

Memory Loss, Alzheimer's Disease and General Anesthesia: A Preoperative Concern

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Abstract

Background: The long-term cognitive effects of general anesthesia are under intense scrutiny. Here we present 5 cases from 2 academic institutions to analyze some common features where the patient's or the patient family member has made a request to address their concern on memory loss, Alzheimer's disease and general anesthesia before surgery.

Methods: Records of anesthesia consultation separate from standard preoperative evaluation were retrieved to identify consultations related to memory loss and Alzheimer's disease from the patient and/or patient family members. The identified cases were extensively reviewed for features in common. We used Google® (<http://www.google.com/>) to identify available online information using "anesthesia memory loss" as a search phrase.

Results: Five cases were collected as a specific preoperative consultation related to memory loss, Alzheimer's disease and general anesthesia from two institutions. All of the individuals either had perceived memory impairment after a prior surgical procedure with general anesthesia or had a family member with Alzheimer's disease. They all accessed public media sources to find articles related to anesthesia and memory loss. On May 2nd, 2011, searching "anesthesia memory loss" in Google yielded 764,000 hits. Only 3 of the 50 Google top hits were from peer-reviewed journals. Some of the lay media postings made a causal association between general anesthesia and memory loss and/or Alzheimer's disease without conclusive scientific literature support.

Conclusion: The potential link between memory loss and Alzheimer's disease with general anesthesia is an important preoperative concern from patients and their family members. This concern arises from individuals who have had history of cognitive impairment or have had a family member with Alzheimer disease and have tried to obtain information from public media. Proper preoperative consultation with the awareness of the lay literature can be useful in reducing patient and patient family member's preoperative anxiety related to this concern.

Background

Post-operative cognitive dysfunction (POCD) defined as either a transient and/or durable loss in cognition after surgery is currently being investigated in both animal models and humans. While conflicting results exist in various animal models [1-3], literature reviews found little clinical evidence demonstrating the association between surgery or anesthesia to long term cognitive dysfunction and incident dementia [4-6]. Vigorous prospective clinical studies are warranted for a conclusive answer [4-6]. While there is no clear answer yet, the concern of potential link between memory loss and Alzheimer's disease with general anesthesia has filtered from the scientific literature into the lay press, including the internet, and thus to the attention of surgical patients. Therefore, it is expected that anesthesiologists will encounter such requests for preoperative evaluation and consultation related to such concern. Here we present 5 cases from 2 academic institutions to analyze common features where a patient or patient family members have made a request to address their concern on memory loss, Alzheimer's disease and general anesthesia before surgery. The authors have no intention in this presentation to debate whether anesthetics cause cognitive dysfunction or whether a particular anesthetic plan would be most beneficial for any specific patient who has concern on memory loss, Alzheimer's disease and general anesthesia.

Methods

Application for Institutional Review Board approval from the University of Pennsylvania and Emory University was obtained. Review of the log of requests for anesthesia consultation was performed to identify

consultation specifically arranged for Memory loss, Alzheimer's disease and general anesthesia from February 1, 2010 to May 30th, 2011. Retrospective chart review and follow up discussion with patients was performed for the identified cases for common features.

"Anesthesia memory loss" as keyword was entered into Google® search engine (<http://www.google.com/>) to identify information currently in the public domain. Top 50 hits of the search results were reviewed carefully to identify how many of these articles were from peer-reviewed journals.

Results

Case presentation

5 cases were collected as a specific preoperative consultation re-

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lated to memory loss, Alzheimer's disease and general anesthesia from 2 institutions.

Case 1: A middle aged woman with pre-existing cognitive dysfunction presented for a pre-operative anesthesia consultation before planned bilateral mastectomies with free-flap reconstruction for her new diagnosis of breast cancer. She came to the pre-admission testing center accompanied by a family member, who was also her caretaker. Discussion about the anesthesia plan with her family member raised concerns about the use of isoflurane possibly further affecting the patient's memory and cognition. Her family member did not want her to receive isoflurane because one of her immediate family members has Alzheimer's disease and had significant neurologic decline after a recent surgery under anesthesia with isoflurane. This decline prompted the patient's family member to read more about Alzheimer's disease, including a book that she brought with her to the consultation called, *100 Simple Things You Can Do To Prevent Alzheimer's And Age-Related Memory Loss* [7]. Her family member pointed to a line in the chapter, "Ask questions about Anesthesia" where it says, "We don't have enough data yet to ban isoflurane, but I'm convinced enough that I won't let my mother have it" [7].

