Is the Patient You Anesthetized Yesterday Fully Recovered Today?

The majority of the readers of Anesthesia Progress provide ambulatory anesthesia and sedation in the office-based setting. Unlike a hospital or surgery center, we personally provide or supervise all perioperative care, including postanesthesia/sedation instructions. With our current intravenous agents, we are so used to rapid recovery and discharge that many of us routinely tell our patients that by the next day, they will be fully recovered. But, can we be so certain this is true?

Much attention has recently focused on the possible neurotoxicity of sedative and anesthetic agents in very young children. Issues of sometimes subtle behavioral or learning issues have been found in some studies but not others. Animal studies point to effects on neuroapoptosis and inhibition of synaptogenesis. Should the other side of the age spectrum also concern those of us providing ambulatory dental office-based anesthesia services?

Postoperative delirium (POD) and postoperative cognitive dysfunction (POCD) are recognized complications associated with older patients (≥60 years) undergoing general anesthesia (GA) and possibly sedation as well. POD is an acute organic brain syndrome exhibiting features that may include inattention, memory deficit, and disorientation that exhibit a fluctuating daily course. Because POD occurs 24–72 hours after surgery/anesthesia, this syndrome should be distinguished from “emergence delirium,” which is shorter lived and occurs during the transition from anesthesia to wakefulness. Approximately 10% of elderly surgical patients develop POD with much higher percentages occurring when more extensive surgery, such as hip fracture, cardiac, or emergency surgery, is undertaken. Patient factors such as advanced age, cognitive impairment, lower educational levels, and common preexisting medical conditions such as hypertension, diabetes mellitus, and hyperlipidemia may increase risk as well.

POCD, on the other hand, is a syndrome of more sustained impairment of cognitive function after surgery, with deficits in memory, information processing, and executive function that may last for weeks or months. Onset may be days or even weeks after surgery/anesthesia and may persist long-term. The manifestations may be subtle, such as mild memory loss, whereas some patients may experience concentration difficulty and inability to perform common tasks that were easily completed presurgically. Many of these symptoms may be ascribed to normal ageing and only close relatives/friends may notice that deterioration has occurred. This syndrome is certainly more common after major cardiac surgery but does not appear to be related to the use of cardiopulmonary bypass, hypoxemia, or hypotension. After noncardiac surgery on patients older than 60 years, the International Studies on POCD (ISPOCD) Group reported that 25.8% demonstrated dysfunction 1 week after surgery. This number fell to 9.9% 3 months later.1 A nonsurgical, nonanaesthetized, similarly aged, control group’s neurocognitive abilities deteriorated in only 3% of the group. The group has used what is considered the most rigorous experimental design to date, even questioning their own findings at the 3-month time frame.2

What is the etiology of POCD? Anesthetic and/or surgical stress responses may interrupt central cholinergic neurotransmission, which is a known factor in dementia. As we know, central acetylcholinesterase inhibitors are among the few drugs used to manage dementia. β-amyloid and tau proteins, as are elevated in Alzheimer’s disease, may be enhanced by anesthetic agents. Hypercortisolemia is known to impair cognitive function. Other stress markers such as interleukin-6 have also been studied. At this time, it is not clear that those with POCD have increased levels of stress markers versus those without POCD. Inflammation associated with surgery may activate microglia and astrocytes elaborating other inflammatory markers that may inhibit cognitive function. Genetic factors may play a role, but no specific marker has been found. Does depth of anesthesia play a role? Propofol infusion for surgery in patients with hip fracture repair under spinal anesthesia was studied. Bispectral Index to ≥80 in a light sedation group or BIS to approximately 50 in the deep sedation group found an approximate 50% decreased incidence of POD (not POCD) in the light sedation group as measured starting on the second postoperative day, suggesting that depth of anesthesia may be a factor under our control.3

Still, is the minor surgery we generally provide in dental offices similar to major surgery? And, possibly more importantly to anesthesia providers is the question of whether this POCD effect is due to anesthesia per se? A randomized comparison of 364 elderly patients undergoing major, predominantly orthopedic surgery, under either GA or regional anesthesia found no difference in the frequency of POCD between the groups.4,5 However, most patients in the regional group received a sedative infusion of propofol, so this conclusion may be questioned, particularly for dental...
anesthesia providers as this is similar in nature to the dental/oral surgery model of sedation/GA we provide. Another study by Canet et al,6 again from the ISPOCD group and using their same methodology, studied minor surgery patients who had planned 1 night hospital admission and those that were planned as outpatients. At 7 days, the incidence of POCD was 6.8% (4.3–10.1) and at 3 months it was 6.6% (4.1–10.0). This is a significantly decreased incidence compared to the previous study with more invasive surgery. Importantly, when the inpatient versus outpatient group was compared, the outpatients had an even lower level of POCD, similar to the control group in the initial noncardiac surgery study.

Although some of these results are reassuring to those of us who provide outpatient anesthesia and sedation for mainly minor surgery, the fine print deserves attention. The outpatient group had better preoperative scores on activities of daily living suggesting greater independence that may have affected the results. Duration of surgery in the minor surgery study was only about 30 minutes in both inpatients and outpatients. The ISPOCD group found that with major surgery over 2 hours, there was an increased incidence of POCD. These authors speculate that surgery and anesthesia over 1 hour may be an important cut off, possibly even for minor surgery. And, we are seeing more invasive and longer surgeries being provided in the office-based setting. For instance, many of our older patients are getting full mouth or half-mouth extractions and placement of implants for ‘‘all-on-four’’ immediate implant-supported restorations. These are very time-consuming procedures, and many surgeons request intubated GA, which may be an ideal way to provide this service to patients. Additionally, if inflammatory factors are 1 key to the development of POCD, it is possible that oral inflammation might impact POCD presentation.

Given these concerns, should we as anesthesia/sedation providers do anything differently for our elderly patients? We are aware that small doses of sedative/anesthetic agents can have a pronounced activity in our elderly patients. Midazolam has a potency ratio of 4 : 1 comparing effects on a 40-year-old to an 80-year-old patient. A dose of 5 mg in a 40-year-old is the same as a 1.25-mg dose in an 80-year-old. Fortunately, we do not generally use long-acting benzodiazepines (ie, loraze-pam) in dental sedation, which are known to contribute to POD. When utilizing propofol infusions, adjusting dosages to the lowest levels necessary to achieve sedation and surgical goals would seem advisable. Centrally acting anticholinergics (ie, atropine, scopolamine) as well as other drugs with these effects (eg, diphenhydramine) are known to contribute to POD and should be avoided, if possible, in the elderly. Meperidine and its major metabolite normeperidine are known contributors to POD in the elderly and are relatively contraindicated. Lastly, we may want to caution our elderly patients that they may need 1 or 2 days to fully recover from their sedation/anesthetic, particularly for longer procedures. And, they may want to evaluate whether they are ready to drive and/or perform other tasks that may require more concentration.

It may prove to be that issues of POD and POCD are not of great importance to our anesthetic practices. Only with additional research, however, can we know with more certainty that the elderly patient we anesthetized yesterday really has recovered today.

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REFERENCES