Volume : 5 | Issue : 3 | March 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Research Paper

Combined General And Thoracic Epidural Anaesthesia With Levobupivacaine 0.5% Versus General Anaesthesia For Upper Abdominal Surgeries : A Comparative Study

Medical Science

KEYWORDS : Thoracic epidural anaesthesia, Levobupivacaine, Stress response.

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ABSTRACT

Aim: The purpose of our study was to compare the stress response to surgery for patients undergoing elective major upper abdominal surgeries by giving combined general and thoracic epidural anaesthesia versus general anaesthesia alone.

Methods: Study was a prospective, double-blinded, randomized controlled study. Conducted on 60 patients, 30 in each group. Group A: combined general and thoracic epidural anaesthesia and Group B: Patients received general anaesthesia alone. Stress response surgery in peri-operative period assessed by hemodynamic parameters such as pulse rate, blood pressure [NIBP] biochemical parameters such as serum cortisol, blood glucose and effect on tissue oxygen saturation by measuring pO2 in each case of both groups.

Results: There was no statistically significant difference between the groups with respect to age, weight and gender ('p' >0.05).Decreased serum cortisol, blood glucose and increase in tissue oxygenation (pO2) levels in intra and post-operative periods in group A compared with group B, ('p' <0.05) and regarding intra and post-operative hemodynamic tachycardia and hypertension were more common in group B compared with group A ('p' <0.05).

Conclusion: Combination of general anesthesia with thoracic epidural anaesthesia provides a better intra-operative and post-operative hemodynamic stability relative to general anesthesia alone and decreased stress response to surgery, achieved a better analgesia and attenuate the physiologic response to surgery.

INTRODUCTION:

Peri-operative stress response to surgery is major concern with general anaesthesia. A combination of epidural and general anaesthesia is reported to reduce the requirement for analgesic and anaesthetic agents. Intraoperative hemodynamic stability can be better achieved and the metabolic, endocrine and immunologic responses better suppressed. With the combination of epidural and general anesthesia, recovery is faster, a higher anesthetic quality can be achieved, and decreased stress response and patients can be mobilized earlier. It has been suggested that conducting surgery under epidural anaesthesia may reduce preoperative morbidity and mortality compared with general anaesthesia alone[1].

Thoracic epidural anaesthesia was introduced fifty years ago to provide anaesthesia to awake unintubated patients during intrathoracic surgical procedures[2]. Subsequently, thoracic epidural anaesthesia and analgesia have been utilized in the intraoperative and post-operative anaesthetic management of patients undergoing thoracic and upper abdominal surgery [3,4].

Thoracic epidural anaesthesia [TEA] beyond its analgesic properties it effects on post-operative neuro-humeral stress response, cardiovascular pathophysiology and intestinal dysfunction. Provision of pain relief sympatholysis of such magnitude that allows patient to cough, breath deeply, enhanced post-operative outcome such as improved respiratory function.

Levobupivacaine is an amide type of long acting local anaesthetic agent & shows good motor and sensory differentiation.[5] It is the pure S (-) enantiomer of bupivacaine, emerged as a safer alternative for regional anaesthesia than its racemic bupivacaine.It is less cardiotoxic and neurotoxic than bupivcaine.[6]

Our study is aimed to compare the stress response to surgery for patients undergoing various upper abdominal surgeries by giving combined general and thoracic epidural anaesthesia with levobupivacaine 0.5% versus general anaesthesia alone.

MATERIAL AND METHODS:

After approval from ethical committee, the study was conducted at S.R.N Hospital (Associated to M.L.N Medical college, Allahabad), over a period of one year. This prospective study was conducted on 60 adult patients of either sexes belonging to ASA physical status 1-2, aged 30-60 years, scheduled for elective upper abdominal surgeries. All cases were explained the purpose of study along with the procedure and thereafter a valid, informed and written consent was taken from all the patients undergoing study.

GROUP A: Patients received combined general and thoracic epidural anaesthesia by 0.5%levobupivacaine. [G.A+ TEA].

GROUP B: Patients received general anaesthesia [GA group] alone.

Thoracic epidural is given before general anaesthesia at T_9-T_{10} with Tuohy needle by paramedian approach and patient in sitting position. Length of catheter tip inside epidural space: 3cm cephalic+ depth of epidural needle (from skin to epidural space) and 7ml of 0.5% Levobupivacaine is given after confirming epidural space by loss of resistance technique and test dose.

Stress response surgery in peri-operative period is assessed by hemodynamic parameters as pulse rate, blood pressure [NIBP, Mean arterial pressure (M.A.P)] and biochemical parameters such as serum cortisol, blood glucose and effect on tissue oxygen saturation by measuring pO_2.S.cortisol estimated by chemiluminescent enzyme immunoassay method and pO2 by arterial blood gas analyzer (A.B.G).

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Statistical analysis was performed using Microsoft Excel 2010 and statistical software plug-ins. Continuous data was analyzed by student's t-test (Unpaired). Data are being represented as mean ± SD. Any possible significance has been determined considering it statistically significant if 'p' value of <0.05.

