

# EFFECTIVE AWAKE THORACIC EPIDURAL ANESTHETIC FOR MAJOR ABDOMINAL SURGERY IN TWO HIGH-RISK PATIENTS WITH SEVERE PULMONARY DISEASE

- A Case Report -

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## Summary

Awake thoracic epidural anaesthesia as the sole anaesthetic technique was successfully employed for two high risk surgical patients with chronic obstructive pulmonary disease undergoing abdominal surgery. The procedure was tolerated well and the anaesthetic technique which has been shown to reduce intra-operative and post-operative cardiac, respiratory and gastrointestinal complications, may have significantly contributed to the prompt, complication free recovery experienced by both patients.

We report two cases of awake major abdominal surgery in two high-risk surgical patients with severe pulmonary disease, performed effectively under thoracic epidural anaesthesia as a sole technique. The first case was an elective open sigmoid colectomy in a sixty one year old cancerous patient with chronic obstructive pulmonary disease [COPD] and recent thoracotomy for a wedge resection of a bronchial adenocarcinoma [pT1NoMx]. The second case was an emergency open cholecystectomy in an adult patient with end-stage COPD. Reviewing the literature, no similar cases were reported recently.

## First Case

A 61 year old male patient known to have end-stage COPD was diagnosed with a sigmoid adenocarcinoma in January 2008. Pre-operative staging identified a spiculated mass lesion in his right lung. A PET scan suggested that these were two independent primaries. In March 2008 he underwent a right thoracotomy under a combined anaesthetic technique of general anaesthesia in conjunction with a thoracic epidural. During surgery, it was difficult to ventilate him with secretions in his dependent lung and a decision was taken to limit the operative procedure to a wedge resection rather than a lobectomy. The first 10 post-operative days were complicated by atelectasis, reduced oxygen saturation and rapid atrial fibrillation, which converted to sinus rhythm with Amiodarone.

At pre-anaesthetic assessment prior to colonic resection in July, the patient's BMI was 32 and he was still smoking 4-5 per day, with a previous history of 50 packs per year. He had chronic productive cough and was on four different inhalers; Bricanyl, Spiriva and Symbicort regularly plus Salbutamol as required. Although his pre-operative chest xray was reported to be clear his

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chest sounded generally wheezy with reduced air entry bilaterally [Fig. 1]. The patient's peak expiratory flow rate [PEFR] was very low [250 L/M]. Pulmonary function tests showed that his FEV1 was 1.5 liters [54% predicted] with an FEV1/FVC ratio of 45% pre and post bronchodilator. The six minutes walk test [6MWT] detected an overall low level at 223 meters [predicted distance in health elderly =  $631 \pm 93$  meters]<sup>1</sup>, and he was diagnosed to have moderately irreversible COPD.

## Second Case

A sixty six year old male ex-smoker was admitted to the emergency department of Wishaw General Hospital suffering from sudden onset epigastric and right upper quadrant pain. He had tenderness and guarding in the right upper quadrant with obviously palpable gall bladder consistent with acute cholecystitis. He had progressive shortness of breath, generalized expiratory wheeze with bilateral basal crepitations consistent with COPD for which he used three different inhalers regularly; Salbutamol, Seretide, and Spiriva. He could manage only 50 yards on the flat and one flight of stairs, with a PEFR of 250 L/M. His most recent pulmonary function tests showed that he had FEV1 of 1.14 L [45% predicted] and FEV1/FVC ratio of 41% giving him the diagnosis of moderate airflow obstruction with no significant irreversibility, air trapping and severe reduction in transfer factor. His chest x-ray showed COPD with bilateral basal consolidation [Fig. 2]. He was also on Amlodipine for a history of hypertension and Co-dydramol for osteoarthritis. On admission, his WCC was raised with slightly elevated LDH, but CRP was raised to over 300 which was settled to some extent on IV antibiotics. An ultrasound confirmed gallstones with acute inflammatory changes in the gallbladder. Imaging and clinical impression suggested he was developing a gallbladder empyema and concerns were raised about the viability of the gallbladder, suggesting surgery was necessary.

