



World Anaesthesia Tutorial of the Week

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## **Anaesthesia in the Elderly**

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This tutorial should be read in conjunction with the basic science tutorial on anatomy and physiology of ageing. Inevitably there will be some duplication of information but this article will focus on the more clinical aspects relevant to the conduct of anaesthesia in the elderly patient.

Have a think about some of the questions below to assess your knowledge prior to reading the rest of the article.

### ***Tutorial questions***

For the elderly patient:

1. What risk factors might increase perioperative morbidity/mortality?
2. How does the MAC alter with age?
3. What are the proposed advantages of regional over general anaesthesia?
4. List 5 common factors that can cause a confusional state?

### ***Introduction***

The elderly patient poses a specific challenge to the anaesthetist whose role might extend from perioperative physician to palliative care provider. The following tutorial aims to provide a summary of the relevant issues to perioperative care in the elderly.

### ***General considerations***

With increasing age, the incidence of surgery increases and mortality is higher. However age itself is not a disease process but instead serves as a chance for developing age related diseases. Inadequate preparation and cursory evaluation is unfortunately commonplace in a time-pressured environment, especially for emergency cases. A review of emergency procedures in the elderly found a 65%

incidence of correctable deficiencies in blood volume, electrolyte imbalance or oxygen delivery.

Recent studies show the mortality/ morbidity rates for fit, healthy octogenarians are not significantly higher than those for younger patients.

Preoperative assessment would benefit from cross speciality advice from a multidisciplinary team (MDT). The MDT should ideally consist of anaesthetists, surgeons, physicians, nurses, physiotherapists, occupational therapists, dieticians, speech and language therapists, pain specialists, stoma therapists, psychiatric and palliative care services. Their advice and contribution may improve the outcome of surgery and future quality of life for the elderly patient.

### ***The decision to operate***

A decision whether to operate should be made at a consultant level, ideally in conjunction with the MDT, family and most importantly the patient.

This should be clearly documented. The procedure to be undertaken should improve the quality, or quantity of a patient's life. There is no place for heroic, yet futile surgery.

Only patients with competency and capacity can provide informed consent or refuse surgery. Can the patient receive and understand the consequences, alternatives, risks and benefits in order to make a decision? Often patients are referred for competency evaluation if they disagree with a decision, but less frequently, if they agree.

Appropriately trained staff using formal tests of cognitive function should only diagnose confusional states. Potentially reversible causes of confusion may be caused by sepsis, dehydration, over hydration, electrolyte/metabolic abnormalities, hypoxia or constipation.

It is often appropriate to discuss resuscitation status although cardiac arrest on the ward has a much poorer outcome to that occurring in a theatre environment.

### **Surrogate decision-making**

Living wills and advanced directives are documents of competent patient wishes. They must be respected.

Power of attorney is where a patient delegates a person to do their decision-making.

When such formal information is unavailable, it might be necessary to turn to relatives, making the assumption the family's decision is in the patient's best interests and that they share a common cultural background. Unfortunately this assumption is not always valid.

### ***Pre-operative assessment***

A careful pre-operative assessment is imperative to achieve a good outcome.

## ***History***

Prior to taking a history, a mini mental state score is very useful primarily to assess reliability of information but secondarily it might prove very useful in the postoperative period.

Collateral history may be important via relatives, carers, nurses. Old notes are a very useful source of information, especially old anaesthetic charts.

Specific points in the history relevant to this tutorial (in addition to a full normal preoperative assessment) include:

1. Background to admission. For example, it is especially relevant to ascertain whether the “fall” leading to a fractured neck of femur, was purely mechanical or whether it was a syncopal episode for example.
2. Co-existing medical problems. The potential list is very long and includes ischaemic heart disease, hypertension, COPD, stroke, arthritis, diabetes, dementia, Parkinson’s, malnutrition, polypharmacy and sensory impairment (visual/hearing loss common).
3. Gastro-oesophageal reflux disease (GORD) and dentition. The elderly demonstrate slower gastric emptying, deterioration in parietal cell function, a greater incidence of GORD, pharyngeal pouch and hiatus herniae.
4. Medications- including dose, frequency, when they were started, and any recent changes. It is often difficult to ascertain what is taken especially in acute admissions and drugs maybe inadvertently stopped. Long-term medications should be continued. Do not forget alcohol and cigarettes.  
Pay particular attention to steroids, beta-blockers, ACE inhibitors, diuretics, insulin or hypoglycaemic agents and anticoagulants.
5. A detailed social appraisal to assess the level of home support may allow day surgery or earlier involvement of social services prior to discharge.  
Also assess pre morbid functional ability including activities of daily living and exercise tolerance as a means of risk stratification.

