Abstract

Introduction
This paper reports a case of the use of dexmedetomidine and ketamine for sedation in an elderly patient undergoing a painful procedure.

Case report
An elderly patient with hepatobiliary sepsis was planned for percutaneous transhepatic cholecystostomy (PTC) insertion at a remote location. Monitored anaesthesia care (MAC) using dexmedetomidine infusion, supplemented with ketamine boluses, was successfully used as the anaesthetic technique. We were able to achieve a calm, sedated and cooperative patient with preserved airway reflexes and respiratory drive and minimal haemodynamic fluctuations during the 95 minute procedure.

Conclusion
The combination of dexmedetomidine and ketamine is advantageous for sedation in the remote location, as both drugs confer analgesia, while preserving the patients’ airway reflexes and respiratory drive.

Introduction
We would like to present a case in which dexmedetomidine in combination with ketamine was used successfully for sedation and analgesia in a patient undergoing a painful procedure of percutaneous transhepatic cholecystostomy (PTC) at a remote location.

Case report
A 96 year old patient with hepatobiliary sepsis secondary to underlying cholangiocarcinoma and blocked biliary stent was scheduled for PTC insertion at a remote location, in the interventional radiology suite. Other than a cholecystectomy 20 years ago, she has no other past surgical history. In view of her age, the primary aim of the procedure was palliative in nature, to relieve the hepatobiliary tree obstruction caused by the cholangiocarcinoma and blocked biliary stent. Apart from the underlying malignancy, the patient has no other medical problems. She was cooperative and lucid during the preoperative assessment and consented to the use of monitored anaesthesia care during the procedure. Despite ongoing hepatobiliary sepsis, the patient remained hemodynamically stable during her inpatient stay and did not require any inotropic support. She has no other end organ damage and preoperative renal panel did not show any renal impairment. Liver function test showed an obstructive picture with transaminitis. Standard monitors including non invasive blood pressure monitoring, electrocardiogram and pulse oximetry monitoring were applied. Supplemental oxygen via a face mask was given. Capnography was used to ensure timely detection of respiratory depression, if any. There was also an anaesthetic machine set up in the interventional radiology suite, in event the sedation fails and a general anaesthetic was needed. A 20 Gauge intravenous cannula was inserted, for the purpose of intravenous hydration and infusion of sedative medications. An infusion of dexmedetomidine of 0.2 to 0.6mcg/kg/hr was used throughout the procedure, without an initial loading dose. The infusion was titrated to keep Ramsay sedation score 2-3. We used a standard dilution of dexmedetomidine of 4mcg/ml concentration using 0.9% sodium chloride. The infusion was administered using a controlled infusion device. This was supplemented with ketamine boluses of 5mg during particularly painful parts of the procedure - when the initial 22G needle puncture site was sequentially dilated to allow insertion of an 8F biliary drain. A total of 15mg of ketamine was given in 3 divided boluses throughout the procedure. Communication with the interventionist was important to administer ketamine before the painful stimulus to minimize patient discomfort and movement. The patient remained hemodynamically stable throughout the procedure with no bradycardia. Respiratory rate was 15-22 beats per minute throughout the entire procedure. No breakthrough pain was reported by the patient. No additional sedatives or analgesics were required and the patient was able to lie still throughout the 95 minute procedure. There was minimal blood loss and a total of 500mls of ringer’s lactate was infused. After the procedure, the patient was monitored for 30 minutes in the recovery room in the interventional radiology suite before discharge to the general ward with hourly vital signs monitoring for the next 6 hours. She remained hemodynamically stable in the general ward. We were able to achieve a calm, sedated and cooperative patient with preserved airway reflexes and respiratory drive and minimal hemodynamic fluctuations during the 95 minute procedure.

