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EFFECTIVENESS OF COMBINED THORACIC EPIDURAL AND

LIGHT GENERAL ANAESTHESIA IN PATIENTS UNDERGOING NON-CARDIAC THORACIC SURGERY

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Background: The specialty of thoracic anaesthesia has emerged as a scientifically based discipline just 30 years back. At the start of the 20th century empyema and tuberculosis were the main indications for the thoracic surgery. Later on with the introduction of antibiotics lung malignancies were more commonly operated. Recent resurgence of tuberculosis and associated medical illnesses put these patients in high risk for surgery and anaesthesia, necessitating introduction of more skilful approach. The objective of this study was to evaluate the effectiveness of combined thoracic epidural anaesthesia and light general anaesthesia in patients undergoing non-cardiac thoracic surgery. **Methods:** This study was conducted at the department of Anesthesia and Intensive care, Pakistan Institute of Medical Sciences, Islamabad from 1st Jan 2001 to 31st August 2002. Ten adult patients of both sexes of ASA grade I-III, < 68 years of age, who were undergoing non-cardiac thoracic surgery were included. Thoracic epidural and central venous lines were placed 20 to 30 minutes before the start of procedure. All patients received same premedication, induction agents, analgesics, inhalational agents and muscle relaxants. All patients were transferred to Surgical Intensive Care unit after completion of the procedure. **Results:** Seventy percent patients were operated on lungs, twenty percent on mediastinum and one percent for carcinoma of esophagus. Only one patient had co morbid disease of hypertension. One patient (10%) died of massive intraoperative hemorrhage. One patient (10%) developed superior vena caval obstruction, that was to be operated for mediastinal growth. Rest of eight (80%) patients were extubated in the operation theatre. All (100%) patients received intraoperative blood transfusion. 20 % patients' required additional analgesia in the postoperative period. 20% developed postoperative arrhythmias. **Conclusion:** Combined use of light general anaesthesia and thoracic epidural is effective in patients undergoing non-cardiac thoracic surgery.

Key Words: Non-cardiac thoracic surgery. Thoracic epidural. Epidural tramadol.

INTRODUCTION

The entire peri-operative period is stressful, characterized by complex autonomic, hormonal and physiological perturbations. Patients undergoing thoracic surgery have associated cardiac and respiratory disturbances, which pose them to increase risk.[1] Pulmonary dysfunctions begin with incision and remain diminished for 7—14 days postoperatively.[2] Measures are required to decrease the morbidity and mortality in this group of patient.

A comprehensive preoperative evaluation is very crucial, because this is the time when important decisions are being made by the clinician, patient and his family.

Thoracic epidural combined with light general anaesthesia is an established anesthetic management for thoracic surgery. It is well known in literature that patients with preexisting impaired oxygenation have good oxygen content and blood pressure when combined thoracic epidural and general anaesthesia is used.[3] It is also well documented that inhaled anesthetics, mechanical ventilation, paralysis and opioids all contribute to reduce pulmonary function. These harmful effects of general anaesthesia can be reduced with the help of employing thoracic epidural with low doses of general anaesthetics.

Majority of these patients also have coexisting cardiovascular problems. Enhanced sympathetic activity during perioperative stress can result in ischaemia and cardiac arrhythmias; thoracic epidural blocks the sympathetic out-flow to heart and thus provide a good control against the development of such lethal cardiac events.[4-8] Moreover the incidence of post thoracotomy pain is 62%.[9] Employing thoracic epidural can decrease this high incidence.

MATERIAL AND METHODS

Ten patients of ASA grade I-III, < 68 years of age undergoing elective non-cardiac thoracic surgery were included in the study at Pakistan Institute of Medical Sciences, Islamabad. Patients gave their informed consent for the procedure, which was approved by the Institutional Ethics Committee.

Patients with chest trauma, history of allergy to local anaesthetics, low platelet count (<100,000), abnormal coagulation profile, medicinal anticoagulation9aspirin, and non steroidal anti-inflammatory are not contraindications). Patients with bony spinal abnormalities and neurological disorders were also excluded from the study.

