Complex rewarding scenarios for anaesthetists

Greg Purcell
Sept 2009
There is no such thing as a little anaesthesia

- Simplicity does not precede complexity, but follows it!

- This is an exciting job: please do not get excited.
William of Ockham

• English philosopher and Franciscan monk
• 1284-1347.
• His work on knowledge, logic and scientific inquiry played major role in transition from medieval to modern thought.
• “entities must not be multiplied beyond what is necessary”
• Keep things simple. Occam’s Razor.
Aphorisms -

1. Good judgement comes from experience. Experience comes from bad judgement.

2. Learn from the mistakes of others because you won’t live long enough to make all the mistakes yourself.

3. If you want a job well done, do it yourself.

4. Treat the patient not the monitor.

5. Experience is what you get when you don’t get what you want.
Revised Goldman Cardiac Risk Index (RCRI)

Independent predictors of major cardiac complications:

- High-risk operation (intraperitoneal, intrathoracic, suprainguinal vascular procedures)
- Hx of ischemic heart disease
- Hx of heart failure
- Hx of cerebrovascular disease
- DM requiring insulin
- Preoperative serum creatinine > 2.0 mg/dL
Revised Goldman Cardiac Risk Index (RCRI)

Deveraux et al., CMAJ 2005:

Rate of cardiac death MI, and cardiac arrest:

- 0 RF: 0.4% [0.1-0.8]
- 1 RF: 1.0% [0.5-1.4]
- 2 RF: 2.4% [1.3-3.5]
- 3+RF: 5.4% [2.8-7.9]
Beta Blockers

- Continue beta-blockers in patients already on them
- Give beta-blockers to those undergoing vascular surgery who have documented ischaemia on preoperative testing
- Beta blockers probably recommended for those undergoing intermediate risk or vascular surgery with a history of IHD or the presence of 2 or more risk factors for perioperative cardiac events.
- Otherwise no good evidence
Peri-operative MI

DIAGNOSIS

• 14% patients have chest pain
• 53% have a sign or symptom that triggers consideration for perioperative MI
• Cardiac biomarkers
Diagnosis of perioperative MI after noncardiac surgery

• No standard diagnostic criteria. Diagnosis complicated by lack of symptomatic presentation in about half of patients with perioperative MI.

• Deveraux et al, CMAJ 2005 proposed the following diagnostic criteria:

• 1) rise in troponin (or fall after an elevated value) plus one or more of
  – Ischemic signs or symptoms (e.g., SOB)
  – New pathologic Q waves on ECG
  – Coronary artery intervention
  – New wall motion abnormality or fixed defect on echo or myocardial perfusion imaging

• 2) new pathologic Q waves on ECG in patients without troponin measurements
Background CV Disorder

- Cardiovascular disease in common
- 4 METS is the cut-off for considering intervention in at risk patients.
- Preoperative revascularisation may be no better than medical management and has not been shown to improve outcomes
- Intraoperative aims revolve around optimal myocardial oxygen balance
- Postoperative ECG in recovery good screen for post-operative ischaemia
Clinical Details

- Patient A.N. 72y.o. BSA 2.0
- Unstable angina, at rest and min. exertion
- Q-waves posteriorly
- TIAs
- AF- on warfarin
- ↑ BP, ↑ cholesterol
- Intolerance to aspirin.
### ASA Classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Class 1</td>
<td>Healthy</td>
</tr>
<tr>
<td>Class 2</td>
<td>Mild systemic disease, no func limitations</td>
</tr>
<tr>
<td>Class 3</td>
<td>Moderate to severe systemic disease, functional limitations</td>
</tr>
<tr>
<td>Class 4</td>
<td>Severe systemic disease, constantly life threatening, functionally incapacitating</td>
</tr>
<tr>
<td>Class 5</td>
<td>Not expected to survive with or without surgery 24h</td>
</tr>
<tr>
<td>Class 6</td>
<td>Organ Donor</td>
</tr>
<tr>
<td>Class E</td>
<td>Emergency</td>
</tr>
</tbody>
</table>
Coronary angiogram (A.N.)

