

# Anaesthesia for older people and people with dementia

For a long time, there have been anecdotal reports from family members that their older relative “has never been the same since the operation.” This sheet describes the different types of problems that may occur.

## Can exposure to a general anaesthetic cause dementia?

Some older people do experience cognitive problems or changes in behaviour after surgery and anaesthesia, but for the majority these will be temporary problems.

Over 50 years ago, it was suggested that up to 7% of older patients who underwent surgery experienced ‘dementia’, while minor changes in thinking were common. However, the evidence for this was anecdotal. More recently, more rigorous research has investigated the incidence and long term outcomes of post-operative changes in thinking or cognitive function, as well as potential causes. Changes in thinking after surgery can present as confusion, delirium or as deterioration in aspects of cognitive function (compared to cognitive function before surgery) that is termed post-operative cognitive dysfunction. There is now an appreciation that the changes in cognition and thinking after surgery and anaesthesia share many of the attributes of cognitive decline in the general community. With this in mind, recent work has been undertaken to align cognitive changes after surgery with cognitive change in the community which use the terminology of mild cognitive impairment (MCI) and dementia. The alignment of terminology will allow researchers and doctors to better understand the relationship of postoperative cognitive dysfunction with cognitive decline in the general community.

Delirium and postoperative cognitive dysfunction have different time courses. Delirium after surgery is a transient and fluctuating disturbance of cognition that occurs mainly in the days immediately after surgery, while patients are still in hospital. Post-operative cognitive dysfunction (POCD) can occur in the weeks to months after surgery and there is evidence that it may be present in some cases longer than five years.

## What is post-operative cognitive dysfunction (POCD)?

POCD is the term used to describe a decline in cognitive performance from pre- to post-surgery. This deterioration is evident from changes in the ability of the individual to perform brief standardised tests of cognitive function (for example, tests of memory, attention, concentration or fine movements). In general, the changes in performance that give rise to a classification of POCD are subtle, and may pass unnoticed to others or may appear as just minor changes in a persons ability to function in daily life. In a small proportion of people deterioration in thinking can be more substantial and interfere with daily life.

POCD has rarely been documented in people under 40, and is most common in patients aged 65y or more. There is some evidence of cognitive changes similar to POCD in middle-aged patients but these are more subtle. For older people, research suggests that 1 to 2 weeks after surgery, around 50% of cardiac surgery patients, around 20% of other major surgery patients and around 7% of minor surgery patients will show POCD. Patients who are older, are sicker, require more extensive surgery or have post-operative complications are more likely to have POCD at this early stage.

Three months after surgery, around 10% of patients will have POCD, regardless of the type of surgery. Hence there is a reduction in the incidence of POCD across the weeks after major surgery, indicating most patients improve and return to normal.

Between 1 and 2 years post-surgery, POCD persists in around 3% of non-cardiac surgery patients and 9% cardiac surgery patients. It should be noted that around 10% of older people who did not have surgery have some cognitive decline, so the cognitive decline observed in these patients is possibly due to normal

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This help sheet is funded by the Australian Government

ageing changes rather than the effects of earlier surgery or anaesthesia. This is especially likely since we know that patients with subtle cognitive impairment before their operation are at significantly higher risk of cognitive decline after their surgery.

In the case of cardiac surgery, some research has followed patients for 5 years and found evidence of POCD in 30 to 50% of patients at this time and 30% at 7.5 years. This intriguingly suggests that although there is improvement in cognition in the first few years after surgery, cognitive decline may reappear several years down the track. However, the effects of heart disease, coronary bypass during surgery, and being 7 years older may contribute to this cognitive decline, rather than it being a direct consequence of the anaesthesia and surgery.

Taken together these studies suggest that while POCD is common in older surgical patients, it only affects a minority. Furthermore, for most of those who do develop POCD, they will experience subtle cognitive problems of varying severity that are likely to last a few weeks to a few months at the most. There is evidence that for some cardiac surgery patients, longer term cognitive problems can arise, but it is unknown if this is due to the surgery.

### **What is delirium?**

Delirium is an acute and generally reversible disturbance of attention and cognition. Symptoms develop quickly and fluctuate across the day. They may include confusion, restlessness, anxiety, irritability, social withdrawal, lack of attention and concentration (being easily distracted) and sleep disturbances. Medications, infection and metabolic disturbance are the most common causes in older people. However, Delirium frequently follows surgery. Several factors increase the risk of developing delirium, including multiple medications, longer and more-complex surgery, dehydration or malnutrition, physical or mental illness, loss of orientation to time and place, sensory impairment (poor vision or hearing without corrective aids), pain, increased age and pre-existing cognitive impairment or dementia. Many of these factors can be avoided with vigilance and families can assist in this process (for example ensure that the patient has hearing aids or glasses, assist with feeding and hydration, maintain orientation).

Post-operative delirium is reasonably common in older patients. Research shows that it affects around 10 to 15% of minor surgery patients, around 30 to 50% of major surgery patients, and up to 60% of cardiac surgery patients. However, it is also thought that post-operative delirium in older patients often goes undiagnosed. It is important that factors contributing to delirium are recognised and treated, since delirium is associated with longer hospital stays and delayed recovery.