Case 2: A middle aged woman requested an anesthesiology consultation prior to a scheduled thyroidectomy for multinodular thyroid goiter. She had no prior surgical history and no prior exposure to general anesthesia. During a telephone consultation, the patient expressed concern about undergoing general anesthesia. She stated that an elderly family member had experienced significant neurological deficits that have persisted several months after undergoing general anesthesia and abdominal surgery. She wanted to know the risks of permanent neurological injury related to anesthesia and the specific drugs that she would be exposed to.

During a subsequent conversation, it was explained to the patient that direct correlation between general anesthesia and permanent neurological symptoms have not been proven in human populations. Furthermore, several options of general anesthetics were presented to the patient including the use of TIVA in an effort to avoid inhalational agents all together. The patient seemed fully satisfied with this discussion and planned to proceed with her scheduled surgery.

Case 3: A middle aged man requested to speak with an anesthesiologist regarding concerns about anesthetic management prior to his scheduled inguinal hernia repair since he had recently read a few published scientific studies suggesting that exposure to general anesthetics may increase the risk of the development of Alzheimer's disease. Currently he has 2 family members with Alzheimer's disease and he was worried that he himself may be exhibiting some early signs. He had several surgeries in the past without significant complications.

During a telephone conversation, it was explained to the patient that evidence supporting the link between cognitive decline and exposure to anesthesia has only been demonstrated in animal studies and is limited to isoflurane. Alternative anesthetic techniques, such as total intravenous anesthesia (TIVA) and spinal anesthesia, while avoiding volatile anesthetic agents all together, were presented to the patient and were well received.

Case 4: A man in his early 60s presented for recurrent nasal surgery. In a preoperative consultation encounter, the patient queried his anesthesiologist "Is it possible that anesthesia makes you stupid?" During this conversation, the patient revealed that he had experienced a feeling of "cloudiness" for several weeks in the postoperative period after his 2 previous outpatient surgeries over the past 24 months. Prior

to these surgeries, he had worked as a mechanical engineer and now reported a persistent difficulty visualizing how pieces of machinery fit together while reading his trade journals. The patient said that he became concerned about the long-term effects of anesthesia after he performed online internet searches using the following search terms: "side-effects anesthesia" and "memory loss anesthesia." He encountered several online web logs (blogs) where people discussed similar concerns.

Case 5: A man in his late 70s requested an anesthesia consultation before a repeat umbilical hernia repair. He requested the consult because he refused to have general anesthesia due to previous post-operative memory loss after this same type of surgery a few years ago. Both he and his family noticed a significant decline in his cognition after that surgery, which the patient attributed to general anesthesia. A psychiatric evaluation indicated that he did not score as well on standardized assessments as compared to other people of his age with his level of education, though a specific cause was not determined.

At his pre-operative consultation he was adamant about not having general anesthesia, even at the expense of not having the surgery. The anesthesia team had a lengthy discussion with the patient about his anesthetic options if avoiding inhalational agents, including regional anesthesia (epidural, spinal, regional block, high dose local injection by the surgical team) with and without sedation (i.e. monitored anesthesia care or "MAC") and TIVA. The patient rejected TIVA. The patient stated that he wanted to remember the entire surgery and requested that no medication that could affect his memory be administered. The patient reiterated that he would rather not have surgery than have general anesthesia ever again. Upon discussion of the induction of general anesthesia in a life-threatening emergency, he acknowledged that he had discussed the possibility of his hernia becoming a surgical emergency with this general surgeon and understood that in that instance he may have no other option than general anesthesia. The patient subsequently postponed his surgery.

Summary of Cases

The common feature for these five cases is that all of the individuals either had memory/cognitive impairment after a prior surgical procedure with general anesthesia or had a family member with Alzheimer's disease. The consultation requests in the first three cases were either from the patient or family member who has a family history of Alzheimer's disease or postoperative memory loss and neurological deterioration. The fourth and fifth patients believed that they suffered cognitive impairment or memory loss after a previous general anesthesia. They all had accessed public media sources, including books and the internet to find information related to anesthesia and memory loss. While 4 out of the 5 patients had their concerns successfully addressed by a pre-anesthesia consultation, one was unsatisfied and postponed the procedure while seeking further information.