## ***Examination***

Following introduction, full exposure whilst ensuring warmth, comfort and dignity, allows a full complete, clinical examination.

Documentation of blood pressure allows appropriate intraoperative management of hypotension to maintain organ autoregulation perioperatively.

Fluid balance, weight and nutrition are all important in the assessment. Bowel prep or fractures may need fluid pre operatively. Unrecognised pathology might be found, and be highly relevant, such as the systolic murmur of aortic stenosis. If possible, walk the ward or stairs with the patient to assess “real-time” exercise tolerance.

## ***Investigations***

Given the high incidence of co morbidities, an absolute minimum of ECG, full blood count, urea and electrolytes and blood sugar are required. Otherwise investigate as clinically indicated. Age is not a barrier in itself to more “active” tests such as exercise ECG and cardiopulmonary exercise testing.

### ***Intraoperative considerations***

Multiple retrospective and prospective studies have arrived at the same conclusion. No significant difference in outcome can be attributed solely or predominantly to the use of any specific agent, and no clear and objective benefit can be demonstrated for using regional rather than general anaesthesia.

Technique should be compatible with patient’s physical status and type of surgery. With ASA 3 or above patients, both anaesthetic and surgical staff should be adequately trained, supervised and experienced. Attention to detail is important.

### **Specific issues**

1. Psychological preparation, appropriate pre medication, and patient pre warmed
2. IV access, adequate and accessible, is potentially more difficult in the elderly with dermoporosis.
3. Routinely pre-oxygenate all patients as FRC exceeds closing capacity as discussed in the previous tutorial
4. With IV induction agents, arm-brain circulation time is often increased and doses can be reduced if given slowly. Ensure a free-flowing drip and have vasopressors to hand.
5. Airway maintenance may be more difficult/hazardous because of:
  - Osteoporotic mandibles
  - Nuisance/peg/loose teeth
  - Temporo-mandibular joint stiffness
  - Lax oropharyngeal muscle tone and edentulous jaws
  - Cervical spondylosis
  - Arthritis of atlanto-occipital jointSometimes it is best to leave dentures in place to provide support for facemask ventilation or laryngeal mask stability
6. There will be increased sensitivity to some agents such as volatile anaesthetics, opioids, benzodiazepines, but reduced sensitivity for others, such as inotropes and vasopressors.

7. If available, consider using short acting agents such as desflurane or sevoflurane. The favourable low blood/gas and tissue/blood solubility coefficients should result in a more rapid arousal and possibly fewer critical events in the early recovery period.

8. Regional anaesthesia (RA) or general anaesthesia (GA)?

A Cochrane review of hip surgery looked at 17 trials (2567 pts) comparing GA to RA. It concluded that RA might reduce mortality at 1 month but the long-term mortality was unchanged.

The proposed advantages of RA include:

- Reduced thromboembolic events
- Reduced confusion
- Reduced post op respiratory problems
- Reduced endocrine stress response to surgery
- Reduced blood loss
- Advantageous for monitoring in carotid/TURP surgery

Spinal anaesthesia blocks sympathetic efferent nerves controlling vascular smooth muscle tone, and if above T4, the SA and AV nodes, and myocardial contractility.

Therefore heart rate, contractility and peripheral vasoconstrictive compensatory mechanisms are potentially reduced. Given the elderly may already have reduced preload and LV contractility, particular vigilance is required.

Sympathetic blockade can extend above the level of sensory blockade.

Epidurals and spinals are technically more difficult in the elderly due to spondylosis, osteoarthritis and patient positioning

9. Maintenance of normothermia intraoperatively is essential.

Older patients have:

- An impaired ability to sense a colder temperature
- Less subcutaneous fat
- Impaired autonomic homeostasis
- Reduced heat generation due to a decline in BMR
- Reduced ability to increase their metabolic rate
- Reduced ability to vasoconstrict and shiver

Anaesthetic agents exaggerate these issues along with orthopaedic flow theatres. Hypothermia impairs coagulation, immune function, wound healing, and the clearance of some drugs. It has been shown to increase both the frequency of wound infection and perioperative myocardial infarction.