OBSERVATIONS AND RESULTS:

The two groups were similar regarding demographic profile (Table-1).There were no significance difference between baseline hemodynamic and biochemical parameters in both the groups (p>0.05).Decreased serum cortisol and blood glucose level in intra and post –operative period in group A compared to group B (p<0.05). Increase in tissue oxygenation (pO2) levels in intra and post-operative periods in group A compared to group B (p<0.05). Regarding intra and post-operative hemodynamics tachycardia and hypertension were more common in group B compared with group A (p<0.05).Duration of surgery is same in both groups (p>0.05).

DISCUSSION:

Major surgery induces profound physiological changes in the preoperative period, characterized by increase in sympathoadrenal and other neuroendocrine activity. As epidural anaesthesia can attenuate this stress response to surgery, improve the quality of post-operative analgesia in comparison with systemic opioids and hasten recovery of gut function.

Surgical stress leads to reproducible physiological metabolic and hormonal responses, characterized by an altered carbohydrate metabolism, a net loss of protein and an increased lipolysis. They are due to an increased secretion of catecholamines, ACTH, cortisol and cytokines. Epidural analgesia prevents the hyperglycemic, cortisol and adrenocortical responses to surgery. The lipolysis and the loss of protein are also attenuated.

The key pathogenic factor in postoperative morbidity is the surgical stress response with its potential for multiorgan damage. Thoracic epidural anaesthesia (TEA) significantly dampens the stress response, and relieves the postoperative pain. It offers maximal sympathetic blockade of the heart and bowel, which promotes coronary perfusion and gastrointestinal motility, and provides freedom from lower extremity motor blockade and opioid-induced side effects. Moreover, in upper-abdominal surgery, there could be additional routes of transmission of noxious stimuli to the CNS through the phrenic nerve and the vagus nerve, which almost need very high, doses of opioids in case of giving general anaesthesia without neuraxial block.

Hadimioglu N et al. [7] they conducted a study to compare a combination of epidural anaesthesia with general anaesthesia versus general anaesthesia alone as regards peri-operative insulin resistance and inflammatory activation among renal transplant patients.Glucose,insulin,TNF-alpha and IL-6 were significantly higher in the general anaesthesia group when compared with the epidural with general anaesthesia group.

Zhao W et al.[8] conducted a study on the hemodynamic effects during thoracic epidural anaesthesia combined with general anaesthesia in patrients undergoing major abdominal operations and concluded that there no negative effects on cardiac functions. Lattermann Ret al.[9] conduced a study on epidural blockade with local anaesthetic has been shown to blunt the increase in plasma glucose concentration during and after abdominal surgery.

Treschan TA et al.[10] conducted a study on the effects of epidural and general anaesthesia on tissue oxygenation and they concluded that epidural anaesthesia significantly increases subcutaneous tissue oxygenation with and without general anaesthesia. Qu DM Jin et al.[11] conducted study on the effects of general anaesthesia combined with epidural anaesthesia(GEA) and pure general anaesthesia(GA) on the surgical stress response and cytokines in pulmonary surgery and they concluded that pulmonary surgery performed with two different anaesthetic techniques causes inflammatory cytokine response.The additional epidural anaesthesia doesn't influence cytokine production.It incompletely inhibits the stress response in the early phase.IL-6 and cortisol may have some effects on each other.

Barbara Kabon et al.[12] conducted a study on thoracic epidural anaesthesia and found that increase in tissue oxygenation during major abdominal surgery.Thoracic epidural anaesthesia improved intra-operative tissue oxygen tension outside the area of epidural block.The resul;ts give evidence that supplemental neural nociceptive block blunts generalized vasoconstriction caused by surgical stress and adrenergic responses during major abdominal surgery.

Yuhong Li et al.[13] copnduicted a study on 32 adults,undergoing nephrectomy lasting about 2 hrs for renal carcinoma were randomly assigned to one of two groups,epidural(saline)/general anaesthesia(group C) and epidural (0.375%ropivacaine)/general anaesthesia(group R) and concluded that epidural ropivacaine suppressed stress hormone response and sufentanyl; requirement peri-operatively during maintenance of anaesthesia for nephrectomy.

Our observations are consistent with all above studies.

CONCLUSION:

In conclusion our study shown that combination of general anaesthesia with thoracic epidural anaesthesia provides better intra and post-operative hemodynamic stability relative to general anaesthesia and decreased stress response to surgery , better analgesia and attenuate the physiologic response to surgery.

