CASE REPORT

Thoracic epidural analgesia in a patient with multiple comorbidities for subxiphoid incisional hernia repair

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ABSTRACT

Anesthetic preparation before non-cardiac surgery deserves particular attention in patients with cardiac disease as these are prone to develop hemodynamic instability and myocardial ischemia. Risk of complications is not only related to individual patient characteristics, but also to surgery related factors. In this report we present our experience regarding anesthetic management of a patient with multiple comorbidities including advanced chronic obstructive pulmonary disease, severely impaired left ventricular systolic function and occluded bypass grafts. We chose thoracic epidural analgesia for his sub-xiphoid incisional hernia repair. The operative and postoperative course was uneventful.

Key words: Sub-xiphoid incisional hernia; high thoracic epidural anesthesia; heart failure; myocardial ischemia

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INTRODUCTION

After coronary bypass graft (CABG) operations, damage to the upper abdominal wall may occur as a complication of median sternotomy and may eventually lead to the development of an incisional hernia. As a result of the worldwide increase in number of CABG, incidence of associated incisional hernia has also increased with an incidence of 1 to 4.2%.[1]

Epidural anesthesia may be favorable in terms of reducing mortality and morbidity in patients with ischemic heart disease submitted to non-cardiac surgery.[2,3] High thoracic epidural anesthesia (HTEA), offers several advantages including improving pulmonary functions, reducing the risk of ileus, allowing for early ambulation and early discharge to home and thus decreasing cost, besides effectively reducing pain. HTEA improves the balance between myocardial oxygen consumption and delivery by blocking the cardiac symphatethic nerves in a selective way (T1-5).[4] HTEA, owing to its protective effects against myocardial ischemia, may alleviate symptoms of inadequate coronary perfusion, improve left ventricular functions and thus provide relief in ischemic chest pain.[5]

This report presents anesthetic management by HTEA of a patient with multiple comorbidities including advanced chronic obstructive pulmonary disease and severely impaired left ventricular systolic functions with occluded bypass grafts.

CASE REPORT

A 51-year-old male presented with a painful and tender sub-xiphoid incisional hernia which

developed after his first CABG operation, which he received 9 years back. The patient was scheduled for sub-xiphoid hernia repair. His functional capacity was NYHA class III and he was American Society of Anesthesiologists (ASA) physical status IV. He had an inferior myocardial infarction (MI) 2 years ago but did not undergo revascularization since no suitable culprit vessel was found on coronary angiography. He thereafter had received a biventricular implantable cardiac defibrillator (ICD) having broad QRS complexes in electrocardiogram. There was a 90% stenosis at left anterior descending artery, 75% stenosis at circumflex artery and 85% stenosis at right coronary artery with all three bypass conduits placed during the previous CABG procedure being totally occluded. He also had a long history of COPD and was still using tobacco with a history of 30 packs years. On lung auscultation, inspiration was found shortened, expiration was prolonged and there were early inspiratory crackles and ronchi in different tones and frequencies. Laboratory investigation including total blood count, chemical analysis and coagulation paremeters were within normal limits. Lung x-ray showed a broad cardio-thoracic index and marked increase in pulmonary vascularity but no sign of pleural effusion. Spirometry findings were obtained (Table 1). Arterial blood gas analysis showed pH:7,41, PCO_2: 47 mmHg, PO_2: 86 mmHg and SO_2: 96%.

Table 1: Pulmonary function tests (PFT) revealed severe obstructive airway disease

Parameters	Measured value	% Predicted value
FEV1	1.42	56%
FVC	2.13	70%
Residual volume	2.88	114
FEV1 : FVC	66	-

Electrocardiogram showed sinus rhythm with right bundle branch block. In transthoracic echocardiography, there was systolic and diastolic dysfunction, left ventricular hypertrophy, moderate mitral regurgitation. Ejection fraction was 22% and systolic pulmonary artery pressure was 50 mmHg. His oral medications included carvedilol, ivabradin, ramipril, spironolactone, acetyl salicylic acid and furosemide.

The surgical procedure and anesthetic considerations and available options were discussed with the patient, who chose HTEA. On the morning of surgery, ICD device was turned off and the patient was given 50 mg of ranitidine and 20 mg of metoclopramide orally and 1 mg of midazolam intravenously. Standard monitoring included electrocardiogram and pulse oximetry. Peripheral intravenous line was introduced and fluid administration was started at a rate of 5-8 ml/kg. Invasive blood pressure was monitored through right radial artery. Initially, arterial blood pressure was 110/70 mmHg and peripheral oxygen saturation (SpO_2) was 95%. Oxygen inhalation was initiated at a rate of 2 L/min by nasal catheter.

With the patient in the sitting flexed position, 2 ml of 2% lidocaine was injected over T8-T9 vertebral level to achieve local anesthesia. Then, 18G Tuohy needle (Portex®) was introduced in the midline through the T8-T9 intervertebral space. Epidural space was identified with loss of resistance technique. The catheter was advanced 3 cm cephalad and 2 ml of lidocaine 2% injected as a test dose to confirm appropriate catheter position. Somatosensorial anesthesia was maintained within T2-T8 level titrating the dose of inj. lidocaine 1%, inj. fentanyl 5 μg/ml and 2.5 mg/ml bupivacaine. Anesthesia level was tested using ice cubes. Sedation was achieved by inj. midazolam 1 mg followed by infusion at a rate of 3 mg/hr, targeting a Ramsey sedation level of 2.