- **Rt:** large dominant right has 99% lesion involves origin of ant Rt ventricular branch, distal normal.
- **Lt:** Left main normal. LAD has sequential 80% lesions just beyond large first diagonal. Distal LAD normal. Normal Cx, 90% lesion proximal in large high Lat. Cx.
- L.V. mild global impair. E.F. 40-50%.
- Recommend: Grafts to distal LAD, distal Rt., and First Lat. Cx.
Carotid ultrasound.
Rt 16-49%, antegrade vertebral flows
Aphorisms - Surgery

1. Never ask your surgeon whether you need an operation
2. The poor surgeon needs good anesthesia, the good surgeon deserves it
3. A hospital is no place to be sick
4. If you can’t manage the surgeon, you have no business managing the anesthetic
5. You should not prevent patients from getting well on their own.
Inhaled general anesthetics promote ischemic preconditioning

- Extent of ischaemic preconditioning altered by general anesthetic
- Isoflurane adds to ischaemic preconditioning
- Isoflurane effect blocked by glyburide

Myocardial Protection

- Volatile agents exert important cardioprotective effects during myocardial ischaemia and reperfusion injury.
- Isoflurane reduces myocardial infarct size \textit{in vivo} by activating KATP channels in a manner that bears striking similarity to those observed during ischaemic preconditioning.
Anti-ischaemic approaches

- Preoperative $\beta$-blockers reduce ischemia, arrhythmias, neurobehavioral complications, and mortality
- Inhaled general anesthetic agents promote ischemic preconditioning
- Morphine (delta opioid agonist) produces ischaemic preconditioning
- No effect of selective $\mu$-agonists (fentanyl, sufentanil, remifentanil)
Strategic Aims

• Sustain exaggerated intravascular volume
• Maximise coronary dilatation.
• Limit cardiac rate, Sinus rhythm
• Optimise cardiac output with minimum myocardial workload
• Restrict ionotropes unless required
• Adequate anaesthesia (fentanyl & isoflurane)
Cardiac manipulation

- Rotation of heart on caval axis
- Compression of atria (R>L)
- Compression R ventricle
- Distortion/incompetence of valves (T>R)
- Distension of atria (R>L)
- Twist of arteries
- Pericardial sutures aid rotation
- Leg elevation, Trendelenburg
Summary

OPCAB surgery significantly reduces the incidence of several complications such as atrial fibrillation, impaired renal function, and a trend toward lower incidence of stroke; resulting in a shorter ICU stay, hospital stay, and lower mortality. (Bucerius 2003)

In centers experienced in beating heart coronary bypass, an off-pump approach for CABG was associated with lower risk-adjusted morbidity and mortality. (Plomondon 2001)

When compared to on-pump CABG, beating heart surgery results in less potential for generation of cerebral emboli, and appears to produce a lower incidence of cognitive dysfunction in short- and intermediate-term follow-up periods. (Murkin 1999)

Cognitive problems identified in the immediate post-op period can be a significant predictor of long-term cognitive decline. (Newman 2001)

With present-day OPCAB techniques, patience and perseverance, access to and exposure of all coronary targets is possible with insignificant hemodynamic disturbance. (Hart J, 2002)

With shortened operating time, ICU stay, hospital stay, and less dopamine and blood product needed, the average cost savings compared to cCABG is over $5000 for OPCAB. (Lee 2003)
• The good ship “ISOFLURANE”
Aphorisms - Preparation

1. The best way to handle complications is to avoid them

2. Accidents can happen if planned that way

3. A routine is only a substitute for thought

4. 15 minutes spent pre-operatively, is worth 15 mgs of morphine as a premed.

