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Transurethral resection of bladder tumor surgery conducted using epidural anesthesia and obturator nerve block in an elderly multimorbid male

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Abstract

Epidural Anesthesia (EA) is mainly used for perioperative and post-operative analgesia, usually combined with Spinal Anesthesia (SA) or General Anesthesia (GA). It is safe, easy to perform, and has multiple applications. The benefits of Regional Anesthesia (RA) over general anesthesia include superior analgesia, reduced opioid consumption, reduced pulmonary complications, improved gastrointestinal function, early mobilization, a reduced need for thrombo-prophylaxis, early discharge, and higher patient satisfaction. Anesthesia for urological surgeries has unique problems due to patient factors and procedure complexity. An 84-year older man with a known history of hypertension/ Coronary Artery Disease (CAD)/ complete Left Bundle Branch Block (LBBB)/ dilated cardiomyopathy/ glottic carcinoma/ mixed airway disease, with an ejection fraction of 30%, was scheduled to undergo Transurethral Resection of Bladder Tissue (TURBT) for carcinoma bladder mass. It was done under EA and an ipsilateral obturator nerve block.

Keywords: epidural anesthesia; dilated cardiomyopathy; TURBT; mixed airway disease; frailty.

Abbreviations: EA: Epidural Anesthesia; SA: Spinal Anesthesia; RA: Regional Anesthesia; CAD: Coronary Artery Disease; LBBB: Left Bundle Branch Block; TURBT: Transurethral Resection Of Bladder Tissue; ONB: Obturator Nerve Blockade; HTN: Hypertension; DCMP: Dilated Cardiomyopathy; CKD: Chronic Kidney Disease; CFS: Clinical Frailty Scale; METS: Metabolic Equivalents; ECG: Electrocardiogram; OD: Once Daily; IV: Intravenous; PACU: Postoperative Anesthesia Care Unit, RCT: Randomized Controlled Trial; COPD: Chronic Obstructive Pulmonary Disease; CHF Congestive Heart Failure; PAH: Pulmonary Arterial HTN; Ppcs: Postoperative Pulmonary Complications; ASA: American Society of Anesthesiology.

Introduction

Patients undergoing TURBT are frequently at the extremes of age to have cardiovascular and respiratory comorbidities. CAD is a leading cause of perioperative morbidity and mortality risk in cardiac patients [1].

TURBT is an onco-surgical procedure predominantly performed in frail and rid of multiple comorbidities in the geriatric population. The choice of anesthesia is usually SA over GA due to a wide range of benefits, including attenuation of the stress response, minimizing the use of volatile anesthesia and its associated immunosuppression, reduced postoperative pain, and opioid analgesics. Hence, it is hypothesized to reduce tumor recurrence. The risk of stimulation of the obturator nerve situated next to the lateral bladder wall during TURBT can be dealt with by administering GA with muscle relaxants or Obturator Nerve Blockade (ONB). In patients with severely compromised cardiopulmonary function, SA can lead to profound hypotension, increasing the risk of myocardial ischemia, congestive heart failure, stroke, etc. Hence, the choice of anesthesia is to be optimized on a case-to-case basis.

Management of geriatric patients is a challenge to anesthesiologists because of limited organ reserve, unique disease predisposition, and compromised organ function [2]. EA results in a sympathetic block, sensory block and motor block depending upon the dose, concentration, and volume of the local anesthetic. EA and analgesia reduce overall morbidity and mortality by approximately 30% as compared to GA [3].

Here we report successful anesthetic management of an 84-year-old man with multiple morbidities, namely Hypertension (HTN), Coronary Artery Disease (CAD), Complete Left Bundle Branch Block (LBBB), dilated cardiomyopathy (DCMP), Chronic Kidney Disease (CKD), mixed pulmonary disease, difficult airway due to glottic carcinoma and a Clinical Frailty Scale (CFS) of 6 under graded EA and ipsilateral ONB.