A detailed preoperative assessment included; history followed by relevant investigations. Every patient was assessed preoperatively for epidural catheter placement. On arrival in the operation theatre, two 16 gauge intravenous cannulas and electrocardiograph leads were placed (Kion, Siemens SC7000. monitor was used to monitor continuous ECG, NIBP (non-invasive blood pressure monitoring), SaO_2 (oxygen saturation) and inspiratory and expiratory anaesthetic gases. Urine out put and central venous pressure was recorded after every 15 minutes. 16-gauge double lumen central venous line (Certofix Duo S B720, B. Braun) were placed through subclavian vein of the operative side.

Epidural catheter was placed at T5/6 interspace about 20 to 30 minutes before the induction of general anaesthesia. 18 gauge Tuohy needle (1 Perifix 401 Filter set (loss of resistance), B. Braun) was introduced and epidural space identified with loss of resistance to air technique. Seven milliliters of inj. Bupivacaine 0.375% was injected after test dose of 3 ml lignocaine 2% with adrenaline

1: 200,000. Patients were premedicated with pethidine 50 mg. Sleep dose of Thiopentone sodium was used for induction. Tracheal intubation was facilitated with inj. Atracurium in the dose of 0.5 mg/kg. Muscle paralysis was maintained by appropriate doses of atracurium for the entire procedure. A left sided double-lumen endotracheal tube (Broncho-cath ^{TM} Left) was used for one lung ventilation. Position of the tube was confirmed with the help of fibreoptic bronchoscope. Anesthesia was maintained with thoracic epidural combined with low dose concentration 0.3---0.5 vol % of isoflurane (end-tidal) in a mixture of O_2 and N_2O and intermittent positive pressure ventilation. Blood loss exceeding 500ml was replaced with whole blood.

Postoperatively, epidural Bupivacaine was administered in a dose of 0.25% four-hourly and tramadol 50 mg 6 hourly as guided by the sedation score. UCL Hospital Sedation Score was used to assess the level of pain control and sedation of the patient. Awake and uncomfortable patient was labeled +2, awake and calm +1 and aroused by voice and calm was labeled 0.

RESULTS

Out of total 10 patients, two of our patients were smokers and they were preoperatively counseled and bronchodilators prescribed. Duration of the procedure ranged from three to five hours. One lung ventilation was required in eight (80%) patients and it was achieved with the use of left sided double lumen tube in all cases. The hypotension recorded after epidural injection of local anaesthetic was within 20% of the base line. Hypoxemia occurred in three (30%) patients and it was treated effectively by increasing the inspired oxygen concentration. None of these patients required the need for dependent lung PEEP (positive end expiratory pressure) or non-ventilated

lung CPAP (continuous positive airway pressure). All patients received blood transfusion from loss greater than 500 ml. Only one patient developed life threatening ventricular fibrillation during the procedure, remaining nine (90%) patients had no such problem during intra operative period. Urine out put remained greater than 60ml in 90% of patients. 80% of the patients were extubated in the operation theatre. One patient died in the operation theatre due to massive and uncontrolled blood loss. None of our patient required any additional analgesia during surgery.

According to our department protocol all patients were shifted to intensive care unit after the completion of surgery. ICU stays ranged from two days to five days. During their ICU stay none of our patient developed life threatening hypoxemia (<90%), respiratory dysfunctions (tachypnoea, hypoventilation, inability to cough, and abnormal arterial blood gases), Only one patient developed supraventricular tachycardia, which was managed by non-pharmacological method (carotid massage). No other major organ dysfunctions were observed. Average dose of tramadol injected through epidural space was 300-mg/24 hrs. Bupivacaine in a dose of 0.25% was used after every four hours. Two (20%) patients demanded supplementary analgesia that was provided by inj. Pethidine in a dose of 10 mg on as required basis guided by the sedation score.

Table-1: Frequency of Complications

Complications	**Frequency**
Intraoperative Hypoxemia	30%
Intraoperative ventricular fibrillations	10%
Postoperative arrhythmias	10%
Deaths	10%
Massive Bleeding	10%

Table-2: Summary of advantages of combined thoracic epidural and light general anaesthesia

Advantages	**Frequency**
Intraoperative hypotension	10%
Intraoperative hypoxemia	30%
PEEP	0%
CPAP	0%
Intraoperative VF	10%
Extubation in O R	80%
Postoperative Hypoxemia	0%
Postoperative Arrhythmias	10%
Postop additional analgesia	20%
Successful epidural placement	100%

DISCUSSION

The number of patients undergoing non-cardiac thoracic surgery has increased due to the resurgence of tuberculosis and increased incidence of lung cancer in both sexes. At the same time it requires sophisticated anaesthetic and surgical techniques to decrease the morbidity and mortality in these patients.