5. Lack of planning on your part does not constitute an emergency on my part
Midnight Call from ED

• “78 year old gentleman, extraction of 6 teeth and placement of 2 implants this afternoon in a private hospital
• While on the ward, he developed respiratory difficulties 2200hrs
• Just transferred in by ambulance
• Currently sitting up in bed, blood drooling, unable to speak, grossly swollen and black tongue, stridulous
• Saturating 97% on 4l/min O₂ via nasal prongs”
Wherefore art thou, uvula
In the ED…

- **ENT** registrar contacted – but slightly delayed
- Informed the ENT registrar to come to OT directly
- **OT** informed to prepare for difficult airway and possible tracheostomy
- **ICU** informed to prepare for the admission
En route to OT

- Accompanied this patient upstairs –
  - Patient still sitting up in bed,
  - blanket over the shoulders to keep warm,
  - oxygen via nasal prongs,
  - cricothyroidectomy set opened,
  - intubating drugs and equipment, self inflating resuscitator, suction apparatus
In OT...

- While waiting for the ENT surgeon
- Place monitors (ECG, SpO₂, NIBP)
- Nasal prongs with 4l/min O₂
- Patient still very agitated over difficulty breathing
- Managed to pull out both antecubital fossa cannulae
- Another 18G cannula inserted into right hand
Equipment

- ETT #7.0 opened and lubricated,
- LMA #4.0 with bars cut with ETT #6.0 opened and lubricated.
- FOB scope checked and prepared
½ hr later, ENT surgeon arrives

- My plan - tracheostomy
  - Under local anaesthesia
  - Inhalational induction, spontaneous ventilation.
- Surgeon requests for a nasendoscope
- Cophenylcaine sprayed to both nostrils
- Uses the FOB to inspect
  - Left nostril – blocked, unable to advance
  - Right nostril – able to get to the posterior part of the larynx

- Thinks we can intubate fibreoptically
FOB

• I railroad a #7.0 ETT onto the FOB and attempt to perform an awake FOB
• Split nasopharyngeal airway with 2% lignocaine gel into the right nostril
• Some blood/secretions
• Swollen distorted anatomy
• Patient moving, swallowing
• Unable to identify the vocal cords
FOB

- ENT surgeon takes over (using the eyepiece)
- Attempt to railroad the ETT in
  - No ETCO$_2$, no chest movement, subjectively patient gestures that it’s more difficult breathing
- Put the FOB down the ETT
  - ?tracheal rings, carina
  - But still no ETCO$_2$, no chest movement
- At this point, we decide to remove the ETT and prepare for a tracheostomy
Why did I do that ....?

- As the surgeon scrubs, I remove the ETT, insert a nasopharyngeal airway and mask ventilate the patient

- Sevoflurane slowly dialled up, but patient started struggling a little, sevoflurane turned up higher

  Patient loses consciousness...
  and airway is lost.
Oh  Oh

• Unable to maintain patent airway with bag and mask ventilation

• SpO₂ drops suddenly from 97% to 35%

• HR drops from 100/min to 35/min, ventricular escape rhythm

• Femoral pulse present throughout
Cricothyroidectomy

• ENT surgeon called to “quickly come in and slash the throat”

• Meanwhile atropine 600mcg given, adrenaline syringe prepared

• Emergency cricothyroidectomy performed,
  – #4 cuffsed Shirley inserted,
  – SpO₂ quickly recovers to 100%,
  – ECG rhythm returns to normal

• Total downtime <2 minutes
Tracheostomy

• Surgeon converts to a proper tracheostomy between 1st and 2nd tracheal rings – size 8 Shirley inserted.

• Cricothyroidectomy site closed and haemostasis obtained

• Direct laryngoscopy – very enlarged, swollen and black tongue, only the posterior pharyngeal wall can be seen

• Arterial line inserted, blood gas shows metabolic acidosis, high lactate
In ICU…

• Sent to ICU intubated, ventilated and sedated.
• Develops acute renal failure
  – creatinine 125→121→88 (settles within 1 day)
• Raised troponin
  – 0.17→0.18→0.12→0.07 (settles by day 2)
• Serial ECGs – no acute ST changes
CT Neck

