

Anaesthesia for the patient with dementia undergoing outpatient surgery

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Purpose of review

Dementia is common in elderly patients, and anaesthesiologists are increasingly challenged in managing these patients who are especially vulnerable. The aim of this article is to highlight some of the most important perioperative issues relating to demented patients, both regarding anaesthesia and other aspects that should be considered to ensure a quick and uncomplicated recovery.

Recent findings

Demented patients often receive prescribed medication that can interact with various anaesthetic drugs and cause serious side effects. The anaesthesiologist should consider this when choosing the drugs used during surgery and when relieving postoperative pain. Generally, hypnotics, opioids, and inhalational anaesthetics should be administered in lower doses and carefully titrated because of altered pharmacokinetics and pharmacodynamics leading to a great variability, as documented in elderly patients. Neuromuscular blocking agents, and especially rocuronium, display an increased variability in the duration of action, but the new drug sugammadex may reverse the neuromuscular block in a few minutes. Postoperative cognitive decline is more frequent in elderly patients with preexisting cognitive impairment and several preventive measurements can be provided.

Summary

Outpatient surgery for demented patients causes many concerns in relation to anaesthesia. Extensive drug-related problems may arise and restrictive drug usage is recommended to avoid serious complications.

Keywords

anaesthetics, dementia, pain relief, postoperative cognitive dysfunction

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Introduction

Because of the population ageing, an increasing number of elderly patients are attending healthcare services, and this quantity is likely to grow in the future [1]. A risk of dementia comes with increasing age, although it also appears in patients below 65 years of age [2]. Dementia is an independent risk factor for experiencing postoperative complications [3]. Anaesthesia for demented patients provides various challenges in the perioperative setting, and this study will highlight some of the important issues.

Definition of dementia

Several classification methods can be used in diagnosing mental disorders, but it is common to adhere to the criteria addressed in the International Classification of Disease-10 manual (WHO) or in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders

[4]. Dementia is defined as a disturbance of multiple higher cortical functions, including memory, thinking, learning capacity, and judgement. Often, it has occupational and social consequences.

Dementia is one of the most common cerebral disorders and is highly associated with advancing age. The prevalence of dementia is age-specific and doubles with every 5 years of increase in age, and the global prevalence is estimated to be around 4% in people above 60 years of age [5]. Dementia can be classified in different subtypes such as Alzheimer's dementia (50% of all dementia cases), vascular dementia, and Parkinson's dementia. [4,5]. Furthermore, a relatively new group of patients with HIV-associated dementia is increasing [6].

Dementia may be associated with a variety of neuropathological changes such as cerebral atrophy and plaques [7]. Cognitive impairment is not always apparent to those around the patient, and certainly not to the

patient himself [8]. Dementia affects multiple cognitive domains and is eventually manifested in loss of memory, language, and ability to recognize, and identify family members and simple objects. The patient might seem normal at first impression, but the cognitive disability usually becomes obvious when the physician asks for certain details at the preoperative evaluation. It is important to distinguish dementia from other mental disorders, including mild cognitive impairment, depression, and delirium. Information about cognitive status should be obtained not only from the patient but also from an informant close to the patient [8].

Preoperative evaluation

Preoperative evaluation for the demented patient undergoing outpatient surgery should include considerations on the following issues to ensure the best possible outcome postoperatively.

Informed consent

In the preoperative consultation, the physician should obtain informed consent. First of all, it should be determined whether or not the patient is able to understand, retain, and process the information that is presented before giving consent, and, furthermore, the healthcare personnel should ensure that any sensory deficit the patient might have is corrected, if possible, with sensory aids such as spectacles or hearing aids [9^{*}]. In case of significant dementia, a family member or another representative should be sought regarding decisions on treatment.

Severity of dementia

The severity of cognitive impairment can be assessed by using the Minimal Mental State Examination (MMSE) [10]. The maximum test score is 30, and a score at or just below 23 points indicates incipient light dementia. Severe dementia corresponds to a MMSE score below 10, but the test has some limitations because the patient must be able to comprehend and perform the tasks in the MMSE and the test is not independent of education or culture.

