combined general anesthesiawith thoracic epidural as maintenance anesthesia. Patients in group 2 received only general anesthesiaas maintenance anesthesia. All patients received Tab alprazolam 0.5mg and Tab ranitidine 150 mg on prior night of the surgery. Patients was kept nil by mouth from midnight. **Results:** A total of 60 patients were included in the study and were randomly grouped equally into Group 1 and Group 2. The mean age in group 1 was 60.25 years and in group 2 was 63.25 years. Mean duration of operation in Group 1 was 152.32 min and in Group 2 was 180.33 min. We observed that both groups show similar pattern with respect to arterial blood pressure changes. Heart rate showed significant higher values compared to baseline after induction, pre and post intubation and at skin incision in both studied groups. Heart rate showed persistently increased lower values in group 1 as compared to group 2. **Conclusion:** From the results of present study, this can be concluded that combined general and thoracic epidural block decreases stress response more than general anesthesia alone during major abdominal surgery.
Key words: Analgesia, general anesthesia, abdominal surgery

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INTRODUCTION:

Epidural analgesia (EA) is a key adjuvant therapy for effective postoperative pain control after abdominal surgery. [1]Neuraxial anesthesia in general and EA in particular causes modulation of spinal sympathetic outflow with resultant vasodilatation and consequent increased visceral perfusion and reduced afterload. [3] Drawing on these physiologic actions, the effect of Epidural analgesia on reduction of postoperative cardiac, pulmonary, renal, and neurologic complications has been investigated. [4,5] Although there is accumulating evidence in favor of Epidural analgesia use combined with general anesthesia (EA-GA) during abdominal surgery, studies showing conflicting findings exist; thus, the certainty of the benefits of Epidural analgesia use remains debated. [6] Major surgery induces profound physiological changes in

the perioperative period, characterised by increases in sympathoadrenal and other neuroendocrine activity and also increased cytokine production. Because epidural anaesthesia can attenuate this "stress response" to surgery, improve the quality of postoperative analgesia in comparison with systemic opioids, and hasten recovery of gut function, it has been suggested that conducting surgery under epidural anaesthesia (either as the sole anaesthetic or in combination with general anaesthesia) may reduce perioperative morbidity and mortality compared with general anaesthesia alone.[7, 8] On the basis of these considerations, we sought to evaluate the effect ofGeneral anaesthesia with epidural analgesia vs GA for major abdominal surgeries.

Duration of study: (Six month)

MATERIALS AND METHODS:

The present study is a prospective a randomized controlled double blind study conducted at Department of Anesthesia of the MGM Medical institute.

Total of 60 patients of both genders were enrolled for the study& divided into two groups of 30 patients in each group:

Group 1: Administered combined General anaesthesia with thoracicepidural analgesia as maintenance anaesthesiafor major abdominal surgeries

Group 2: Administered only total intravenous general Anaesthesiafor major abdominal surgeries

INCLUSION CRITERIA:

1. Patients of ASA Grade I and II undergoing Abdominal surgery.
2. Age 18 to 75 year
3. Weight 40-90 kg

EXCLUSION CRITERIA:

1. Patients belonging to ASA Grade III and IV
2. Patients who were had systemic disorders which could hamper the results of the study.
3. Severe coronary insufficiency
4. Myocardial infarction
5. Diabetes mellitus
6. Bleeding disorders
7. Patient refusal
8. Hypersensitive to neuraxial blockade

Randomization was done in the operation theatre prior to starting the case with a sealed envelope. Appropriate patients were selected after preoperative assessment & investigation. Informed consent of the patient was taken. A day prior to surgery, preoperative evaluation done. All patients received Tab alprazolam 0.5mg and Tab ranitidine 150 mg on prior night of the surgery. Patients was kept nil by mouth from midnight. On the day of surgery, after checking preoperative orders, nil by mouth status, informed consent, equipment and anaesthesia machine the patient shifted to the operation theatre monitors was attached for continuous monitoring pulse oximeter, non-invasive blood pressure, electrocardiography, capnography. An intravenous access was secured with a 20G cannula and Ringer Lactate infusion was started. In group I, an epidural catheter was placed between T9-10. Ten mL of bupivacaine 0.1% was administered as a bolus via the epidural route 20 min before induction of anesthesia and then infusion was maintained at 6 mL/h of the same drug concentration.