Hemodynamic parameters and SaO_2 level remained stable throughout the procedure. Heart rate remained within a range of 45-50 bpm accompanied by rare premature ventricular contractions at ¼ of normal sinus rhythm. Inj. ephedrine was used when systolic blood pressure fell below 90 mmHg. Ten minutes after the start of the procedure, blood gas analysis was pH: 7.39, pCO2: 47 mmHg, PO_2:110 mmHg, SO_2: 97%. The 4 cm defect was closed and reinforced by a polyprolene mesh. Surgical procedure took a total of 35 min during which no additional analgesics or sedatives were required. The patient was infused a total of 500 ml of IV fluid. At the end of the operation level of anesthesia was at T4 level. After the operation the patient was admitted to post-anesthesia care unit for one hour and then transferred into intensive care unit. His ICD was turned on. Early postoperative course was uneventful. Somatosensory blockade was found totally eliminated 4.5 hours after the operation and the patient did not require any inotropic support perioperatively.

Sedation was ceased and patient controlled analgesia was established with a prepared solution of 1 μg/ml fentanyl and bupivacaine 0.0625%.

Following an initial loading dose of 3 ml/h and bolus infusion of 3 ml/h, infusion was started at a rate of 3 ml/h and lock time was set at 30 min. The patient was transferred to ward at 14th hour of surgery and then discharged to home on 2nd postoperative day.

DISCUSSION

General anesthesia (GA) is generally considered as the first choice in thoracic and upper abdominal surgery. Main target of anesthesia is to maintain stable hemodynamics and avoid myocardial ischemia by balancing myocardial oxygen consumption and delivery.[6] We performed dose-titrated high thoracic epidural anesthesia in our patient who had significant comorbidities including advanced heart failure (EF: 22%), occluded bypass conduits, severe COPD and ICD dependency. Using this anesthetic approach, we aimed to maintain stable hemodynamics, reduce myocardial oxygen demand and avoid myocardial ischemia.

Complications of thoracic epidural anesthesia include epidural hematoma, spinal cord injury, phrenic nerve palsy and inadvertent high anesthesia level. Occasionally, perioperative panic attacks might necessitate conversion to general anesthesia.[7]

For elective general surgery, the incidence rate of postoperative pulmonary complications was 33.9% and the lung-related mortality rate 3.4% in patients with mild-to-moderate COPD.[8]

Stenseth et al investigated the effect of TEA on postoperative pulmonary functions in 44 patients, aged <65 years with an EF >50%. They compared patients receiving high dose fentanyl anesthesia with those receiving low dose fentanyl plus thoracic epidural anesthesia and found that thoracic epidural anesthesia was associated with a significant improvement in pulmonary functions attributed to a more effective postoperative analgesia and better controlled postoperative hemodynamic parameters.[9,10]

Hypotension due to uncontrolled sympathetic blockade is the main disadvantage of regional anesthesia and requires volume expansion. It may result in myocardial ischemia. High dose local anesthetics may also cause myocardial toxicity and depression.[11] In our patient, local anesthetic was given by slow infusion and at an appropriate dose while the hemodynamic status of the patient was being closely monitored.

TEA improved diastolic function in patients with coronary artery disease undergoing operative revascularization.[12] Diastolic dysfunction has been reported to be an early sign of cardiac ischemia. Berendes and colleagues showed improved systolic function and wall motion in coronary artery disease. Troponin release and long-term survival after CABG underline the cardio protective potential of TEA in that study.[13]

Zhao YJ and colleagues, studied the effect of HTEA in congestive heart failure (CHF) in a rat model.[14] They found that; myocardial norepinephrine, angiotensin II, endothelin-1 and tumor necrosis factor alpha concentrations were significantly higher in GA group compared with HTEA group. When they examined myocardial cells under microscopy, they found that myocardial cell damage was reduced in HTEA group compared with GA group.

Anesthesiologists play an important role in the perioperative and postoperative management of off-pump CABG surgery patients and the use of HTEA offers important benefits, e.g. excellent analgesia, the ability to reduce myocardial oxygen consumption, and the good hemodynamic stability in off-pump CABG surgery.

CONCLUSION

A successful anesthetic management was achieved using high thoracic epidural anesthesia in a patient with serious cardiac and pulmonary comorbidities. The technique may be considered as an option in patients with high risk of hemodynamic instability or pulmonary complications since central effects are unlikely within a relatively short time course, provided that the dose is adjusted appropriately.

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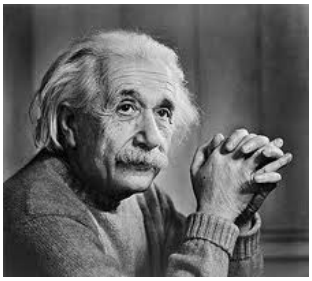

In matters of truth and justice, there is no difference between large and small problems, for issues concerning the treatment of people are all the same

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