Depression

Depression is another issue that can influence the preoperative assessment of the patient. Demented patients are predisposed to depression and studies show that 30–50% of patients diagnosed with Alzheimer's disease have symptoms of depression [11]. The two conditions share some of the same features and clinicians need to be aware of the potential confusion between the different syndromes, and carefully establish whether the patient shows signs of real depression, as it might call for alternative preoperative considerations [12].

Concurrent disease and drug interactions

Many older people take several prescribed medications and also herbal remedies that can trigger unintended and dangerous interactions when used together with anaesthesia. This is especially a problem with older demented patients as they frequently are not aware of what they are taking and why. For that reason, patients should always be encouraged to either show a list of all medications or bring the drugs to the preoperative consultation. Contrary to the acute setting, outpatient surgery provides the possibility for the clinician to decide whether any prescribed medication should best be avoided preoperatively, thereby reducing the drug-related problems. This is particularly important in patients with Parkinson's dementia as some anaesthetic drugs can interact with anti-Parkinson drugs, for example opioid-induced muscle rigidity [13].

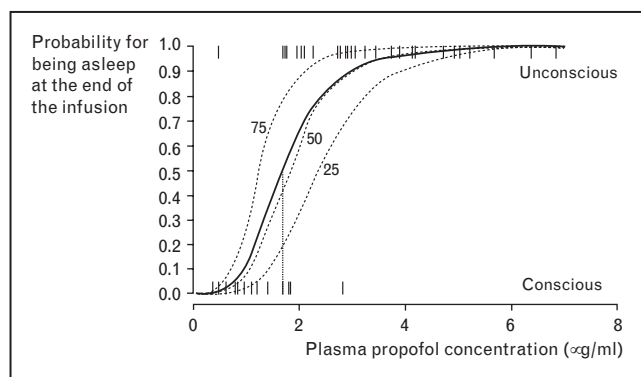
Premedication

Dementia does not indicate a routine use of premedication. However, as irritability, anxiety, and agitation are common symptoms in demented patients [14], it is sometimes necessary to use anxiolytics as these behavioural expressions are best avoided in the operative setting. If this manifestation of dementia is expected, a short-acting benzodiazepine can be administered as premedication. On the contrary, a conservative approach is again preferable due to the side effects of drugs and the potential interactions as previously mentioned. Neuroleptics are best avoided [15], and the administration of preoperative analgesics to demented patients should be similar to other frail elderly, but it should be noted that on rare occasions severe side effects can occur [16].

Choice of anaesthetics

Very few recent studies have been conducted concerning demented patients and the evidence is mainly based on investigations, including elderly surgical patients. As a general recommendation, general anaesthetics should be titrated and given in smaller doses in the elderly because of prolongation of onset as well as recovery. This is based on the pharmacodynamic aspect that the elderly, and especially the demented, have an increased sensitivity, and also on changes in pharmacokinetics with a slower distribution and a reduction in clearance. As a result, the elderly may experience a prolonged recovery, and anaesthetic-induced circulatory depression is more common [17]. The prolonged onset time may lead to overdosing induction agents. Depth of anaesthesia monitoring based on electroencephalography may aid in the administration of hypnotics. Such monitoring has been shown to reduce recovery time and drug consumption but the benefit in elderly and demented patients has not been clearly demonstrated yet. However, it should be noted that the baseline bispectral index value of demented patients is

Figure 1 Age-related association between plasma propofol concentration and probability of being asleep, dotted lines showing patients 25, 50, and 75 years of age



Data from Schnider *et al.* [21*].

lower than in nondemented elderly patients [18]. Hence, it seems likely that the pattern of depth of anaesthesia changes during surgery in the demented patients might be different.