Thoracic epidural combined with general anaesthesia is an established anesthetic technique for thoracic surgery. Use of preemptive analgesia in the form of thoracic epidural was very beneficial. Neustein and colleagues employed preemptive epidural analgesia for thoracic surgery and discovered its hidden benefits.[9] Moreover, the preoperatively initiated thoracic epidural has the most satisfying results in controlling postthoraco-tomy pain in the acute and long-term period, and is associated with a decreased incidence of chronic pain compared with postoperative epidural or opioids analgesia. We recorded a lesser magnitude of hypotension with the administration

of local anaesthetic at thoracic epidural level. This was because only upper thoracic segments were blocked, sparing the caudal-sympathetic nervous system. This is supported by the study carried out by Magnusdati and colleagues.[10] Thoracic epidural when combined with general anaesthesia decreases the dose requirements of inhalational agents. This decrease in inhalational agent dose have a very good impact in decreasing the frequency of hypoxemic episodes in our patients because of the preservation of reflex pulmonary vasoconstriction when one lung ventilation was instituted.[3]

It was possible to extubate 80% of our patients in the operation theatre. These early extubations can be attributed to small doses of opioids and low concentrations of inhalational agents. Thoracic epidural added advantage that made it possible. It is a well-known fact that phrenic nerve function is inhibited in thoracic surgery and use of local anaesthetics through epidural route can improve its function. This is supported by the study carried out by Fractacci, who reported improvement in diaphragm function in thoracic surgery with the use of thoracic epidural.[3] We observed decreased frequency of cardiac arrhythmias and ischaemic episodes in our patients. When patients undergo major surgery, it puts them under stress. This results in sympathetic over activity, which can lead to cardiac arrhythmias and ischaemic episodes. Study carried out by Oka showed that local anaesthetics when injected in epidural space decrease the incidence of cardiac arrhythmias.[11] This better outcome is not due to systemic absorption of local anaesthetics. The better outcome in such patients is attributable to diminished stress response achieved with the use of thoracic epidural.[12]

There were no major complications observed in the intensive care suite. We employed epidural technique because of its documented facts in patients who have coexisting obstructive pulmonary disease along with lung cancer. A similar study carried by Shuman showed excellent results in patients where thoracic epidural was employed for thoracic surgery.[13] Our results are similar to study carried out by Tenling in regard to improved ventilation-perfusion when combined thoracic and light general anaesthesia was employed.[14]

We used one (m-methylphenyl)-2-(dimethylaminoethyl)-cyclohexan-1-01 (tramadol; tramal) in combination with local anaesthetic bupivacaine for postoperative pain relief. The efficacy of tramadol for pain relief through epidural route is well established and when combined with local anaesthetics, they augment each other actions.[15]

CONCLUSION AND RECOMMENDATIONS

It is suggested that thoracic epidural should be used in combination with general anaesthesia for non-cardiac thoracic surgery. People generally think that the complications associated with the insertion of thoracic epidural are greater than lumbar approach. Recent survey suggests that placement of epidural catheter at thoracic level do not confer higher risk than placement at lumbar level.[16] In contrast to the exacerbation of postoperative pulmonary dysfunction seen with general anaesthesia, thoracic epidural has minimal effect on pulmonary function and may offset detrimental changes in pulmonary function induced by general anaesthesia. The combined use of the drugs reduces the dose requirements of individual agents.

Many residency programs do not teach the insertion of thoracic epidural technique, and postgraduates are, therefore uncomfortable with the procedure, preferring instead the more familiar lumbar route. So the author think that the combined use of the general and thoracic epidural anaesthesia is a good approach in improving the out-come of patients undergoing non-cardiac thoracic surgery. The general concept of analgesia is very true but we can also achieve some hidden benefits.

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