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Case report

Dexmedetomidine for intraoperative sedation in a severe Chronic obstructive pulmonary disease patient for lower limb amputation under regional anesthesia - A novel choice

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Abstract

The effective management of sedation and analgesia in severe chronic obstructive pulmonary disease patients provides a challenge to the anaesthesiologists and critical care practitioners. Choosing the appropriate agent or combination of agents for sedation is crucial in order to alleviate noxious stimuli, stress and anxiety while minimizing the risk of adverse events. We selected epidural anaesthesia and dexmedetomidine to preserve spontaneous breathing and obtained appropriate sedative and analgesic effect without causing respiratory depression and hemodynamic changes in a patient diagnosed to have chronic obstructive pulmonary disease undergoing femoral to tibial bypass with amputation of right foot.

Keywords: Conscious sedation; Dexmedetomidine; Regional anaesthesia

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Introduction

Interest in the role of alpha (α)-2-adrenoceptor agonists in anaesthesia and intensive care is growing. These drugs exhibit a wide range of effects that include sedation, anaesthetic-sparing, analgesia and sympatholytic properties.[1] Dexmedetomidine has been successfully used as the primary sedative/anaesthetic agent in various surgical procedures. Recent evidence obtained from a prospective, randomised, double-blind, multicentre trial indicates that it is an effective and well tolerated sedative for surgical patients requiring monitored anaesthesia care.[2] It may be useful in patients with chronic obstructive pulmonary disease (COPD) requiring sedation.[3] In a

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recent study dexmedetomidine provided an acceptable level of sedation and fewer interventions were required for managing airway when compared to propofol.[4] Dexmedetomidine is a α2-adrenoreceptor agonist with a unique mechanism of action: it induces sedation via receptors within the locus coeruleus, analgesia via receptors in the spinal cord and attenuation of the stress response without significant respiratory depression.[5] Several studies have demonstrated the superiority of dexmedetomidine over benzodiazepines which is generally used.[6] This case study we will present new insight into dexmedetomidine and will comment on the recent data supporting its use as and first choice sedative agent for COPD patients.

Case Report

50 yr female who is known case of hypertension for the past 2 years under medications presented with history of pain and blackening of bilateral foot gradually starting from greater toe and gradually expanding for the past two months. On local examination of lower limbs there was bilateral blackish discolouration of foot with tenderness and the extremity was cold. There was absence of pulsations bilaterally at Popliteal, anterior and posterior tibial and dorsalis pedis arteries. Chest examination revealed crepitations with SPO_2 of 70 % under room air. X-ray of Chest, posterior-anterior view showed hyper-inflated lungs with opacities on bilateral lower lung field. Arterial Blood Gas (ABG) at room air revealed pH of 7.53, PO_2 44.1, PCO_2 31, SpO_2 84.5, HCO_3^- 25.6. Echocardiography screening revealed Normal Left Ventricular Systolic Function with Mild Pericardial Effusion and Grade I left ventricular diastolic dysfunction (LVDD). Spirometry showed Forced expiratory volume in one second (FEV1) 60 % of predicted value. Patient was planned for Right side Femoral to Tibial Bypass with Amputation of Foot. Consent was taken and patient was kept nil per oral for 6 hours. Intravenous line was secured at preoperative preparation room and base line vitals were taken. Patient was explained regarding the mode of anaesthesia to be given and shifted to operative room. Monitors were attached and oxygen was started via face mask at 5 Litre per minute after which SPO_2 came up to 93 % and patient was kept in sitting position. A 16 g epidural catheter was placed in L1-L2 inter space under local anaesthesia. Test dose of 3 ml lignocaine 2 % with 1:200,000 Adrenaline was given and the insertion site was then covered with a sterile occlusive dressing. Epidural anesthesia was initiated with a bolus of 0.2 % Bupivacaine Morphine 3mg diluted to a total volume of 7 ml. Sensory level achieved was T12, and motor level was grade II. Dexmedetomidine was given in bolus dose of 1 µg/kg over 10 minutes followed by a continuous intravenous infusion at a dose of 0.2 to 0.7 µg/kg/h titrated to a Ramsay *sedation scale* score of 4 throughout surgery. To maintain adequate epidural anaesthesia during surgery, Bupivicaine 0.2 % was started in infusion dose at 2 ml/hr and titrated according to the sensory level which was checked every 30 minutes. Surgery lasted 180 minutes and was uneventful. At the end of surgery Dexmedetomidine was stopped and patient was shifted to recovery room after Ramsay *sedation* score of 2. The patient was monitored for 1 hour post operatively before shifting to post operative ward. Epidural 0.125 % Bupivicaine at the rate of 2 ml per hour under infusion was continued for another 2 days for analgesia purpose.

Discussion

Chronic obstructive pulmonary disease (COPD) is considered independent risk factors for mortality and major cardiopulmonary complications during and after surgery. COPD share common risk factors and are often encountered, isolated or combined, in many surgical candidates. The ideal sedative agent for these patients should allow for rapid modification of the sedation level by modifying the dosage (titratable) and should not have depressor effect on the cardiovascular or respiratory systems.[7] It should be cheap and have short duration without cumulative effects, allowing for rapid recovery of effective spontaneous respiration after interruption of its administration.[8,9] Dexmedetomidine is a medication that appears to have great utility in areas of sedation. It is an imidazole, a potent α2 -adrenoceptor agonist that has eight times greater specificity for α2 receptors than does clonidine. The actions of dexmedetomidine are thought to be mediated through post-synaptic α2 receptors which activate pertussis toxin-sensitive G proteins; thus, increasing conductance through potassium ion channels.[10] The advantage of dexmedetomidine as a sedative and its respiratory profile make many anaesthesiologists excited about using it to patients when maintaining spontaneous ventilation. Since dexmedetomidine does not negatively affect the respiratory rate or depth compared to other sedatives, it has proven to be advantageous in high risk patients. We conclude that dexmedetomidine has no deleterious clinical effects on respiration when used in adequate doses and provides adequate sedation and effective analgesia but further research is needed. We ascertain that dexmedetomidine has the potential for an increasing role in anaesthesia and sedation. Additionally, dexmedetomidine offers an alternative choice to Proprofol, opoids, and benzodiazepines for the sedation of patients whose are at high risk of pulmonary complications.

Conflict of interest The authors declare no conflicts of interest.

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