



## Editorial

# Alzheimer's disease after a major surgery: are we prepared?

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## Enfermedad de Alzheimer tras una cirugía mayor: ¿estamos preparados?

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Alzheimer's disease (AD) is a neurodegenerative disease that leads to gradual memory loss and behavioural changes and it is time for the surgeons to understand the pathophysiology and management of AD. It is characterized by the pathological hallmark of abnormal deposit of extracellular amyloid beta (A $\beta$ ), as amyloid senile plaques and tau proteins, or intracellularly as neurofibrillary tangles, in the brain, affecting neuronal functioning and

connectivity, resulting in a progressive loss of brain function. It has been reported recently that major surgery may trigger certain patterns of cognitive alterations, depending on the previous presence or absence of Alzheimer's pathological changes, thereby acting as a promoter or accelerator of AD [1]. The preoperative stress and anxiety of undergoing surgery in a foreign environment, along with disrupted sleep, painful medical procedures,

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infections and new medications including the anaesthetics used for general anaesthesia may contribute to the onset of 'hospital delirium'. There is now a consideration to include preoperative evaluation of cognitive tests and the analysis of Alzheimer's biomarkers to screen the population at risk of developing the disease later on. The recent perception that general anaesthesia may have unknown neurotoxic effects which might trigger the development of neurodegenerative disorders like AD is not new but not having enough evidence [2]. Recent advances in the field of biomarker data and prospective human trials will hopefully provide enough information to make an informed decision in future mandatory about the risk of development of AD after a major surgery. However, the incidence of post-operative impairment of memory, cognitive and other mental functions have been reported among 40%-60% of cardiac surgery patients at discharge. 20%-40% of such patients still experiencing symptoms three months after surgery and 10% of those patients developing sustained mental deficits lasting a year or longer, the pathophysiology of postoperative development of AD remains elusive [3]. Older adults and those with pre-existing cognitive impairments are believed to be more susceptible to this consequence of surgery. It has been reported that cardiac-surgery patients' p-tau181 blood levels jumped more than 5-fold in every case during surgery, exceeding levels predictive of progression to Alzheimer's. In a cohort study, on elderly individuals with subjective cognitive decline, to examine the association between preclinical AD and undergoing anaesthesia and surgery, it was concluded that surgery is associated with an increased risk of subtle cognitive decline after surgery, in the cognitively healthy elderly at risk for AD [4].

Although these levels declined in the first two days after surgery, they remained higher than normal. Similarly, in hip-surgery patients, the increase, although present, was milder: a 2.5-fold rise in p-tau181. The levels, which were slightly above those predictive of Alzheimer's disease, remained high one and two days after surgery before returning to the normal range [1].

As most of the trial was small and of short duration and the blood levels of these substances were measured for just three days post-surgery and none of the patients went on to develop a full blown AD, so enough evidence is still lacking about the risk of AD following a surgery. A long-term study is required in the preoperative evaluation with cognitive tests and Alzheimer's biomarkers in surgical patients.

Until there are strong evidence available about the risk of development of AD after a major surgery, every elective surgery patient should take adequate precautions and preventive steps. These variables include stopping smoking, decrease in alcohol intake, eating a healthy and balanced diet, including at least 5 portions of fruit and vegetables every day and exercising for at least 150 minutes every week (such as cycling or fast walking), along with strict control of blood sugar, serum cholesterol and the blood pressure before being planned for the surgery.

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## 1. CONFLICT OF INTERESTS

The authors have no conflict of interest to declare. The authors declared that this study has received no financial support.

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