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# BESPOKE ANESTHESIA TO AVOID POSTOPERATIVE COGNITIVE DECLINE: A COMBINATION OF REGIONAL AND TOTAL INTRAVENOUS ANESTHESIA

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## Introduction

Patients of advanced age have an increased sensitivity to nearly all anesthetic modalities and suffer from a much larger incidence of cognitive dysfunction. Unfortunately, this amongst other physiologic changes of aging, lends itself to an increased risk of postoperative dysfunction - particularly with anesthetics of small molecular size.

## Materials and Methods

Patient informed consent obtained.

## Results/Case Report

An 80-year-old female presents to our pre-anesthesia testing clinic prior to open reduction and internal fixation (ORIF) of the right femur with a right iliac crest bone graft and a right distal femur hardware exchange secondary to partial non-union, status-post ORIF for traumatic femur fracture one year prior. She endorsed a personal and familial history of severe postoperative cognitive dysfunction (POCD). She states that after her previous procedure she experienced an acute episode of short-term memory loss and has no recollection of the week following her anesthetic. Additionally, she states that her mother experienced similar, but more severe, symptoms after an inhaled anesthetic at her age, and subsequently declined into severe dementia until the end of her life. Extremely hesitant toward general endotracheal anesthesia, our patient inquired about other options. Albeit many anesthetic modalities exist, choosing an alternative was made difficult by her extensive and complex past medical history with long-time apixaban use due to multiple severe cardiac arrhythmias, history of multiple transient ischemic attacks, and potential surgical sites covering multiple anatomical planes and dermatomes.

Being that the patient was at high risk for both perioperative cardiogenic-thromboembolic events and cerebrovascular accidents, the decision was made not to hold her apixaban for the 72hrs currently recommended prior to neuraxial anesthesia. So, alternative methods were discussed, and the decision was made to proceed with a combination of 4 peripheral nerve blocks and a propofol-based total intravenous anesthetic.

The patient underwent standard induction and intubation and was subsequently maintained with an infusion of propofol. The regional anesthetics were then performed, and the procedure moved forward. Throughout her procedure she received no opiate after the initial 100 mcg of fentanyl given at induction, maintained low-normal blood pressure, and showed no physiological reactions to surgical stimulation. The procedure, anesthetic emergence, and PACU stay were uncomplicated. Immediately, post-operatively she showed no signs of delirium or POCD which maintained true over the next two days of inpatient care. We maintained long term postoperative follow up, in-person with the orthopedic surgeons and personally via telephone, and we are excited to report that the patient showed no signs or symptoms of POCD at 1, 3, 6, or 9 months. To our knowledge, the patient remains at her preoperative baseline without any complaints of post operative cognitive dysfunction.

## Discussion

In the United States, a significant portion of surgical procedures are performed on elderly patients whose preoperative comorbidities increase their susceptibility to perioperative complications [1]. Elderly patients have an increased sensitivity to both inhaled and intravenous anesthetics secondary to changes in both pharmacokinetics and pharmacodynamics, particularly in respect to the functionality of gamma-aminobutyric type A (GABA<sub>A</sub>), N-methyl-D-aspartate (NMDA), and opioid receptors [2]. When providing care to patients of advanced age, and those susceptible to POCD, it is important to consider what produces the greatest benefits with the lowest potential for harm. In this case, we chose to use anesthetics with larger molecular structures to decrease penetration of the blood brain barrier (BBB), thus decreasing the likelihood of POCD. It is presumed that by decreasing the amount of anesthetic which crosses the BBB, we will decrease the oligo-polymerization of B amyloid and other native proteins and peptides alike. This may subsequently result in fewer adverse effects and be an essential portion of preventing long-term postoperative cognitive decline, which may be in large part secondary to the use of anesthetics with smaller molecular makeup, such as volatile anesthetics. A recent meta-analysis reviewed seven studies and concluded that TIVA potentially reduces the risk of POCD compared to General Anesthesia with a significant odds ratio of 0.52 [3], supporting the positive outcomes seen in this patient. With an ever-aging population and increased incidence of surgical procedures in patients of advanced age, it is the opinion of these authors that consideration of alternative methods may be of paramount and life altering importance in the prevention of postoperative cognitive dysfunction in this at-risk patient population.

## References

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2. Akhtar, S., Pharmacological considerations in the elderly. *Curr Opin Anaesthesiol*, 2018. 31(1): p. 11-18.
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## Disclosures

No

## Tables / Images