Internet data mining

A posting in a website from a "heartbroken daughter" also publicizes these personal beliefs. She wrote: "I'm not a Health Care Professional. My father was just diagnosed with a progressive form of Alzheimer's disease. A year ago, he underwent an operation. He went downhill fast, emotionally. 6 months later he was getting lost in the house. He underwent YET ANOTHER oral surgery to have 4 titanium implants into his lower jaw. He again, in less than a year, went under anesthesia. His condition worsened at an alarming rate! He started having delusions, confusion, conversations that one word didn't go with the next! I KNOW FOR A FACT that anesthesia does exacerbate Al-

zheimer's disease if it's there. But it also ACCELERATES it! WHY ARE WE NOT BEING TOLD? The Dr. mentioned that 85% of his patients are there because of anesthesia! My dad may have had AD before, but it would have progressed more slowly! Families need to be warned and studies need to be done." (<http://alzheimers.infopop.cc/eve/forums/a/tpc/f/960108781/m/1141033071>; Accessed July 3, 2011)

On May 2nd, 2011, we searched "anesthesia memory loss" in Google[®] which yielded 764,000 hits. Only 3 of the 50 Google[®] top hits are from peer-reviewed journals, suggesting that the public is getting its information from less reliable, often sensationalistic, and sources. Many articles available in the lay press link anesthesia with memory loss and Alzheimer's disease. One of the examples is an article of "Memory Loss Due to Anesthesia" posted in http://www.ehow.com/about_5503591_memory-loss-due-anesthesia.html (Accessed Dec 24th, 2011).

Discussion

The common feature of these cases is the pre-anesthesia concern for cognitive dysfunction after anesthesia. In all cases, the individuals had done extensive reading from public media sources. While the concerns of the first 4 patients were addressed to their satisfaction, the 5th patient postponed his surgery. These cases clearly indicate the preoperative concerns surrounding the issue of memory loss after anesthesia and surgery and the potential influence of public media on this concern.

Anxiety related to memory loss, and the associated loss of independence, is common to people of all ages. Alzheimer's disease is associated with aging, and its major feature is cognitive loss which affects the quality of daily life. Although most of the anesthetics used in perioperative period are short acting, they have been suspected to have long-term cognitive effects for over a half-century [8-11]. Despite ongoing animal and clinical studies, no definitive conclusions can be made from the current scientific literature [12]. The consensus based evidence from experts studying this issue indicates that there is no conclusive link between anesthetics and POCD [12]. It is clear from the current case analyses that a mismatch exists between current evidence and public perception.

With the development of modern mass media, scientific manuscripts are readily accessible to scientists and non-scientists alike. Popular internet search engines rely heavily on the choice of specific key words, which may yield millions search results for the key words of "memory loss anesthesia" as used by one of the patients. It is difficult to identify which information is reliable from such an overwhelming search results and which could confuse the information inquirer if conflict results exist.

What might be most troubling is the possibility that faulty or incomplete information might be disseminated by health professionals, as alluded to in the referenced website posting. If we are to assume that the first-hand account is an accurate description of the conversation between family member and physician ("85% of his patients are there because of anesthesia"), this reinforces the notion for patients that a causal association between anesthesia and Alzheimer's disease exists. Similarly, the excerpt of "I'm convinced enough that I won't let my mother have it" from the book of "100 Simple Things You Can Do To Prevent Alzheimer's And Age-Related Memory Loss" by a scientist might have influenced many readers as evidenced by the claim in case 1.

Other specialties have proposed that strategies for changing the public's perception are required because of the mismatch between cur-

rent evidence and the public's beliefs [13]. However, this is difficult when available evidence is insufficient to arrive at a definitive conclusion. It is unclear whether public beliefs lag behind the scientific evidence or vice versa in the case of anesthetic and memory loss. Well-designed clinical investigation is warranted.

The question of "why are we not being told?" surrounds the issue of trust between patients and anesthesiologists. This was recognized in the new version of consensus statement [6]. It is our obligation that we should inform patients such potentials. The concerns from patients should and can be addressed preoperatively.

In summary, the potential link between memory loss and Alzheimer's disease with general anesthesia is an important preoperative concern from patients and their family members. This concern more likely arises from individuals who have had history of cognitive impairment or have had a family member with Alzheimer disease and have tried to obtain information from public media. Proper preoperative consultation can be applied to reduce patient and patient family member's anxiety relate to this concern.

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Brief Summary Statement

The potential link between memory loss and Alzheimer's disease with general anesthesia is an important preoperative concern from patients and their family members. This concern arises from individuals who have had history of cognitive impairment or have had a family member with Alzheimer disease and have tried to obtain information from public media in this case study.

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