Day 1
5.2x3.5x3.9cm

Day 3
5.5x4.8x3.1cm

Day 6
4.9x3.5x2.4cm
Initial procedure

- Aspirin (stopped 2 days prior)
- Epiglottic ulcer – biopsy done Feb 08 – showed low grade dysplasia
- 1400hrs dental extraction under general anaesthesia-nasal tube, reasonable view.
- ? clamp on tongue (stated by nursing staff, but denied by surgeon)
- 6 broken roots – lower anterior teeth – bleeding ++ when they were pulled out
- 2 implants were placed in the canine region, noted very brittle bone, profuse bleeding during the procedure
  - “placing implants in this area can cause lots of swelling of the tongue and perforation of the lingual plate or even raising a flap in this area will cause lingual swelling”
- End of procedure, sutured, bleeding controlled
Initial procedure

- Had a swollen tongue postoperatively, but noted to be able to “poke out his tongue”
- Sent back to the ward 2-3 hours later
- Returned to the ward at 1830 hours,
  - with difficulty maintaining airway,
  - increased blood loss from mouth,
  - tachycardia 120/min,
  - BP 157/102
- Dexamethasone 4mg given
- Saturating 85% on RA, 98% on 4l/min NP
- Surgeon and anaesthetist involved unable to be contacted
- 2337 ambulance booked, patient sent over to RNSH
- Arrived at RNSH 0009hrs
"can't intubate, can't ventilate" situation with increasing hypoxaemia

Plan D: Rescue techniques for "can't intubate, can't ventilate" situation

Cannula cricothyroidotomy

Equipment: Kink-resistant cannula, e.g. DTJV-BTT (Cook) or Ravussin (VBM)
High-pressure ventilation system, e.g. Manujet III (VBM)

Technique:
1. Insert cannula through cricothyroid membrane
2. Maintain position of cannula - assistant's hand
3. Confirm tracheal position by air aspiration - 20ml syringe
4. Attach ventilation system to cannula
5. Commence cautious ventilation
6. Confirm ventilation of lungs, and exhalation through upper airway
7. If ventilation fails, or surgical emphysema or any other complication develops - convert immediately to surgical cricothyroidotomy

Surgical cricothyroidotomy

Equipment: Scalpel - short and rounded (no. 20 or Minitrac scalpel)
Small (e.g. 6 or 7 mm) cuffed tracheal or tracheostomy tube

4-step Technique:
1. Identify cricothyroid membrane
2. Stab incision through skin and membrane
   Enlarge incision with blunt dissection (e.g. scalpel handle, forceps or dilator)
3. Caudal traction on cricoid cartilage with tracheal hook
4. Insert tube and inflate cuff
   Ventilate with low-pressure source
   Verify tube position and pulmonary ventilation

Notes:
1. These techniques can have serious complications - use only in life-threatening situations
2. Convert to definitive airway as soon as possible
3. Postoperative management - see other difficult airway guidelines and flow-charts
4. 4mm cannula with low-pressure ventilation may be successful in patient breathing spontaneously

Difficult Airway Society guidelines Flow-chart 2004 (use with DAS guidelines paper)
Post Surgical Requirements

• Prospective study of high dependency care requirements and provision
• Aberdeen 1999
• 1000 beds, 15 Ors
• 3 months survey, 7000 operations.
• Major surgery excl cardiac, elective ortho.
• 1400 pts, median 59yrs, M:F 1.1:1.
• 58% planned, 42% emergency
Aberdeen ICU/HDU

- Optimal level of care by surgeons and anaesthetists
- ICU 9.7%, HDU 23.6% (480 pts of 1400).
- NOT MET:
  - 16% of 132 ICU and 74% of 350 HDU
  - If received optimal care, mortality 1.2%.
  - If NOT received, mortality 3.1%.
- SIGNIFICANT Lack of Access.
PRINCIPAL RECOMMENDATIONS:
• Surgeons and anaesthetists should partake in multidisciplinary audit,
• specialists meeting together to discuss improvements in care.
• These meetings should concentrate less on asking ‘Who is to blame?’ and more on changing systems of practice to safeguard patients wherever possible.
General ICU v Neuro ICU

- Project Impact
- Multi institutional data collection.
- ICH admissions.
- 42 ICUs, 13 Neuro ICU
- Odds Ratio: mortality 3.4 more likely
- In General v Neuro ICU
- Full time intensivist significant impact.
Ether dome
Optimal OR design (bang, 2004.)