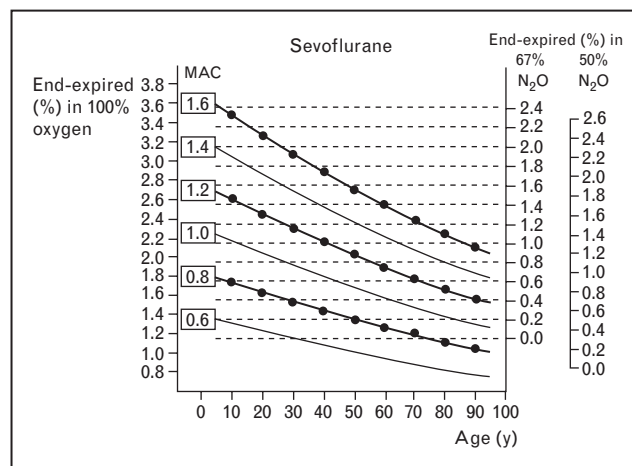
Hypnotics

Increasing age is associated with a substantial decrease in the anaesthetic requirements for induction agents such as thiopental and propofol. In most studies, the adequate dose is 30–50% lower than in young adults. One of the most important factors seems to be that the distribution and the elimination from the central compartment are slower and this probably explains why the thiopental dose should be reduced in the elderly [19,20]. For propofol, a similar reduction in dosage is recommended, and a much lower plasma concentration is needed to achieve the same effect in the elderly ([21*], Fig. 1).

Opioids

Opioid potency is increased in the elderly but these drugs cause less circulatory depression. The initial dose should probably be nearly the same as in younger adult patients, but subsequent doses should be lower or at least be separated by longer intervals because of reduced clearance. Otherwise, higher plasma concentrations may appear and side effects such as sedation may occur post-operatively [22*]. Remifentanyl should be administered at a much lower infusion rate in elderly patients because of a reduction not only in volume of distribution but also in clearance [23,24]. In addition, the sensitivity is much greater, meaning that the same effect can be obtained at a plasma concentration that is 50% lower. The infusion rate in patients above 60–70 years should probably be no more than 30–40% of younger patients as a result of increased drug potency and the decreased elimination rate with advanced age. Bolus doses of remifentanyl are generally not recommended in elderly patients for the

Figure 2 Increasing age leads to a reduction in the necessary dosage of sevoflurane as illustrated by a decreasing minimal alveolar concentration



Data from Nickalls and Mapleson [25].

same reasons. Other opioids should also be carefully titrated due to a pronounced variability in sensitivity.

Inhalational anaesthetics

The potency of inhalational anaesthetics is traditionally expressed as the minimum alveolar concentration (MAC), of which one MAC is defined as the concentration that prevents movement in 50% of patients after a painful stimulus such as surgical incision. Increasing age is associated with a reduction in MAC, with a 30% reduction from 20 to 80 years of age for sevoflurane, isoflurane, and desflurane ([25], Fig. 2).

However, it is not entirely predictable, so the dosage must be adjusted individually and this may be easier when administering inhalational anaesthesia – using end-tidal gas concentrations – than with intravenous anaesthesia. In addition, spontaneous ventilation can be maintained, at least for a number of surgical procedures in which neuromuscular block is not needed.

Neuromuscular blocking agents

Neuromuscular blocking agents (NMBAs) are useful for providing optimal tracheal intubation conditions. Unfortunately, there is a risk of residual neuromuscular blockade [26,27] and some anaesthesiologists avoid NMBAs, but this practice may be associated with a higher risk of difficult tracheal intubation [28]. In elderly patients, there is a huge variability in the duration of action of several NMBAs, especially rocuronium [29*,30]. A new drug, sugammadex, may allow a very rapid reversal of rocuronium and vecuronium, and full neuromuscular recovery can therefore be obtained a few minutes after even larger doses of NMBAs [31]. This must, however, be

documented and the most important lesson is that neuromuscular monitoring should be used when NMBAs are given [26,27].

Regional anaesthesia

Patients with preexisting cognitive impairment are at a higher risk of postoperative cognitive deterioration, but none of the numerous randomized trials focusing on cognition have shown a significant advantage of regional anaesthesia beyond the first postoperative week [32]. Early recovery may, however, be improved and another advantage is the opioid sparing that is associated with local anaesthesia, especially if continued postoperatively [33]. The current literature is limited by the fact that demented patients are not enrolled in most scientific studies. Lack of consent is not the only problem in that setting but also the required cooperation of the awake demented patient can be challenging if regional anaesthesia is scheduled.