Case report

An 84-year-old gentleman presented with lower urinary tract symptoms, including hematuria, and was diagnosed with urinary bladder cancer. He was scheduled for TURBT. His previous medical records reveal that he was a known hypertensive with CAD and complete LBBB. He was a chronic smoker with a history of pulmonary tuberculosis 25 years back. On examination, he was underweight with a body mass index of 17.25 kg/m^2. The pulse rate was 84 bpm, regular, and blood pressure was 146/88. His METS score was less than 4, and the CFS was 6, making him a high risk in outcome assessment. On auscultation, occasional rhonchi and fine basal crepitations bilaterally while coarse crepitation in left apical, infraclavicular, and infra-axillary areas were noted. On airway examination, he was edentulous, his Mallampatti Grade (MPG) was III, and indirect laryngoscopy revealed glottic growth. Preoperative 12 lead ECG showed LBBB with few Ventricular Premature Contractions (VPC). Echocardiography report demonstrated global hypokinesia with poor systolic function, ejection fraction of 30%, DCMP, mitral regurgitation, mild Pulmonary Arterial Hypertension (PAH), and type II diastolic dysfunction. His CT thorax reported collapse, consolidation of the left upper lobe, and benign fibrotic lesions with diffuse emphysematous changes with cystic spaces in both lung fields. Based on raised urea and creatinine with bilateral kidneys showing renal parenchymal changes, he was diagnosed with CKD. His preoperative hemoglobin was 10 gm%

He was on multiple medications, namely doxyphyllin 400 mg Once Daily (OD), metoprolol XL 25 mg OD, valsartan 40 mg OD, torsemide 10 mg OD, ivabradine 5 mg OD and atorvastatin 20 mg OD.

Anesthetic management

A high-risk consent was obtained. He was classified as ASA IV. EA technique was explained to the patient. A difficult airway cart was checked and kept ready. Intravenous access was established with an 18 G intravenous (i.v.) cannula, and the patient preloaded with 250 ml of ringer lactate. Invasive blood pressure monitoring was instituted through a 20 G arterial line in the left radial artery. Arterial oxygen saturation (SpO_2) and lead II, V of the electrocardiogram were monitored throughout the surgery.

Under all aseptic precautions, an 18 G epidural catheter was introduced at L3-4 space. A test dose (3 ml of 2% lignocaine-adrenaline) was given. It was followed with 5ml of 0.25% bupivacaine slowly to attain sensory and motor block up to T10 level. The mean blood pressure was 50 mmHg after 5 minutes which was managed with a bolus of 100 ml crystalloid and intravenous mephentermine 3 mg i.v. to maintain it to 65 mmHg. Ventricular ectopics were seen on the ECG, which were not persistent. An ipsilateral obturator nerve block was performed using 12 ml of 0.25% bupivacaine. The patient was sedated with midazolam 0.5 mg i.v. The cystoscope was well lubricated with 2% lignocaine jelly before introduction into the bladder. In the intraoperative period, the patient was comfortable, and heart rate was maintained between 60-80 bpm and MAP of 65 mmHg. The surgery lasted for nearly 95 minutes with a blood loss of 250 ml. He had no complaints of chest pain, sweating, or difficulty in breathing. The arterial cannula was removed before shifting to the Postoperative Care Unit (PACU). The subsequent postoperative course was uneventful. An epidural catheter was removed after giving a bolus of tramadol 50 mg and dexamethasone 4 mg diluted in 10 ml of saline.

Discussion

Elderly patients require a higher level of care than younger patients during surgery. Age-related organ reserve decline, compounded by chronic diseases, leads to a high incidence of Postoperative Complications (PPCs) in elderly patients. Pulmonary function declines with increasing age due to loss of both lung and chest wall compliance, especially seen in smokers. A 2006 systematic review has shown that risk factors for PPCs are advanced age, ASA class II or higher, COPD, and CHF. In patients undergoing non-cardiac surgeries, rate of PPCs are 14% and 15% in ages > 65 years and > 70 years respectively [4]. Our patient was 84 years old with multimorbidities including CAD with DCMP and LBBB. Anesthetic goals for CAD patients are to maintain stable hemodynamics, prevention of MI by maintaining myocardial oxygen supply, and reducing oxygen demand [5]. A systemic review on 141 trials including 9559 patients reported that incidence of MI and overall mortality was reduced by one-third in patients who were given neuraxial blockade [3].

