AWAKE THORACIC EPIDURAL ANAESTHESIA FOR LAPAROTOMY: A SAFER ALTERNATIVE TO GENERAL ANAESTHESIA IN ASTHMATIC PATIENTS

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ABSTRACT

Asthma is a common obstructive lung disease with a hallmark of airway inflammation and hyper-reactivity in response to a variety of stimuli. The morbidity and mortality in asthma is directly related to reversible airway obstruction and bronchospasm in response to specific triggers. The goal of the anaesthetist is to avoid eliciting triggering stimuli that can incite bronchospasm. Neuromuscular blocking agents and invasive airway procedures like endotracheal intubation are known triggering factors for bronchospasm in asthmatics. It is therefore prudent to use regional, as oppose to general, anaesthesia whenever possible. We describe the use of an awake thoracic epidural anaesthesia for laparotomy in an asthmatic patient. We recommend that, where possible, epidural anaesthesia should be preferred to general anaesthesia in asthmatic patients.

Keywords: *anaesthesia, epidural and general, asthma, laparotomy*

INTRODUCTION

Asthma is a common obstructive lung disease with a hallmark of airway inflammation and hyperactivity in response to a variety of stimuli[1]. It is a major public health issue with a high and increasing prevalence rate and a concomitant increase in morbidity and mortality[2]. Anaesthesia for an asthmatic patient constitutes a formidable challenge to the anaesthetist since some of the anaesthetic agents and procedures, as well as the surgical stimulation can trigger asthmatic attacks. Asthmatic attack is characterized by severe difficulty in breathing. The occurrence of this potential life-threatening condition in anaesthesia practice varies from 0.17% to 4.2%[3].

The goal of the anaesthetist should be to minimize the risk of inciting bronchospasm by avoiding triggering stimuli. Both general and regional anaesthesia may be used in asthmatic patients. General anaesthesia, with or without tracheal intubation, is associated with reduction of tone in either the palatal or pharyngeal muscles, accompanied by a lung volume reduction and an augmentation of the layer of liquid on the airway wall. These factors predispose to unstable airway condition, airflow obstruction and considerably greater airway resistance[4].

Regional anaesthesia, especially epidural anaesthesia, on the other hand, has been reported to result in improvement of wheezing and amelioration of status asthmaticus[5]. Many researchers have documented the use of thoracic epidural anaesthesia in laparotomy for various surgical conditions[5, 6, 7]. However, the practice is infrequently reported in our environment probably due to insufficient experience with the procedure. This report aims to highlight that, in the absence of contraindications, thoracic epidural anaesthesia is feasible, simple and cheap, and can be a safe alternative to general anaesthesia.

CASE REPORT

The patient was a 25-year old male, known asthmatic on salbutamol inhaler, who was scheduled for emergency exploratory laparotomy on account of a perforated appendix with associated pelvic abscess with peritonitis. He was admitted 3 weeks prior to surgery for conservative

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management of appendiceal mass with antibiotics and close monitoring. He was not a known diabetic, hypertensive or sickle cell disease patient. This was his first exposure to anaesthetics. He had no known history of allergy to drugs. He had two episodes of asthmatic attack while on admission; the last one was the night before surgery. Both attacks were managed with aminophylline, hydrocortisone and nebulised salbutamol.

On the morning of surgery, the patient was in painful distress. There were no obvious signs of respiratory distress. He was well hydrated, anicteric but febrile to touch. Vital signs were as follows: pulse rate - 84/min, blood pressure – 120/70mmHg, respiratory rate – 18cpm, and temperature – 38.9^{0}C. Laboratory investigation revealed a packed cell volume of 28%, an adequate platelet count, and serum electrolyte, urea and creatinine that were within normal limits. One unit of crossed-matched blood was made available.

Baseline vital signs in the theatre from a multi-parameter monitor, were within normal limits except for the elevated temperature. The patient was pre-medicated, after establishment of an intravenous access, with metoclopramide 10mg, ranitidine 50mg and hydrocortisone 100mg. The patient was preloaded with 500ml of 0.9% saline; this was also used to maintain the intravenous access. Under aseptic condition, a thoracic epidural anaesthesia was performed in the sitting position, using a 16G Tuohy needle, through the 10^{th} and 11^{th} intervertebral space. The loss of resistance to air technique was used. A 19G epidural catheter was threaded into the epidural space. About 5cm length of the catheter was left in the epidural space cephalad. The catheter was taped to the back of the patient.

After giving a test dose, consisting of 45mg of lidocaine and 15ug in 1.5ml of solution, epidural anaesthesia was induced with 15ml of 2% lidocaine with adrenaline 1:200,000 in 5ml aliquot given at 5min intervals. This was done with patient in the sitting position. About 10min after the injection of local anaesthetic solution, the sensory block tested with pinprick was between T4 and L3. The motor block level was Bromage score 3.

About 30min into surgery, the patient experienced pains at the operation site. The severity of pain was 6-7 on the numerical rating scale (NRS) necessitating the suspension of surgery for about 5 minutes. This was treated with intravenous diazepam 5mg, ketamine 20mg and pentazocine 30mg. Oxygen was delivered via facemask at 4L/min. Another 5ml of 2% lidocaine was injected through the epidural catheter. Subsequent epidural top-up doses were given at 45min intervals using 3ml of 2% lidocaine plus adrenaline. A total of 3 top-up doses were given. Sedation was maintained with 10mg ketamine every 30min and verbal contact was maintained with the patient throughout the procedure.