Forced air warmers, warmed operating rooms, covering exposed body parts (especially the head), and warming surgical wash and IV fluids all reduce the incidence of hypothermia. Shivering in recovery may increase oxygen demand above respiratory capacity and may cause myocardial ischaemia as oxygen demand exceeds supply.

10. Fluid management should be based upon assessment of preoperative hydration, intraoperative losses, urine output, pulse, blood pressure, central venous pressure or even transoesophageal Doppler. Both overhydration and dehydration cause significant morbidity.

11. Meticulous positioning with appropriate padding is especially important. There is an increased frequency of neuropraxia (especially ulnar neuropathy), joint contractures/ stiffening and bony protuberances. Combined with a fragile skin matrix, subsequent pressure sores are not uncommon. These may prolong hospital stay, result in subsequent major morbidity or even cause death from sepsis. Catheterisation risks include sepsis and confusion but might help prevent pressure areas by keeping tissues dry.

### **Postoperative considerations**

1. DVT prophylaxis. The risk of pulmonary thromboembolism is increased due to age itself, the nature of surgery for which the elderly present, immobility and concurrent disease such as heart failure. Simple therapeutic options include good hydration, early mobilisation and thrombo-embolic stockings. Low molecular weight/unfractionated heparin and calf compression devices might also be available. All patients should have a risk assessment performed preoperatively and appropriate treatment options discussed with surgical staff.

2. Nutrition. Good nutrition aids healing and recovery. Mortality from fractured neck of femur has been reduced with fine bore NG feeding. Relatives and ancillary staff can help tremendously in such a simple but necessary therapy.

3. Blood sugar monitoring. There is an increasing body of evidence for tight glucose control improving patient outcome. There is a greater incidence in glucose intolerance, reduced hepatic function and a reduction in hepatic mass of 40% by 80 yrs of age leading to increased risks of both hyper and hypoglycaemia.

4. Fluid management. Highlighted by the National Enquiry into Perioperative Deaths (NCEPOD) as major contributory factor in postoperative morbidity and mortality. Fluid prescription " should be accorded the same status as drug prescription" (AAGBI July 1998). Acute renal failure can account for up to 20% of postoperative deaths in the elderly. Monitor of urea and electrolytes regularly.

5. Pain. The majority of elderly patients notified to NCEPOD underwent surgery in hospitals with an acute pain service but only a minority had pain assessment charts. Pain charts should include regular pain and sedation scoring with non-verbal scores available. Assessment can be difficult due to cognitive impairment,

dementia and aphasia. Patients posture, facial expressions help non-verbal assessments. Intervention should be followed up with re-assessment. Often analgesia is substandard, in a busy ward situation, with inappropriate drugs, doses, routes and assessment. Common myths are that pain perception reduces with age and they cannot tolerate opioids. Patients have a fear of addiction, expect to have pain and are unfamiliar with the concept of patient controlled analgesia (PCA). Paracetamol is good, safe analgesic with minimal side effects and should be charted regularly in almost all cases. NSAIDS risk gastric bleeding with high doses, long durations, concurrent steroids, and previous ulceration. Risk is reduced with ibuprofen and diclofenac. Generally avoid in renal impairment, especially if dehydrated. Intramuscular (IM) opioids are painful and effects unpredictable. PCA or oral opioids if tolerated are more reliable. Patients should be monitored for sedation, respiratory depression, nausea and vomiting, ileus, pruritis, urinary retention and confusion. Intraoperative LA wound infiltration, regional blocks (e.g. femoral nerve block for knee surgery), heat, cold, massage, exercise, distraction and relaxation are alternative strategies.