The elderly gentleman also had mixed airway disease and glottic carcinoma making his airway anatomically and physiologically difficult. As exemplified by Dec GW, the anesthetic management of the patient with DCMP with reduced ejection fraction with mixed airway disease is challenging and associated with high mortality [6].

Frailty is a syndrome in which there is decreased physiologic reserve and resistance to stressors. A prospective measure of frailty in 594 patients found that preoperative frailty was associated with an increased risk of PPCs and length of hospital stay [7]. A 2019 RCT with 80 elderly patients undergoing orthopedic surgery concluded that as compared with GA, Regional Anesthesia (RA) has few negative impacts on short-term cognitive function and lower incidence of postoperative cognitive dysfunction [8]. On preoperative evaluation, our patient, scored a 6 in CFS, making him a high risk for PPCs.

The associated perils in urological surgeries, namely perioperative bleeding, thrombosis, fluid overload, bladder perforation, compel SA to choose anesthesia over GA. But, SA can cause hypotension, which is dangerous in patients with inadequate cardiac reserve. GA is associated with hypotension due to intravenous induction agents, tachycardia, hypertension due to laryngoscopy response, which leads to cardiac morbidity. Epidural local anesthetic or opioids compared to systemic opioids are better for postoperative analgesia, suppresses surgical stress response & so reduces MI and arrhythmias [9]. Yeager et al [10]. reported that patients with EA groups had less incidence of postoperative cardiac morbidity than GA group patients. A meta-analysis conducted by Beattie et al [11]. on EA reported a reduction in cardiac events.

TURBT encompasses the risk of stimulation of the obturator nerve, which is a significant concern during surgery. It can lead to complications like bladder wall perforation and vascular injury, so EA combined with ONB is safely applied to prevent the obturator jerking. It precludes adductor spasms.

The recurrence rate of invasive bladder tumor is relatively high, [12]. RA reduces tumor recurrence rate because it provides pain relief without the use of systemic opioids, decreases sympathetic nerve activity during surgery, & it reduces perioperative immune-suppression, [13,14] use of RA has been related with improved oncologic outcomes. Inhalational anesthesia has been known to have a prolonged and profound inhibitory influence on natural killer cell activity [15] Wada et al. [16] demonstrated that laparotomy under sevoflurane anesthesia decreases the tumoricidal activity in liver mononuclear cells in a rat model; thus, the induction of GA by inhalational anesthesia may be associated with immunosuppressive & host-defense impairment, which leads to acceleration of tumor growth [7].

Hole et al. [18] evaluated monocyte function in patients undergoing total hip arthroplasty performed under either GA or EA; the phagocytic function of monocytes was reported to be improved in EA.

EA is a safe, cost-effective technique to provide surgical anesthesia and postoperative analgesia. It has the potential to reduce perioperative physiological stress response due to surgery, so it decreases complications. In this case, with multiple comorbidities, graded EA with ONB proved to be a safe anesthesia technique reducing the risk of PPCs.

Conclusion

Graded EA has minimal effect on hemodynamics and myocardial contractility in patients with global hypokinesia and LBBB. EA also reduces stress response, tumor recurrence, and decreased incidence of thromboembolism in patients posted for oncological surgeries. The subset of patients undergoing TURBT is usually elderly with multiple comorbidities posing a challenge for anesthetic management. The anesthesiologist should have knowledge of geriatric physiology, various comorbidities, diagnostic evaluations, and treatment modalities. This is to be followed by careful planning for the provision of safe anesthesia.

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