- Modern operating rooms that are expected to be a good chassis for future processes need to be designed in the 600 to 650 square foot range (55-60 square metres).
- With high-density arrangements immediately adjacent to the operating room table, sufficient space exists in most plans to create three zones that are sometimes literally marked by changes in the flooring:
  - A central zone centered on the table to denote the surgical area. It serves as a prompt to be certain there is a purpose in approaching the operating room table.
  - A 30 to 36 zone along the walls which is the parking place for items not immediately engaged in the operation such as specialty carts, imaging equipment, and students.
  - The annular space between these two becomes the circulation zone of the room. It should be clear of most, if not all, tripping hazards.
Operating Rooms

- **Size**
  - AusHFG recommend 42m²/52m²
  - DHS Vic recommend 42m²/50m²
  - NHS recommend 55m²
  - USA recommend 50m²/55m²/60m²
  - Canada recommend 48m²/55m²/60m²
  - GCUH are all briefed at 55m² for future flexibility

- **Specific use**
  - Cardiac/Trauma/Obstetrics/Elective/Emergency

- **Specific needs e.g. Bariatric patient**
Bi Plane the anaesthetic knuckle
console that then permits precise surgical manoeuvres to be undertaken. The surgeon is remote from the operating table and the patient. Through an intuitive interface, the four robotic arms are manipulated to conduct the surgical procedure. Apparently, robotic surgery is useful with prostate surgery.

A team of military, telecommunication and surgical experts in combination with the University of Cincinnati, USA, are taking robotic surgery one-step further. The team are developing a prototype where robotic surgery can be undertaken.
Functional Programming & Design

Spilling Over of Technology

Intra-operative MRI, PET-MRI
Stationary, Pivoting Couch, & Traveling Magnet

Storage
Magnet Docking Room
Imaging Console Room
Alcove Alcove Alcove Alcove Alcove
Sub-sterile
Scrub

Intra-operative MR/OR, Children’s Hospital Boston
An integrated system will display these data to the physician operators and also support efficient and safe care. The hardware of the AMIGO system is comprised of a 3.0T MRI Scanner, PET/CT Scanner, Fluoro X-ray C-arm, navigation systems, surgical microscopes, and a sophisticated surgical table that moves the patient between stations.

Advanced Multi-Modality Image Guided Operating Room (AMIGO)
Earlier this week, a Johns Hopkins surgeon successfully removed a healthy kidney through a donor’s vagina for transplantation, the first operation of its kind. The donor and the recipient, the donor’s niece, are both recovering. Typically, removing the kidney requires a six-inch incision through the belly and the donor is in the hospital for several days after. With the new procedure, the donor could likely go home in a day without the scar. The operation left three pea-size scars on the woman’s abdomen, one hidden in her navel, from where the wand-like camera and operating tools were inserted through small incisions.

Diseased gallbladders, kidneys and appendixes have been removed through the vagina before
Murder on the coast

- Nurses plead not guilty to manslaughter

- Christine Kellett | April 8, 2008 - 1:25PM

- Two nurses at a Gold Coast private hospital failed to raise the alarm when an elective surgery patient fell gravely ill, a court has heard.
- Physical education teacher Mr H, 41, later died after being transferred to a public facility across the road.

- Nurses X, of Reedy Creek, and Y, of Hope Island, have pleaded not guilty to Mr H's manslaughter at a Supreme Court trial in Brisbane this morning.

- The pair was the only medical staff on duty at Southport's Pacific Private Hospital on the night of April 22, 2005 when Mr H's condition deteriorated following elective surgery to treat a back complaint.
• Crown prosecutors say X an enrolled nurse, and Y, a more senior registered nurse, did not call for back up from doctors on duty at a second facility several blocks away when they noticed Mr H's oxygen saturation levels - or SATS - had dropped dangerously low.