Post-operative delirium is usually seen on the first or second day after surgery and symptoms are often worse at night. The majority of older patients will recover within a few days, but in a small number of patients delirium can persist for weeks or even months. Importantly, persisting delirium is not the same as dementia.

### **What is dementia?**

Dementia is a chronic, progressive decline in brain function. A prominent feature is memory impairment, but dementia also involves deterioration of other cognitive, behavioural and emotional functions. It may be the result of a number of medical conditions, the most common of which is Alzheimer's disease (AD). The symptoms of dementia gradually worsen over a long time, rather than coming on suddenly after an event such as surgery. This contrasts with the acute onset of delirium.

### **For healthy older people, can anaesthesia cause dementia?**

One of the features of AD is 'plaques' (clumps of proteins) that form in the brain. Recent studies have found that some anaesthetic drugs increase the rate at which plaques form in brain cells in animal experiments. However, these laboratory findings may not have any bearing on what happens in a living person undergoing surgery and anaesthesia. Some of the inhaled anaesthetics investigated in these animal experiments are no longer used in Australian hospitals, further weakening the argument for an Alzheimer's type process causing cognitive decline after anaesthesia and surgery.

These studies do not provide enough evidence to suggest that surgery and anaesthesia can cause AD or other dementias. In fact, several studies looking at risk factors for dementia have shown that previous exposure to general anaesthesia is not associated with an increased risk of developing dementia.

Instead, people in the very early stages of dementia, as yet undiagnosed and possibly unnoticed, may be more vulnerable to developing post-operative delirium or POCD because of the changes already going on in their brain. They may go on to be diagnosed with dementia at a later stage. It may be that in some cases the trauma of undergoing surgery can expose pre-existing cognitive deterioration.

For older people who experience post-operative delirium, studies have shown that they have an increased risk of developing dementia in the following years. However, while the risk may be slightly increased, most people who experience post-operative delirium do not go on to develop dementia.

### **For people with dementia, can anaesthesia make it worse?**

People with dementia are at increased risk of developing delirium, for any reason, not just following surgery. It must be remembered though, that delirium is not a worsening of dementia, it is a separate illness that is transient. It can be longer lasting in people with dementia and the identification and therefore treatment of the cause can be more difficult.

Anaesthetic management is improved if the surgical team is aware that the patient has dementia, so they must be informed. An important factor in post-operative care for patients with dementia is treatment of pain. Although patients with dementia report less pain and are administered fewer painkillers, research shows that the perception and processing of pain are not diminished in people with dementia. It may be that they are less able to effectively communicate their level of pain. As pain is known to increase the risk of delirium, it is important that it is adequately treated.

### **What causes post-operative cognitive problems?**

Many possible causes of POCD or delirium following surgery have been suggested. These include direct effects of anaesthetic drugs on brain function or chemistry, physical effects of anaesthesia leading to altered blood flow and oxygen delivery to the brain, effects from the heart-lung machine during cardiac surgery, genetic factors, inflammation as a result of the surgery, and the stress of undergoing surgery and being hospitalised. At present the precise causes of POCD and post-operative delirium are unknown, and it is likely that there are multiple causes.

It is known that older people and people with dementia are more susceptible to cognitive problems following surgery. As we age, the structure and chemistry of our brain changes. These changes may mean that the older brain has less reserve to cope with the effects of anaesthesia and surgery and is more vulnerable to developing POCD. In AD and other dementias, these brain changes are much greater and progress more rapidly. People with dementia therefore have even less cognitive reserve, which may make them further susceptible to POCD or delirium.

Additional factors may predispose an older person to post-operative delirium or cognitive impairment. These include alcohol or drug withdrawal, interactions between anaesthetic drugs and other drugs the patient is taking, physical illness, depression and anxiety, and increased age. It is very important that the surgeon and anaesthetist are made aware of the patient's medical history and any current medications.

### **Does the type of anaesthetic make a difference?**

Some research has compared patients having a general anaesthetic with patients having a regional (local anaesthetic) for the same operation. These studies have shown that the number of patients who develop POCD is similar for both types of anaesthetic, but that delirium may be less common after a regional anaesthetic. So a regional anaesthetic may decrease the risk of some post-operative problems. Other studies have looked at different methods of general anaesthesia, using inhaled versus intravenous anaesthetic drugs for example, and have shown no difference in the incidence of POCD.

### **What can you do to minimise POCD or delirium?**

#### **Before surgery**

In order to help anaesthetists choose the most appropriate way to treat an individual patient, it is vital that they have accurate and full information. For an older person or person with dementia who may not be able to communicate their medical history, a family member or carer should be involved in the pre-operative assessment. The anaesthetist should be told about any medical problems the patient has now or had in the past, how any previous anaesthetics have affected them, and all medications the patient is currently taking, including those used to treat dementia such as acetylcholinesterase inhibitors.

As far as possible, the patient should be psychologically prepared for the operation. Ask their doctor to talk to them if appropriate, and try to minimise their anxiety.

### After surgery

Report any changes in behaviour, concentration, memory, other cognitive functions, or confusion to medical staff so that they can determine whether any action needs to be taken. Sometimes delirium can be a sign of infection or pain and these need to be treated.

Although it can be difficult in a hospital setting, try to ensure that the environment for the patient during their recovery is as comfortable and familiar as possible. This can help reduce confusion and anxiety.

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