Use of Neuropsychatric Tests and S-I00 B protein for Assessment of Postoperative Cognitive Function in Elderly Patients (Comparative study)

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Date received: September 5th, 2006
Date accepted: January 30th, 2007

Objectives: Postoperative cognitive impairment is not an uncommon problem in elderly patients. This study was designed to evaluate and compare the cognitive recovery profiles in elderly patients after general anesthesia with sevoflurane, isoflurane based anesthesia, or propfol IV infusion.

Patient and Methods: Sixty ASA physical status I-II patients over 60 years undergoing knee replacement procedures were included. They were randomly assigned to one of three general anesthetic groups (sevoflurane N_2O, isoflurane N_2O, or propofol IV infusion). Pre and post surgery psychomotor state assessment took using On Trigger Dot Test (TDT), Digit Symbol Substitution Test (DSST), and Minimental State Test (MMS). Visual analog scale (VAS) for pain assessment was used and side effects after anesthesia (e.g. nausea, vomiting... etc) were recorded. Level of S-100B protein marker was detected pre and post operatively at several intervals.

Results: No significant difference among groups in demographic data, and intraoperative hemodynamic changes. The early recovery (e.g. tracheal extubation, eye opening, response to commands and orientation were significantly faster in sevoflurane group compared with the isoflurane group ($p<0.0l$ or 0.001) and comparable to propofol group. Also both sevoflurane and propofol groups had shorter duration of stay in the post anesthesia care unit. At 30 and 60 minutes after recovery from anesthesia patients in the three groups showed significantly impaired cognitive function compared to base line levels ($p<0.0l$ or 0.001). Significantly more patients in sevoflurane group gave more correct response in TDT and DSST compared with isoflurane and propofol groups ($p<0.001$or 0.01) and the same significant difference was found in propofol group compared to isoflurane group. While at 90 minutes no significant difference was found between groups. There were no significant differences between all groups (except between sevoflurane and isoflurane at the first hour) when the MMS scores were compared preoperatively and postoperatively. MMS scores values were significantly decreased from baseline levels at 1h postoperatively in all groups. However, the MMS scores returned to almost preoperative baseline levels within 6h after surgery, there was no persistent cognitive dysfunction at the end of 24 hours postoperatively in all patients groups. The level S-100B protein is increased significantly in all groups postoperatively, in the first 30min, ($P<0.05$) and returned to near baseline level after 12 hours postoperatively.

Conclusion: Emergence and return of cognitive function was significantly faster after sevoflurane compared with isoflurane and propofol up to 60 min after recovery from anesthesia as assessed by TDT, DSST, MMS tests. S-100B protein may increase postoperatively but it doesn't appear to be a specific test for post operative cognitive dysfunction (POCD).

Keywords: Middle Aged, Methyl Ethers, Isoflurane, Propofol, Anesthesia Recovery Period.

Abbreviations:
DSST: Digit Symbol Substitution Test
MAP: mean arterial pressure
MMS: Minimental State Test
PACU: post anesthesia care unit
TDT: Trigger Dot Test
TIVA: total intravenous anesthesia
POCD: post operative cognitive dysfunction
VAS: visual analogue scale

INTRODUCTION

Cognitive impairment (e.g. delirium, confusion) is a significant problem in elderly patients during the early postoperative period (*Parikh and Chung, 1995*). The high occurrence of postoperative delirium in the elderly can result in increased morbidity, delayed functional recovery, and a prolonged hospital stay. For some patients who suffer transient prolonged (Weeks to months) cognitive impairment, complaints may cause only annoyance, for others they may constitute a serious crisis, especially if cognitive impairment is permanent and results in loss of job or loss of independence. Several studies have described early postoperative cognitive dysfunction, (*Dyer, et al. 1995; Williams Russo, et al. 1995; Campbell, et al. 1993*) whereas long term (Weeks to months) postoperative cognitive dysfunction is seldom found. However, a substantial