## Anesthetic Technique

Pre-operatively, surgical and anaesthetic options were discussed and we decided to proceed to open

surgery under awake thoracic epidural anaesthesia to minimise potential chest complications. With each patient's consent, they have had their laparotomies [case no. 1: lower abdominal for a sigmoid colectomy and case no. 2: sub-costal for a cholecystectomy] completed under thoracic epidural anaesthesia only.

Both patients were received an awake thoracic epidural anaesthetic [case no. 1: T7-8 and case no.: 2: T6-7]. The technique was performed in a lateral position under complete aseptic technique and basic monitoring; heart rate (HR), arterial blood pressure (ABP), and pulse oximetry (SpO2%). Light sedation using 4-mg of Midazolam was given and Lignocaine 1% [5 ml] was used to infiltrate the chosen space. For the block induction, a recipe of Lignocaine 2% with Adrenaline 1:200.000 [total, 20 ml], Clonidine [150 ug] and Diamorphine [3 mg] were used. Up to T4 loss of sensation was obtained bilaterally 5 minutes post induction. This was confirmed using the ice test and we were confident that the surgery should proceed. Later, a bolus of 10 ml L-Bupivacaine 0.5% was given followed by an infusion of 0.1% L-Bupivacaine with Fentanyl, 2 ug/ml [10 – 15 ml / hour] to maintain the block through out the operation. The analgesic and the abdominal muscle relaxation conditions were optimum and the Surgeons were very satisfied.

The two patients were conversing with the operative teams during surgeries, while they remained very comfortable, breathing spontaneously 4-6 L/M O2 via Hudson face mask. Because of potential complications, no further sedation was given. They were haemodynamically and respiratorily stable throughout the operations. The operation time was two hours in the first case and one hour in the second. No invasive monitoring was needed.

Post-operatively, patients were transferred to the recovery room and, subsequently, to the high dependency unit [HDU] for post-operative observation, monitoring and continuous epidural analgesia which was very effective in both cases. No further analgesia was required. The upper level of the epidural block was consistent with the epidural scoring scale for arm movements of zero {ESSAM score = 0; able to perform a hand grip}<sup>2</sup>, and patients were breathing comfortably and no respiratory support was needed. Not having had a general anaesthetic, both

made a remarkable recovery and later were able to be discharged home in good general condition. The first patient went home only 6 days post-operatively with a final diagnosis of a pT3 No adenocarcinoma, and was reviewed 4 and 8 weeks post-discharge and found to be well, having returned to all pre-operative activity levels. The cholecystectomy patient had to stay in hospital for 12 days post-operatively to optimise his chronic chest condition with nebulisers, antibiotics and physiotherapy. The postoperative histopathologic examination of his specimen has confirmed the diagnosis of acute diffuse suppurative cholecystitis with numerous suppurative foci within the necrotic gallbladder wall.

## Discussion

General anesthesia in high risk surgical patients with significant pulmonary disease can trigger some adverse effects including: pneumonia, impaired cardiac performance, neuromuscular problems, biotrauma and barotrauma and subsequently intra and post-operative hypoxemia<sup>3</sup>. Avoiding endotracheal intubation decreases the risk of postoperative laryngospasm and bronchospasm, especially in elderly COPD patients with irritated upper and lower airway tracts. Awake thoracic epidural anaesthesia has been reported to be a safe technique in patients with end-stage COPD<sup>4</sup>.

In order to reduce the adverse effects of general anaesthesia, thoracic epidural anaesthesia has been recently employed to perform awake cardio- thoracic surgery procedures, including coronary artery bypass grafting, management of pneumothorax, resection of pulmonary nodules and solitary metastases, lung volume surgery, and trans-sternal thymectomy<sup>5,6</sup>. Thoracic epidural anaesthesia blunts the decrease of subcutaneous tissue oxygen tension caused by surgical stress and adrenergic vasoconstriction during major abdominal surgery providing sufficient tissue oxygenation, and improving cardiac, respiratory and gastrointestinal function and may decrease the incidence of surgical wound infection<sup>7</sup>. Splanchnic sympathetic nervous blockade results in reduced inhibitory gastrointestinal tone and increased intestinal blood flow, positive factors where a colonic anastomosis is to be performed<sup>8</sup>.