Discussion
The challenges in this case are: anaesthetic management in the very elderly patient and considerations...
related to the remote location of the procedure. Percutaneous cholecystostomy is a safe treatment for elderly patients and is a rapid and effective tool to relieve symptoms of hepatobiliary obstruction. The procedure involves placement of a drainage catheter in the gallbladder lumen and is usually performed under fluoroscopic guidance in our institution. After cleaning and draping, a 22-gauge needle is used to puncture the gallbladder under fluoroscopic guidance. Placement is confirmed by the aspiration of bile. A guide wire is used to exchange the needle for a dilator to allow final placement of an 8 French biliary drain within the gallbladder. Aspiration of bile from the drain confirms satisfactory position. The procedure can be performed under monitored anaesthesia care with or without local anaesthetic infiltration of the liver capsule. The painful parts of the procedure include puncture of the liver capsule and sequential dilatations of the initial needle puncture to allow insertion of a bigger gauge biliary drain. In our patient, the interventional radiologist requested for anaesthetic team involvement in view of the duration of this procedure, the elderly age of the patient and the higher likelihood for general anaesthesia. They also do not routinely administer LA to the liver capsule for such cases. The choice of dexmedetomidine with ketamine for sedation in this patient undergoing a painful procedure in a remote location provides several advantages. The goals of our anaesthetic management include adequate analgesia, sedation, immobility, cardiovascular stability, while minimizing respiratory depression. Dexmedetomidine is a highly selective alpha-2 agonist that provides anxiolysis and cooperative sedation without respiratory depression. It inhibits the release of norepinephrine via actions on the alpha2A (α2A) adrenoceptors located in the locus ceruleus and the spinal cord, resulting in sedation and analgesia via sympatholysis. Ketamine is a non-barbiturate phencyclidine derivative and provides analgesia in sub-anaesthetic doses with relative haemodynamic stability. Dexmedetomidine is not ideal as a sole agent to provide analgesia/sedation for painful procedures despite its analgesic effects, due to the pronounced bradycardia and hypotension caused during rapid infusions. Administration regime is complicated due to the need for timed initial bolus and subsequent infusion at lower doses. Recovery may also be prolonged. However, when used together with ketamine, the latter can attenuate the bradycardia caused by dexmedetomidine. Dexmedetomidine has also been reported to be effective in attenuating the cardiostimulatory and post anaesthetic delirium effects of ketamine. Both cause minimal respiratory depression, which is advantageous in remote anaesthesia, where airway obstruction in a sedated patient may be catastrophic. So far there have been various reports of the use of dexmedetomidine and ketamine combination for procedural sedation, including cardiac catheterization, conduct of caudal anaesthesia, magnetic resonance imaging, mass biopsy, and 12, with the majority of reports in the paediatric population. We present a case of the successful use of dexmedetomidine-ketamine combination for sedation in an extremely elderly patient undergoing a painful procedure. Elderly patients have decreased physiological reserves that increase their perioperative complication rates. Even in the absence of organ-specific dysfunction, the anaesthetic technique and drug dosing must be tailored to take into account age-related changes to normal physiology and pharmacology. Perioperative hypotension occurs more frequently in elderly patients due to impaired autonomic homeostasis. Increased vagal tone and decreased sensitivity of adrenergic receptors also lead to a lower resting heart rate, making them more susceptible to the bradycardia and hypotension caused by dexmedetomidine. Hence, the use of loading dose or high dose infusion of dexmedetomidine, especially in the elderly age group, can be hazardous. In our case, we chose to omit the loading dose of dexmedetomidine and continued the infusion at 0.2–0.6 mcg/kg/hr during the procedure. Two separate studies reported that dexmedetomidine caused hemodynamic disturbances when used for sedation in cataract surgery. However, in these studies, loading dose of 1mcg/kg over 10 minute was given before the start of infusion during surgery. In contrast, studies that omitted the initial high loading dose achieved appropriate sedation while maintaining stable hemodynamics. The incidence of hypotension in ICU patients sedated with dexmedetomidine was also lowered when the loading dose was omitted. There is increasing emphasis on avoiding postoperative cognitive dysfunction (POCD) in the elderly patient as it causes significant short term and long term morbidity and mortality. Although one may expect that general anaesthesia induces more POCD due to the central nervous system effect of anaesthetic and analgesic drugs, data proving the correlation between general anaesthesia and POCD remains conflicting. Available randomized controlled trials suggest that there is no significant difference in the incidence of POCD when general and regional anaesthesia are compared. Urwin found in his meta-analysis that there was only a non-significant tendency for a greater incidence of confusion following general anaesthesia in patients undergoing surgery for hip fracture. A recent meta-analysis also found that general anaesthesia was associated with a non-significant increase in postoperative cognitive dysfunction. Although the results were not statistically significant, the authors still advocate the use of regional anaesthesia whenever possible. Choice of drugs used during anaesthesia also influences the incidence of postoperative delirium. Limiting the use of GABAergic sedatives such as benzodiazepines and propofol has been suggested to reduce the risk of postoperative delirium. In addition to...
that, randomised controlled trials have shown that addition of ketamine and dexmedetomidine to the anaesthetic regime or for postoperative sedation can reduce the risk of postoperative delirium. A randomized controlled trial also showed that use of dexmedetomidine for sedation in the ICU reduced the incidence of delirium when compared with midazolam. In our case, the benefits of avoiding general anaesthesia in this elderly patient extend beyond reducing the incidence of postoperative delirium. Choice of sedation over general anaesthesia in this elderly patient avoids risks of the latter, such as the risk of airway trauma due to instrumentation; hypotension from use of anesthetics; longer recovery time; airway dislodgement and circuit disconnection during procedure, all of which would be made more hazardous by the remote location of the procedure where skilled help is not easily accessible and use of fluoroscopy limits timely access to the patient. A recent analysis of the risk and safety of anaesthesia at remote locations suggest that remote anaesthesia poses a significant risk for the patient. Serious adverse outcomes can occur even for procedures that are non-invasive in nature. The most common complications in remote anaesthesia are related to over sedation and inadequate oxygenation and ventilation during monitored anaesthesia care. Hence, use of the dexmedetomidine/ketamine combination confers additional safety margin in remote anaesthesia as they produce less respiratory depression.

Conclusion

The combination of dexmedetomidine and ketamine for sedation in an elderly patient coming for a painful procedure in a remote location provides several advantages. Dexmedetomidine allows anxiolysis and cooperative sedation while ketamine confers additional hemodynamic stability by attenuating the bradycardia effects of dexmedetomidine. Both drugs possess analgesic properties and allow preservation of airway reflexes and respiratory drive, which are particularly important in remote anaesthesia. In addition to avoiding the side effects of a general anaesthesia, sedation using this combination of drugs has also been reported to reduce the incidence of postoperative cognitive dysfunction.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

References

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