Patients in both groups received the same technique for induction of anesthesia. Patients preoxygenated for 3 min &premedicated with Inj. Glycopyrrolate 2mcg/kg, Inj. Fentanyl 2mcg/kg, Inj. Midazolam 0.03mg/kg and then propofol was given for induction of anaesthesia in a dose of 2mg/kg to the loss of eyelash reflex, neuromuscular blockade was achieved with inj. Atracuronium 0.5 mg/kg. After 3 mins of assisted ventilation, the patient was given the 'morning sniffing' position endotracheal intubation was done with an appropriate-sized endotracheal tube. General anaesthesia was maintained with nitrous oxide in oxygen and Sevoflurane with controlled ventilation through closed circuit having

tidal volume of 10 mL/kg and respiratory rate adjusted to maintain end-tidal carbon dioxide between 30-35 mmHg. $ier endotracheal intubation, propofol 1% infusion was titrated to maintain AAI index between 15-25 using continuous A-Line ARX index (AAI index) monitoring (AEP monitor/2, Danmeter A/S, Kildemosevej 13, DK-5000 Odense C). For administration of top-up doses of cisatracurium, one-fifth of the initial dose of cisatracurium was administered once the recovery of T1/T0 of electromyographic response of adductor pollicis muscle to train of four of the ulnar nerve reached 10%. Inadequate intraoperative analgesia was defined as an increase in SBP and/or HR by >20% of baseline value for >5 min in response. In this case, patients were given bolus doses of fentanyl 0.5 µg/kg. Fasting and maintenance dose of I.V. crystalloids were calculated as 4 ml/kg for first 10 kg body weight, then 2 ml/kg for the next 10 kg of body weight and 1ml/kg thereaier, blood loss was replaced with 3 ml crystalloid for every 1 ml blood, third space loss were calculated as 6 ml/kg/hour. Packed red blood cells were administered only when hematocrit becomes <24%. Bradycardia was defined as HR <40 bpm and hypotension as a decrease in SBP <40% of baseline. Hypotension was treated by infusion of NS and, and if necessary, 5 mg ephedrine was given intravenously. Operative date including duration of operation measured from the skin incision to skin closure, blood loss, volume and type of fluid infused were recorded. At the end of operation, dose requirements of propofol, fentanyl, and cisatracurium were calculated; dose requirements of each drug were calculated by dividing the total amount of the individual drug used by duration of the operation and patient's weight in kilograms, thus giving the individual drug consumption in mg.kg-1.h-1. Venous blood sample (5 ml) was withdrawn at baseline, 30 minutes aier skin incision and 24 hours postoperatively for detection of fasting blood sugar (FBS), serum cortisol, TSH. Sample for assessment of

interleukin 6 was withdrawn at baseline, 6 hours and 24 hours postoperatively.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS:

A total of 60 patients were included in the study and were randomly grouped equally into Group 1 and Group 2. Table 1 shows characteristics of participants. The mean age in group 1 was 60.25 years and in group 2 was 63.25 years. Mean duration of operation in Group 1 was 152.32 min and in Group 2 was 180.33 min. Fig 1 shows mean arterial blood pressure in both groups. We observed that both groups show similar pattern with respect to arterial blood pressure changes. The blood pressure was significantly lower at induction of general anesthesia and endotracheal intubation than baseline values. Immediately after intubation and after skin incision mean arterial blood pressure increased significantly in both groups as compared to baseline values. Fig 2 shows heart rate changes in Group 1 and Group 2. Heart rate showed significant higher values compared to baseline after induction, pre and post intubation and at skin incision in both studied groups. Heart rate showed persistently increased lower values in group 1 as compared to group 2.