• He was later transferred to the Gold Coast Hospital across the road but died during the early hours of the following morning.

• The court heard X and Y were left alone in the hospital, except for a cleaner, to care for 18 patients, including four who needed close monitoring.

• In his opening address, prosecutor David Meredith said hospital anaesthetists left specific instructions for post-operative care.

• "These two did not follow those parameters... (and) allowed Mr H's SATS to drop a level not compatible with life," Mr Meredith said.

• The court heard Mr H, a hockey player and golfer with a handicap of two, had otherwise been fit and healthy.
Murder on the coast

- Nurses 'erred', then patient died: court

- 2:30p.m. 16 April 2008
- | By Christine Flatley

- Two nurses on trial over the death of a patient made "grave errors" during his post-operative care, a nursing expert has told a court.

- Dr Deborah Mooney told the Supreme Court in Brisbane on Wednesday that enrolled nurse Jennifer X, 48, and her superior, registered nurse Michael Y, 51, did not call for help quickly enough when they noticed 41-year-old high school teacher Christopher Hammett's condition deteriorating.

- Mr H. died on April 23, 2005, less than a day after he was admitted to the Gold Coast's Pacific Private Hospital for a back operation.

- X and Y are currently on trial for manslaughter, accused of breaching their duty of care.
Murder on the gold coast

- **Dr Deborah Mooney**
- RN CCN BAHlthSci(Nrs) GradDipAdvNursPrac(Hons), Mphil AppPsy, FCN (NSW) PhD

**Research & Interests**
- Loss and grief
- Complicated mourning
- Postmortem care
- Behavioural psychology
- Post-traumatic stress disorder and critical incident stress debriefing and management
- Suicide
- Death anxiety
- Stress and coping

**Methodological Interest**
- Scale development and survey methods
- Construct validity and phenomenology - Colaizzi’s method
Nurses acquitted of manslaughter

- The Australian.
- Kevin Meade | April 22, 2008

- THE widow of a 41-year-old man who died in a Gold Coast private hospital after routine surgery vowed to continue her search for justice yesterday after a prosecutor dropped charges against two nurses accused of causing her husband's death.
- Two weeks into their trial on manslaughter charges, registered nurse Michael Y, 51, and enrolled nurse Jennifer X, 48, walked free from the Brisbane Supreme Court after the case against them was thrown out.
- Prosecutor David Meredith told the court that in the light of unexpected evidence that emerged before the Crown closed its case on Friday, he was unable to prove that the nurses' actions caused the death of Christopher H.
- Mr Y and Ms X were the first nurses in Australia to face criminal charges over allegations of negligence.
Murder on the coast  22/04/08

• He said a prosecution witness, intensive care specialist Dr G.C, had given unexpected evidence suggesting Hammett was already critically ill when Mr Y and Ms Y started their shift.

• "Whether or not there had been negligence, the prosecution is unable to say that negligence had any ultimate impact on the outcome of Mr Hammett," Justice Dutney said.

• H's widow, sobbed openly when the case was thrown out. Speaking to The Australian later from her Gold Coast home, she said the outcome was "incredibly disappointing".

• "But I wouldn't say this is over," she said, adding that she hoped an inquest into his death would be held soon. "We'll keep looking for answers. H had only just turned 41. He had no pre-existing medical condition and he suffocated to death over a number of hours and he died, and we need to find out why."
Involuntary Manslaughter.

- For Involuntary Manslaughter to be proved there is no obligation on the Crown to prove that the accused intended to kill the victim. Involuntary Manslaughter has two categories. Negligent Act or Omission Causing Death and Unlawful Dangerous Act causing Death.

- For the offence to be proved under the Negligence head the Crown must prove negligence to a very high degree. This standard is much higher than the degree of negligence required for a plaintiff to prove in a civil case. The Crown must show that it was an act of gross negligence.

- The fact that the victim consents to the act would not of itself prevent the Crown from obtaining a conviction for this offence.