Given that our two patients had end-stage COPD

and significant co-morbidity the advantages of epidural anaesthesia may have been vital contributor to the satisfactory recovery.

Post-operative myocardial infarctions are reported to be significantly lower due to continuous thoracic epidural analgesia<sup>9</sup>. Two systemic reviews have found that epidural anaesthesia with or without post-operative epidural analgesia reduce post-operative pulmonary infections compared with general anaesthesia with or without post-operative systemic analgesia<sup>10,11</sup>. Ballantyne et al confirmed that post-operative epidural pain control can significantly decrease the incidence of pulmonary morbidity<sup>12</sup>. Furthermore, a comparative study of major abdominal surgery in the elderly reported that the epidural route of post-operative analgesia provides better pain relief, improved mental status and faster return of bowel activity<sup>13</sup>. In patients undergoing lower abdominal surgery, the neuroaxial blockade and surgical anaesthesia achieved by epidural local anaesthetics was associated with decreased post-operative analgesic demands as seen with our patients<sup>14</sup>.

The pathophysiological response to surgical trauma, especially when it is major, could include pain, nausea, vomiting and ileus, stress-induced catabolism, impaired pulmonary function, increased cardiac demands, and risk of thromboembolism. Subsequently, further complications, need for treatment, and delayed recovery as well as discharge from hospital, could occur. Development of safe anaesthetic and analgesic techniques including regional anaesthesia have provided an important tool for excellent quality of surgery and enhanced recovery. We definitely agree with Kehlet and Dahl's opinion regarding the pivotal role of the anaesthetist facilitating early post-operative recovery providing a minimally invasive anaesthesia and analgesia and may be tailoring his anaesthetic strategy to meet the surgical demand in view of the patient's general condition<sup>15</sup>.

In 1994, awake epidural anaesthesia has been reported to be effective and safe technique in the high-risk colectomy patient<sup>16</sup>. Since then, there has been a paucity of data in the literature on the procedure performed under regional, especially awake epidural anaesthesia, in patients with co-existing pulmonary diseases. Also, awake laparoscopic cholecystectomy

has been reported to be safely done under thoracic epidural anaesthesia in COPD patients<sup>17</sup>. However, this anaesthetic technique is still unrecorded for open cholecystectomy, despite being known to adversely affect the post-operative pulmonary function more than the laparoscopic procedure<sup>18</sup>.

In this article, the two reported patients had significant co-morbidity, presenting the need to consider all surgical and anaesthetic options. Thoracic epidural was preferred to combined spinal epidural (CSE) anaesthesia because it is simple, less invasive and more reliable. In a CSE technique, the clinician has no chance to test the effectiveness of his epidural until the effect of the spinal wears off, and it would be too late if it is found to be ineffective or not working at all and the only available option in this case scenario would be putting the patient off to sleep, the technique that the Anaesthetist initially tried to avoid. In our technique, we started with Lignocaine to speed up the block induction, but later, the longer acting L-Bupivacaine was used<sup>19</sup>. Diamorphine<sup>20</sup> and Clonidine<sup>21</sup> were added to improve the quality of the analgesic effect of the epidural. The risk of inadvertent high blockade post-operatively, may be reduced by monitoring the patient's arm movements using the epidural scoring scale for arm movements [ESSAM],

which has been found to be very simple and reliable method for the early detection of the cephalad spread of thoracic epidural analgesia<sup>2</sup>.

Finally, we believe that thoracic epidural anaesthesia and analgesia is very useful technique, especially when it is used for selected patients helping to avoid general anaesthesia when it is contra-indicated. Encouraging this technique might help increase the safety margin of the surgery offered to the high-risk surgical co-morbid patients, especially those with severe pulmonary diseases. It could also help smooth the recovery period and enhance the discharge rate of those patients, increase the turnover of surgical cases, and subsequently, shorten the long waiting lists for surgery in the NHS. Needless to say that optimum anaesthetic and surgical experience as well as co-operation will be necessary in such circumstances.

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