Surgical access was through a midline sub-umbilical incision. Intra-operative findings were: 400ml of abscess in the pelvic cavity and right iliac fossa, auto-amputation of the appendix from the caecum and caecal perforation. Peritoneal lavage was done with warm normal saline and drains were inserted. The patient was haemo-dynamically stable throughout the procedure.

At the end of the procedure, which lasted for about $2^{1}/_{2}$hr, 5ml of plain bupivacaine 0.25% was injected through the epidural catheter for immediate postoperative analgesia. The catheter was removed and the patient transferred to the recovery room. Antibiotics and fluid were continued postoperatively. Analgesia was maintained with intramuscular pentazocine 60mg 6hourly.

On the first postoperative day, the patient developed acute asthmatic attack. This was managed with 250mg aminophylline in 50ml 0.9% saline and intravenous hydrocortisone 100mg. He commenced enteral feeding on the 3^{rd} postoperative day. Oral tramadol 50mg twice daily and paracetamol 1g thrice daily replaced intramuscular pentazocine. He was

discharged home on the 18th postoperative day.

DISCUSSION

The morbidity and mortality in asthma is directly related to reversible airway obstruction and bronchospasm in response to specific triggers[2]. In severe cases of asthma, laboratory studies such as arterial blood gases and pulmonary function tests should be done in other to analyse the severity of respiratory impairment[8]. An increase of 15% in FEV_1 following bronchodilator therapy is considered significant[9]. These investigations were not ordered for our patient due to the urgent nature of the planned surgery.

While preoperative treatment with B_2-adrenergic agonists has been shown to attenuate the reflex bronchoconstriction following endotracheal intubation, a combination of corticosteroid and B_2-adrenergic agonists give a better improvement in lung functions and decrease the incidence of wheezing following endotracheal intubation[10, 11]. This combination therapy was used for our patient with good response.

Though both general and regional anaesthesia may be used in asthmatic patients, it is wise to avoid general anaesthesia if feasible due to reduced perioperative complications associated with general anaesthesia[12, 13]. Where regional anaesthesia is not possible, the corner stone of general anaesthesia is a smooth induction avoiding drugs with histamine-releasing property. Propofol and etomidate are suitable agents for this purpose. Vecuronium bromide is the muscle relaxant of choice, while volatile anaesthetics with their bronchodilating properties can safely be used to maintain anaesthesia. Regarding opioids, fentanyl is preferred to both morphine and pethidine because it has less histamine-releasing effect.

Reversal of non-depolarising neuromuscular blocking agents with cholinesterase does not precipitate bronchoconstriction if preceded by an appropriate dose of an anticholinergic. Extubation must be performed under deep general anaesthesia to avoid bronchospasm[14]. In addition, the use of facemask and laryngeal mask airway has been reported to cause less airway irritations when compared to tracheal intubation[15].

The practice of regional anaesthesia for laparotomy is not new. Shono et al[5] reported 6,710 patients for upper abdominal surgeries that were done between 1973 and 1994 under thoracic epidural anaesthesia. Of this number, 57 patients were asthmatic. No adverse outcome was reported for both intubated and non-intubated groups. Similarly, other workers have documented the successful use of thoracic epidural or combined spinal epidural anaesthesia for laparotomy[6, 7].

This was the first attempt at the use of thoracic epidural for exploratory laparotomy in our hospital. Osazuwa et al[14] reported their experience with spinal anaesthesia for appendectomy in 105 patients. Their result showed that 72 patients (68.6%) had adequate anaesthesia while 33 patients (33.4%) required either supplemental analgesia or conversion to general anaesthesia. The use of single shot spinal for this surgery may achieve adequate block height, but lack of control of block height, failed spinal and prolonged surgery may make this option inappropriate.

However, in a recent report, Rodriquez et al[16] documented the use of low dose spinal anaesthesia for laparotomy in an 84yr old woman with Myasthenia Gravis. They injected 8mg 0.5% heavy bupivacaine plus 20ug fentanyl intrathecally at L2 – L3 interspinous space, after which the operation table was tilted 15^0 head down. They achieved a block height of T3. Though the surgery was successful, we consider this approach to be too risky to recommend.

Our patient had asthmatic attack on the first postoperative day that was managed with aminophylline and hydrocortisone. This was attributed to inadequate pain management

since pentazocine only was used for immediate postoperative analgesia. Stronger opioids and non-steroidal anti-inflammatory agents are better avoided in asthmatic patients as they can potentially trigger an asthmatic attack. Continuous epidural analgesia has been documented to provide excellent postoperative analgesia in abdominal surgeries[6]. This was however not possible in our patient due to lack of facility for continuous epidural infusion and experienced personnel in the surgical wards.

CONCLUSION

Awake thoracic epidural anaesthesia for exploratory laparotomy is feasible, simple and cost effective. In the absence contraindications, it is a safer alternative to general anaesthesia in high-risk patients with asthma.

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