TABLE 1 : COMPARISON OF AGE,WEIGHT IN TWO GROUPS

Demographic profile	GROUP A	GROUP B	P value
AGE(Yrs) (Mean±SD) RANGE (Yrs)	38.5667±6.409 30 – 50	38.433±5.042 30 – 48	0.929
WT.(kg) (Mean±SD) RANGE(kg)	59.334±5.208 50– 68	55.667±6.171 46 – 66	0.649

FIGURE-1: CHANGES IN PULSE RATE IN TWO GROUPS IN PERI-OPERATIVE PERIOD

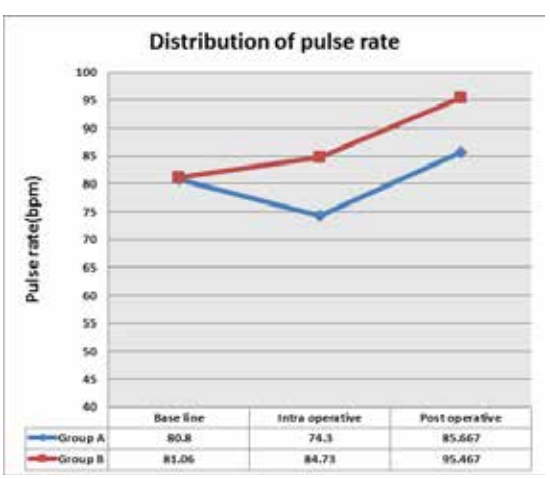


FIGURE-2: CHANGES IN M.A.P (MEAN ARTERIAL PRESSURE) BEYTWEEN TWO GROUPS IN PERI-OPERATIVE PERIOD.

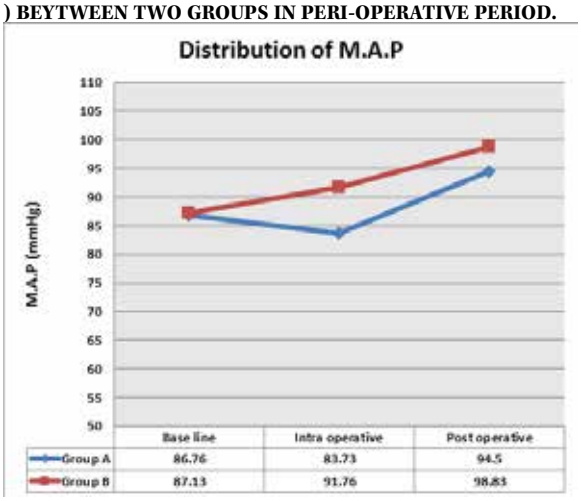


FIGURE-3: COMPARISION OF S.CORTISOL BETWEEN TWO GROUPS.

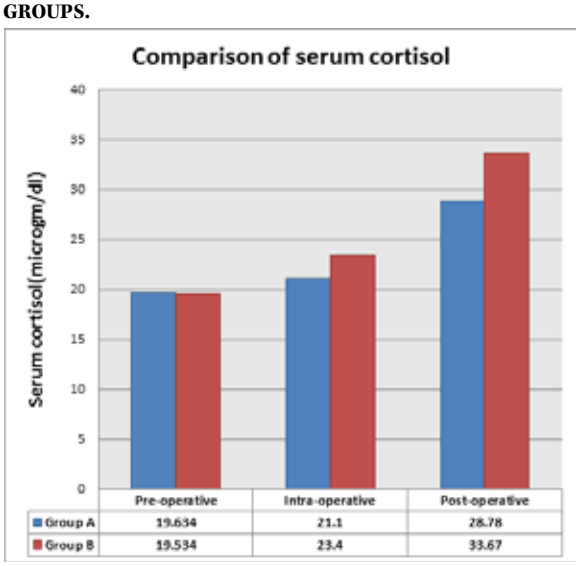


FIGURE 4: COMPARISION OF BLOOD GLUCOSE BETWEEN TWO GROUPS.

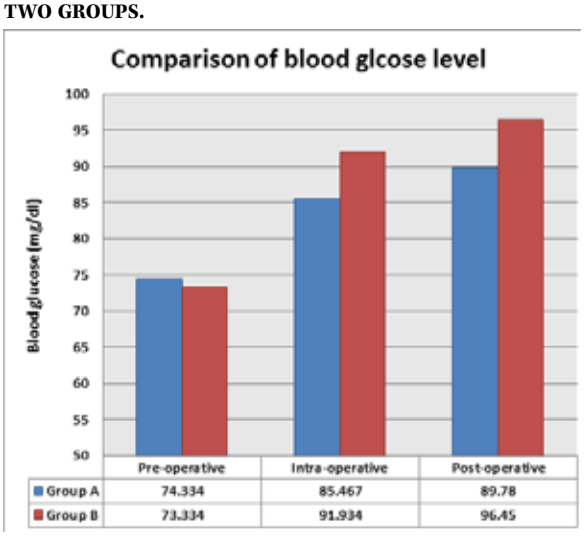
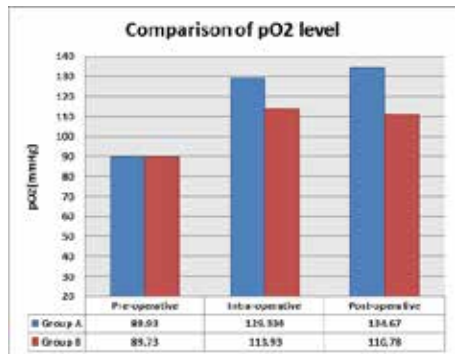


FIGURE-5: COMPARISION OF pO2 LEVEL BETWEEN TWO GROUPS.



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