General Anesthesia and Postoperative Cognitive Dysfunction

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General anesthesia implies the induction of temporary suppression of cognitive functions, this effect is assumed to be fully reversible by the end of the procedure. An increasing body of evidence suggests that general anesthesia might interfere with cognitive functions at various time points in the post-anesthesia period even in patients without perioperative neurological damage [1]. Whether, the post operative cognitive dysfunction (POCD) is attributable to direct or indirect effects of the anesthetic drugs is an open question.

The POCD might last hours (early phase), days (intermediate), or months/years (late follow up) after anesthesia and surgery. The clinical presentation and related effects, as underlying causes, might differ according to the time-point presentation in the post operative course. Early POCD is generally due to residual pharmacological effects, might be enhanced by coexisting clinical conditions (obesity, intraoperative arterial hypotension or hyperventilation, postoperative anemia, etc) and can be associated with higher incidence of postoperative complications (reduced ventilation, reduced ventilator drive and acidosis, increased risk of aspiration pneumonia, etc) [2,3]. Intermediate POCD can be detected as an episode of postoperative delirium with space/time disorientation, inappropriate behavior/communication, hallucination or psychomotor retardation that lasts hours or days [4]. Occurrence of postoperative delirium is associated with increased perioperative morbidity and mortality [4]. Late POCD is a potentially devastating complication associated with lower quality of life and work performance [1].

The anesthetics –mostly hypnotics and opioids- used intraoperatively can affect the timing of early post anesthesia cognitive recovery (hours after awakening), risk for postoperative delirium (up to 3 days after anesthesia) and have the potential to trigger long lasting cognitive disturbance including Alzheimer’s and Parkinson’s disease [1-4].

These effects are in part related to pharmacodynamic properties of the anesthetic drug, in part can be explained with possible direct interactions with the central nervous system (CNS) (synthesis of intracellular mediators, activation of apoptotic process) and in part can be attributed to indirect effects of anesthetics on non-CNS mediated systemic actions, including hemodynamic, ventilator and metabolic effects (arterial hypotension, systemic hypoperfusion, reduced ventilation and systemic acidosis, impaired glucose metabolism, hepatic toxicity, etc).

In spite of these warnings and possible complications, general anesthesia is overall a safe procedure associated with low morbidity and mortality rates and whose safety improved overtime.

Several issues remain to be addressed in order to define the relationship between general anesthesia and postoperative cognitive dysfunction. We have designed a multicenter, randomized, controlled clinical trial (Pinocchio trial) dedicated to assess whether the timing of early cognitive recovery relates with the incidence of post operative delirium and to the risk of long term POCD. We also aim to evaluate if –minimized the perioperative risk factors to the possible largest extent, including avoidance of perioperative use of anesthetics and non anesthetics and physiologic variables that can possibly trigger postoperative delirium- the use of different intrasoperative anesthesiological strategies, namely intravenous (propofol) or inhalational (sevoflurane or desflurane), are possibly related to cognitive dysfunction in the early, intermediate or late phase after general anesthesia and surgery.

References

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Received April 19, 2012; Accepted April 20, 2012; Published April 23, 2012


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