Table 1: Characteristics of participants

	Group 1	Group 2	p-value
Sex (male/female)	16/14	16/14	0.211
Age	60.25	63.25	
Height	171.36	176.54	
Weight	72.69	76.12	
Duration of operation (min.)	152.32	180.33	
Fluid infused (mL)	30180.19	3325.28	
Blood infused (mL)	281.1	345.65	

Figure 1:

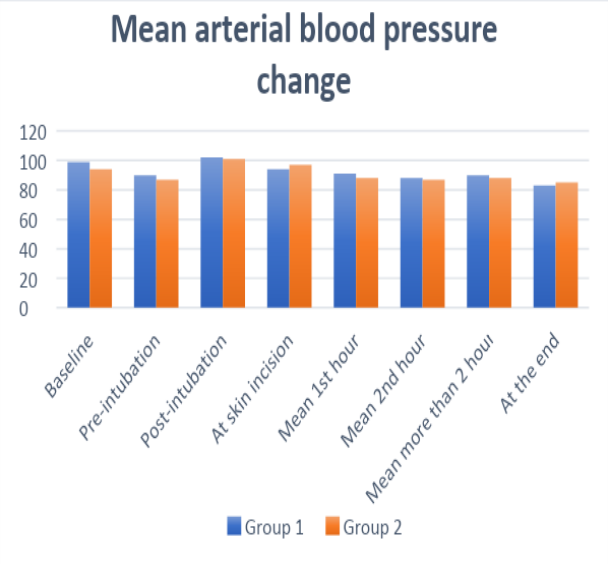
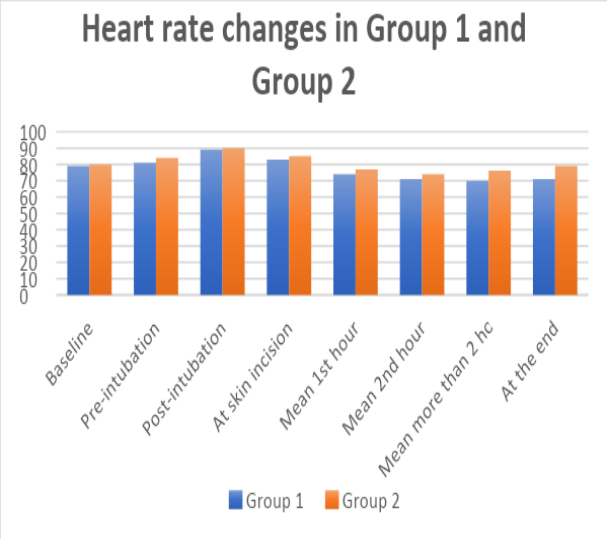


Figure 2:



DISCUSSION:

In the present study, we observed that both groups show similar pattern with respect to arterial blood pressure changes. The blood pressure was significantly lower at induction of general anesthesia and endotracheal intubation than baseline values. Immediately after intubation and after skin incision mean arterial blood pressure increased significantly in both groups as compared to baseline values. Heart rate showed significant higher values compared to baseline after induction, pre and post intubation and at skin incision in both studied groups. Heart rate showed persistently increased lower values in group 1 as compared to group 2. Bardia A et al evaluated the association between combined EA-GA vs GA alone and long-term survival and postoperative complications in patients undergoing elective, open AAA repair. A retrospective analysis of prospectively collected data was performed. Patients undergoing elective AAA repair between January 1, 2003, and December 31, 2011, were identified within the Vascular Society Group of New England (VSGNE) database. A total of 1540 patients underwent elective AAA repair during the study period. Of these, 410 patients (26.6%) were women and the median (interquartile range) age was 71 (64-76) years; 980 individuals (63.6%) received EA-GA. Patients in the 2 groups were comparable in terms of age, comorbidities, and suprarenal clamp location. At 5 years, the Kaplan-Meier-estimated overall survival rates were 74% and 65% in the EA-GA and GA-alone groups, respectively. In adjusted analyses, EA-GA use was associated with significantly lower hazards of mortality compared with GA alone. Patients receiving EA-GA also had lower odds of 30-day surgical reintervention as well as postoperative bowel ischemia, pulmonary complications, and dialysis requirements. No significant differences were noted for the odds of wound and cardiac complications. They concluded that combined EA-GA was associated with improved survival and significantly lower HRs and ORs for mortality and morbidity in patients undergoing elective AAA repair. The survival benefit may be