Postoperative considerations

Demented patients undergoing outpatient surgery present the need for specific postoperative concerns, as they are expected to have an early discharge from the hospital, and must, therefore, rely on quick mobilization and uncomplicated rehabilitation.

Postoperative pain

One central objective is to relieve postoperative pain, which plays a major part in achieving a successful result following surgery. Pain in general is a common and often neglected condition in older people because age-related factors such as dementia and altered nociceptive pain perception make them highly vulnerable to pain and may challenge assessment [34[•]]. The experience of pain is very subjective [35], and acute pain is, therefore, often measured by means of self-report and use of visual or numeric scales such as the visual analogue scale and the numeric rating scale [36]. This approach cannot necessarily be used for demented patients because their impaired cognitive function hampers reliable self-reporting. In addition, the lack of communication skills and reduced use of facial expression found in these patients also make it difficult to assess the degree of pain [37[•]]. Moreover, patients with dementia are less likely to report sensations of pain than cognitively intact patients [35,37[•]].

In recent years, alternative assessment tools of a more observational character to improve postoperative pain

management have been developed. The Mobilization–Observation–Behaviour–Intensity–Dementia pain scale is based on an observation of pain behaviour during rest and physical movement and it has been reported as useful in determining pain in patients with dementia [37[•],38]. Therefore, the appropriate strategy for handling postoperative pain is to combine observational reports from the primary caregiver with self-reported standardized pain scales.

Postoperative complications

Focus on prevention of postoperative complications is obviously very important for both the patient and the healthcare system. The complications highlighted in this paper are those that most frequently emerge in elderly patients undergoing surgery.

Delirium and postoperative cognitive dysfunction (POCD)

Several studies [39[•],40–42] have shown that older patients with a preexisting cognitive disorder such as dementia have a higher risk of postoperative cognitive complications than other patients.

Delirium is a common complication following surgery and affects around 40% of the elderly surgical population [39[•],40]. Delirium is characterized by a prominent fluctuating change in cognition with major disturbances in attention and thinking, in which the level of consciousness may be affected [43]. Several risk factors other than increasing age and dementia have been identified: drug effects, dehydration, sensory deprivation, and anxiety [40,41]. Postoperative cognitive dysfunction (POCD) is another much more subtle cognitive disorder that is often unnoticed when patients are discharged from the hospital. Symptoms vary amongst patients but usually involve a decline in memory, concentration, and information processing [40,41–43]. The risk of experiencing POCD is lower following minor surgery, but studies on POCD have excluded demented patients so the exact incidence for these patients is still unknown. Delirium and POCD differ significantly in clinical presentation and duration (Table 1), but both are associated with higher mortality and morbidity rates [41,42,44[•]].

Sleep disturbance

Altered sleep patterns are a part of normal ageing but are more conspicuous in people with neurodegenerative

Table 1 Key differences between delirium and postoperative cognitive dysfunction

	Onset	Duration	Assessment	Consciousness
Delirium	Acute, fluctuating	Hours–days	Confusion assessment method, Delirium Rating Scale	May be altered
POCD	Days–weeks	Days–months	Neuropsychological test-battery	Unaffected

POCD, postoperative cognitive dysfunction.

disorders, and the degree of sleep disturbance seems to increase with progressing dementia [45,46]. The lack of sleep can have a profound negative effect on demented patients as it may cause a further decline in cognitive function and potentially evolve into delirium. This can evidently have serious consequences on the duration of the hospital stay and all attempts should be made to promote healthy sleep patterns, preferably supplemented with nonpharmacological therapy to avoid extensive polypharmacy.

Conclusion

Outpatient surgery calls for important preoperative and postoperative considerations in patients with dementia. This group of patients is particularly vulnerable in the perioperative setting and has an overall increased risk of complications including drug interactions, cognitive impairment, and sleep disturbances. Most studies on the effects of anaesthesia have not included patients with dementia, and further research could provide a more thorough understanding of the risks associated with surgery in demented patients that will allow better treatment and preventive methods.

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