6. Oxygen therapy. The elderly are less able to increase and maintain ventilation at high levels. Ventilatory muscle fatigue can occur early but may not become apparent until 2-3 days post-operatively. There is reduced CNS responsiveness to hypoxia and hypercarbia, reduced even further by opiates and anaesthesia. Volatile agents are excreted via expiration thereby producing a vicious circle. Protective reflexes, coughing and swallowing reduce with age. This can cause recurrent aspirations and pulmonary damage. The greatest incidence of myocardial ischaemia is on day 2 or 3 postoperatively. Given these facts, oxygen therapy and closer monitoring in a high dependency area might be required. Age alone should not preclude higher levels of nursing care/monitoring.

7. Rehabilitation. Early mobilisation, physiotherapy and occupational therapy facilitate post op recovery.

8. Cognition. Elderly patients frequently experience deterioration in cognitive function in the postoperative period. The features of delirium include acute confusion, disorientation, restlessness, agitation, fear, hallucinations and delusions, altered psychomotor activity, fluctuating levels of consciousness and disturbed sleep wake cycles. Symptoms are worse at night.

Acute delirium increases morbidity, delays recovery, and prolongs hospital stay.

Causes include (note mnemonic – DIMTOP)

**D**rugs e.g. anticholinergics, benzodiazepines, regular drugs omitted

**I**nfection e.g. UTI, chest or wound

**M**etabolic e.g. hypo/hypernatraemia

**T**rauma e.g. hypoperfusion, fat embolism in orthopaedics

Oxygen lack/hypercarbia  
Psychiatric and pain

No difference in frequency can be reliably demonstrated with general or regional anaesthesia.

Pre op assessment of mental status and medications is important as is intraoperative maintenance of oxygen delivery, correct drug dosing and electrolyte balance. Avoid polypharmacy and try to use drugs with short elimination half-lives and minimal active metabolites. Glycopyrrolate is preferable to atropine as it is a quaternary amine and hence less likely to cross the blood brain barrier.

Treatment is of underlying cause e.g. antibiotics for infection and oxygen if hypoxic. Haloperidol 2.5mg IV increased to 5mg PRN can be used to settle an agitated patient. Thiamine and diazepam might also be useful. Repeated orientation, familiar surroundings, family, sensory aids and re-establishing day-night cycles are useful “non medical” therapies.

### **Postoperative Cognitive Dysfunction (POCD)**

This more formal diagnosis requires neuropsychological testing and can present weeks or months post operatively. It resembles dementia.

Impairments are seen in mood, memory, learning, language, judgement, behaviour and motor function. There is wide variation in the reported incidence of POCD in the literature but up to 26% of patients at one week and 10% at three months following surgery are affected.

Compared with a control group of hospitalised patients not undergoing surgery a rate of 4% at one week and 3 % at three months post surgery was reported.

POCD is associated with increasing age, alcohol abuse, poor cognitive and functional status, electrolyte abnormalities, type of surgery, polypharmacy, drug interactions, hypnotic or alcohol withdrawal, endocrine and metabolic problems, and poor pain control.

Treatment involves correction of physiological parameters, good pain relief and involvement of geriatricians/psychogeriatricians.

### **Summary**

- There is no ideal anaesthetic for all elderly patients.
- Meticulous control of physiological parameters perioperatively is more important than anaesthetic technique.
- A thorough understanding of the physiological changes with age and pharmacology helps to optimise the anaesthetic.



- Thorough pre operative assessment with correction of parameters, planning and good monitoring are essential.
- Chronological age is much less important an independent risk factor than emergency surgery and co- existing disease.
- A team of senior anaesthetists, surgeons and physicians need to be closely involved in the care of elderly patients who have poor physical status and high operative risk.
- Each anaesthetic department should have a lead clinician assigned to the elderly to provide inter disciplinary working.

### ***Tutorial answers***

1. Major risk factors include:

- Emergency surgery
- Operative site- vascular/ abdominal/ thoracic 10 –20 % greater mortality compared to TURP, hernias etc
- Physical status of patient being ASA 3 or above
- Co-existing disease, a greater risk than age alone
- Serum albumin level
- Infection/sepsis

2. MAC reduces by 6% per decade after 40. If the formula were extrapolated, the MAC would be zero at 137 years of age.

3. Proposed advantages of RA include:

- Reduced thromboembolic events
- Reduced confusion
- Reduced post op respiratory problems
- Reduced endocrine stress response to surgery
- Reduced post op negative Nitrogen balance
- Reduced blood loss

4. Mnemonic “DIMTOP”, refer to text

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