- Where the negligence involves an omission, it must be proved that the accused owned a personal legal duty of care to the victim and that the degree of negligence was high. The person convicted must be shown to owe a duty of care to the victim. The duty must be connected with life so that the ordinary consequences of negligence would be death.
The ASA OSA Guidelines
• During deep and restorative sleep the pharyngeal muscles lose their tone.
• If tone and pharyngeal collapse is partial, inspired air flutters around the uvula, tongue and epiglottis -> snoring, hypopnoea
• If tone and pharyngeal collapse is complete, obstruction occurs -> silence and apnoea
What are the effects of the arousal mechanism?
Is there a known cause of OSA
Risk Factors

• Obesity (intraluminal and extraluminal fat)
• Micrognathia and retrognathia
• Large tonsils
• Large tongue
• Nasal obstruction
Peri-operative Risk

- Severity of OSA (1,2,3) PLUS EITHER
- Invasiveness of anaesthesia/surgery OR
- Postoperative opioid requirement
  - 0 – no POR
  - 1 – low dose oral POR
  - 2 – mod dose oral POR
  - 3 – high dose oral/parenteral/neuraxial POR

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Table 2. OSA Scoring System: Example

<table>
<thead>
<tr>
<th>A. Severity of sleep apnea based on sleep study (or clinical indicators if sleep study not available). Points score (0-3)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
<tr>
<td>Mild</td>
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<tr>
<td>Moderate</td>
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<tr>
<td>Severe</td>
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<table>
<thead>
<tr>
<th>B. Invasiveness of surgery and anesthesia. Point score (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial surgery under local or peripheral nerve block anesthesia without sedation</td>
</tr>
<tr>
<td>Superficial surgery with moderate sedation or general anesthesia</td>
</tr>
<tr>
<td>Peripheral surgery with spinal or epidural anesthesia (with no more than moderate sedation)</td>
</tr>
<tr>
<td>Peripheral surgery with general anesthesia</td>
</tr>
<tr>
<td>Airway surgery with moderate sedation</td>
</tr>
<tr>
<td>Major surgery, general anesthesia</td>
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<td>Airway surgery, general anesthesia</td>
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<tr>
<th>C. Requirement for postoperative opioids. Point score (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
<tr>
<td>Low-dose oral opioids</td>
</tr>
<tr>
<td>High-dose oral opioids, parenteral or neuraxial opioids</td>
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<tr>
<th>D. Estimation of perioperative risk. Overall score = the score for A plus the greater of the score for either B or C. Point score (0-6)‡</th>
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</table>
Peri-operative Management
Preoperative preparation

• Preoperative use of CPAP or noninvasive positive pressure ventilation may improve the preoperative condition of patients who are at increased peri-operative risk from OSA

• 3 months of CPAP treatment may reverse OSA induced cardiovascular dysfunction and metabolic syndrome
  
  • Lattimore JL, Wilcox I, Skilton M, Langenfeld M, Celemajer DS. Treatment of obstructive sleep apnea leads to improved microvascular endothelial function in the systemic circulation. Thorax 2006;61:493-495
Peri-operative Management

- General anaesthesia with a secure airway is preferable to deep sedation without an airway
  - for superficial procedures
  - for patients with OSA undergoing procedures involving the upper airway
- Patients at increased peri-operative risk from OSA should be extubated when fully awake, in the non-supine position when possible and only after verification of full reversal of neuromuscular blockade
- Respiratory $\text{CO}_2$ monitoring should be used during moderate or deep sedation
- Major conduction anaesthesia should be considered for periperal procedures in patients at increased risk from OSA
Immediate Postop Management

• Patients with OSA should be monitored for a median of \textbf{>3 hours longer} than their non-OSA counterparts before discharge from the facility.