attributable to reduced immediate postoperative adverse events. Based on these findings, EA-GA should be strongly considered in suitable patients. Pouzeratte Y et al assessed the analgesic efficacy of ropivacaine and bupivacaine in combination with sufentanil and the efficacy of ropivacaine alone after major abdominal surgery. Sixty patients undergoing major abdominal surgery received standardized general anesthesia combined with epidural thoracic analgesia. They were allocated to one of three groups: the BS group received postoperative patient-controlled epidural analgesia with 0.125% bupivacaine plus 0.5 microg/mL sufentanil; the RS group received 0.125% ropivacaine plus 0.5 microg/mL sufentanil; and the R group received 0.2% ropivacaine, with the patient-controlled epidural analgesia device set at bolus 2-3 mL and background infusion 3-5 mL/h. Visual analog scale scores were significantly lower during coughing in the BS group compared with the RS and R groups and in the RS group compared with the R group. The BS group required significantly less local anesthetic (milligrams per day) during the first three postoperative days compared with the RS and R groups, and the RS group, significantly less than the R group. No major side effects were noted in any group. They concluded that, after major abdominal surgery, thoracic epidural analgesia was more effective with bupivacaine than with ropivacaine when these two local anesthetics are used in a mixture with sufentanil. Ropivacaine alone was less effective than ropivacaine in combination with sufentanil. [9, 10]

Ahmed FI et al conducted study aimed at the description, evaluation, and comparison between the use of continuous spinal anesthesia (CSA) and continuous thoracic epidural anesthesia (CTEA) as a sole anesthesia for major abdominal surgeries in cases with COPD. Sixty patients of both sexes aged 40–75 years with American Society of Anesthesiologists physical status classes II and III complaining of COPD scheduled for various elective major abdominal operations were included. According to the neuraxial block type, the patients were randomly assigned into two equal groups with 30 patients in each. The first group (CSA group) received continuous lumbar spinal anesthesia and the second group (CTEA group) received continuous thoracic epidural anesthesia. The data recorded included patients' demographic data, characteristics of the used neuraxial blockade, hemodynamic changes, changes in pulmonary functions, incidence of the various side effects, and postoperative pain severity. Although there were no statistically significant differences between both groups regarding demographics, hemodynamics, changes in pulmonary functions, side effects, surgeon, and patients' satisfactions, and postoperative visual analog scale. The CSA group has faster block onset with less local anesthetic dose compared with the CTEA group. Also, there were statistically significant decrease in peak expiratory flow rate, forced expiratory volume in 1 s, and forced expiratory volume in 1 s/forced vital capacity at 1, 2, and 6 h postoperatively compared with the preoperative baseline values in both groups. Hypotension was significantly more frequent in the CTEA group than in the CSA groups. They concluded that although both CSA and CTEA can be used for anesthesia and for postoperative analgesia in major abdominal surgery in COPD patients, the CSA was easier, safer, had faster onset, gave more predictable block, with less hemodynamic instability, and less technical failure compared with CTEA. The preoperative optimization of the lung functions, intraoperative close observation, and postoperative neuraxial analgesia with chest physiotherapy improved the outcome. Shokri H compared whether general anesthesia (GA) combined with epidural anesthesia reduces the incidence of superficial and deep surgical site infections, chest infection, mortality rate, and length of hospital stay. In this prospective randomized parallel group study, 150 patients between 50 and 65 years of age who were scheduled for elective radical cystectomy were randomly divided into two groups: the GA-only group (n=75), which received GA-alone, and the Epi–GA group (n=75), which received both GA and epidural anesthesia. Demographic and clinical data, such as age, sex, and BMI, and surgical data, such as duration of surgical procedure and number of whole blood units given, were recorded. Postoperative data such as superficial and deep surgical site infections, chest infection diagnosed by the consultant over 10 days' duration, mortality rate, and duration of hospital stay were recorded. Demographic, clinical, and surgical data were similar among the study groups. There was no significant difference between the study groups as regards the incidence of superficial and deep surgical site infections, chest infection, and mortality rate. The duration of hospital stay was significantly shorter in the Epi–GA group compared with the GA-only group. His study showed that combined GA and epidural anesthesia offers no advantage over GA alone with regard to the incidence of infectious complications within 10 days postoperatively, but it significantly reduced the length of hospital stay. [11, 12]

CONCLUSION:

From the results of present study, this can be concluded that combined general and thoracic epidural block decreases stress response more than general anesthesia alone during major abdominal surgery.

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