• Monitoring of patients with OSA should continue for a \textbf{median of 7 hours} after the last episode of airway obstruction or hypoxaemia while breathing room air in an unstimulating environment.
Postoperative Management

- Postoperative regional analgesia **decreases adverse outcomes** compared to the use of systemic opioids
- **Exclusion of opioids** from neuraxial analgesia reduces risk for OSA patients
- **NSAIDS have an opioid sparing effect** and therefore their use may result in less opioid use and a decrease in adverse outcomes
- Use of basal PCA rates will result in increased incidence of hypoxaemia
Perioperative Management

• CPAP or non invasive positive pressure ventilation should be administered ASAP after surgery to patients with OSA who were receiving it preoperatively.

• Compliance with CPAP is increased if the patients bring their own equipment to hospital.

• Supplemental oxygen should be administered as needed to maintain acceptable $\text{SpO}_2$

• Continuous $\text{SpO}_2$ in an ICU/step down unit/telemetry reduces the likelihood of perioperative complications among patients who are at increased risk from OSA.
Overall recommendations for postoperative pain management for laparoscopic cholecystectomy

**Pre-operative patient assessment**

**Routine surgery**
- Systemic analgesia
  - COX-2-selective inhibitor
  - Gabapentin
  - Dexamethasone
- Regional analgesia
  - Long-acting local anaesthetic (LA) wound infiltration for wound pain

**High risk pulmonary patients**
- Consider use of epidural analgesia/anaesthesia in addition to other agents

**Anaesthetic technique**
- General anaesthesia
- Low-pressure CO₂
- Saline lavage, followed by suction

**Operative techniques**
- Conventional NSAID at end of surgery
- COX-2-selective inhibitors
- Short-acting strong opioids as part of anaesthetic technique

**Systemic analgesia**
- Conventional NSAID/COX-2-selective inhibitor
- Paracetamol
- Opioid for rescue analgesia

**Regional analgesia**
- Long-acting LA wound infiltration for wound pain
- Intraperitoneal LA for wound pain
- Combined LA wound infiltration/intraperitoneal LA

**Anaesthetic technique**
- Combined epidural/general anaesthesia

**Epidural analgesia**
- Epidural LA + strong opioid in the early postoperative period

**Postoperative**
- Early discharge (<24 h)
Post op Oral Therapy

For minor or intermediate surgery, use strict (not when needed) paracetamol+NSAID (or COX-2 inhibitor); use oral oxycodone or tramadol for breakthrough pain. Continue for 24–72 h (according to extent of surgery) and then use paracetamol or NSAID as needed.

Paracetamol 1–1·5 g (intravenous, oral, or rectal) four times a day. Maximum dose 5 g a day, restrict therapy to <5 days.

Naproxen 250 mg orally three times a day, diclofenac 50 mg orally or rectally twice a day. Reduce dose and restrict therapy to <5 days if dehydration, renal impairment, or patient is elderly.

Tramadol 100–150 mg orally four times a day. Reduce dose if renal failure or patient is elderly.

Oxycodone 5–10 mg orally prn 4 hrly
Major surgery

- **4** For major surgery, use paracetamol ± NSAID (COX-2 inhibitor) ± tramadol + morphine via patient-controlled pump; if anaesthetist has done local anaesthetic block, there will be reduced morphine requirements.

- Initial start with oral opioid regimen may be suitable in selected patients.

- Patient should be referred to acute pain service (if available).
Fine Tuning Post op Pain

- Anaesthetist should administer appropriate amount of morphine intraoperatively; titrate additional doses, each 1–2 mg, in recovery room to control pain before transfer to surgical ward.

- Settings for patient-controlled anaesthesia: morphine 2 mg (1 mg if age >60 years) bolus, 5–8 min lockout period; no background infusion.

- If patient-controlled anaesthesia is unavailable: morphine 0.10 mg/kg intramuscularly or subcutaneously every 2 h as needed.

- If pain intensity is unexpectedly high, notify surgical team to review patient.

- Continue multimodal regimen until 24–72 h after surgery.
Aphorisms - Anaesthesia

1. All post operative complications begin in the operating room

2. Anaesthesia is terribly simple but sometimes can be simply terrible

3. A bad IV never gets better

4. Worry about the blood loss you hear

5. Low risk but not no risk
"They don't give us time to learn anything; we have to listen to the teacher all day."
Bringing it all together