



Royal Australasian College of Surgeons  
Australian and New Zealand  
Audits of Surgical Mortality

# National Case Note Review Booklet

LESSONS FROM  
THE AUDIT

VOLUME 25  
APRIL 2023

OPERATIVE  
MANAGEMENT  
ISSUES



Royal Australasian  
College of Surgeons



The Royal Australian  
and New Zealand  
College of Obstetricians  
and Gynaecologists  
*Excellence in Women's Health*



Royal Australasian College of Surgeons  
Australian and New Zealand Audit of Surgical Mortality  
24 King William Street  
Kent Town SA 5067

**Telephone:** +61 8 8219 0901  
**Email:** [anzasm.racs@surgeons.org](mailto:anzasm.racs@surgeons.org)  
**Website:** [www.surgeons.org/anzasm](http://www.surgeons.org/anzasm)

**DISCLAIMER:** This booklet is produced for Fellows of the Royal Australasian College of Surgeons. Information is obtained under a quality assurance activity.

The information contained in this case note review booklet has been prepared on behalf of the Royal Australasian College of Surgeons, Australian and New Zealand Audit of Surgical Mortality Steering Committee. The Australian and New Zealand Audit of Surgical Mortality, including the Western Australian, Tasmanian, South Australian, Australian Capital Territory, Northern Territory, New South Wales, Victorian and Queensland audits of surgical mortality, has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the Health Insurance Act 1973 (gazetted 24 April 2022).

# Contents

Guest Chair's Report	<b>2</b>
Case Studies	<b>4</b>
Case 1: Appropriate decision-making for gliosarcoma debulking surgery	<b>4</b>
Case 2: Management dilemmas in a patient with perforated ulcer	<b>6</b>
Case 3: Questionable decision to operate	<b>9</b>
Case 4: Avoiding futile surgery may include avoiding inappropriate transfers	<b>11</b>
Case 5: Sometimes patients just need blood	<b>14</b>
Case 6: The dilemma of futile surgery	<b>16</b>
Case 7: Probable massive pulmonary embolus following complicated laparoscopic cholecystectomy	<b>18</b>
Case 8: Poor intraoperative decision-making contributing to unexpected intraoperative death after bypass surgery	<b>20</b>
Case 9: Attributing falling postoperative haemoglobin to a faulty blood pressure cuff results in death following cholecystectomy	<b>22</b>
Case 10: Elective bypass using bilateral radial grafting in a patient with diffuse triple vessel disease	<b>25</b>
Case 11: Inappropriate gastrectomy in a patient with advanced gastric cancer	<b>28</b>
Abbreviations	<b>30</b>

# Guest Chair's Report

The latest Case Note Review Booklet highlights several recurrent issues that provide valuable lessons for all practising surgeons, surgeons in training and other clinicians.

This collection of cases can be considered under four headings—the decision to operate at all, intraoperative decision-making, postoperative care, and delayed surgery when the initial decision was to manage the patient conservatively.

In almost half of the cases, palliation would have been wiser than surgical intervention. In most of them, death was inevitable, surgery was futile and it hastened early death.

Readily available additional investigations were not performed in one case, formidable comorbidities were present in others, sufficient resolution with antibiotics had already occurred in a particularly surgically-difficult patient, and strong surgical reservations were swayed by the desperation of the patient's relatives in another.

Faulty intraoperative decision-making occurred in one high-risk case when an additional difficult component of the operation was added. If it was to be attempted at all, a wiser option for doing so was not utilised, which led to uncontrollable bleeding on the operating table.

There were failures in postoperative management in three cases.

A difficult operation resulted in heavy intraoperative and postoperative blood loss, causing hypotension and a falling haemoglobin level. Administration of packed red blood cells would have been a better option than the iron infusion chosen for this vulnerable patient.

In another case, clear evidence of continuing postoperative intra-abdominal haemorrhage was attributed to faulty blood pressure cuff readings in an obese patient until it was too late. This laparoscopic case emphasised the importance of viewing on the screen the insertion of the secondary ports and, ideally, their removal, and of being alert to the possibility of unexpected bleeding even when there is no bleeding problem during the operation itself.

The third case involved a high-risk patient with multiple comorbidities and a history of pulmonary emboli. Although perioperative DVT/PE prophylaxis was instituted, there was a six-day period of absence after it had been initially paused for valid reasons. It was not recommenced expeditiously and a fatal pulmonary embolus occurred.

The fourth category in this collection of cases is that of being decisive, with clear reasoning and documentation, when a conservative approach is initially chosen but surgical intervention then becomes the preferred course.

In this high-risk case—presenting some years after extensive intra-abdominal surgery and a subsequent marginal ulcer perforation—surgery for a perforated peptic ulcer was performed on the fourth postadmission day, two days after the decision to operate was made. The patient died of overwhelming intra-abdominal sepsis.

Unlike some previous ANZASM Case Note Review Booklets, lack of consultant involvement and major problems with transfer of patients between hospitals were not features of this current review.

Clear documentation remains a continuing challenge. Timely discussions between relevant clinicians, effective teamwork, the retrieval of results with minimal delay, and appropriate discussions with patients' relatives are features of high-standard professionalism.

An aging and often fragile population, increasing levels of obesity, and the persistence of several other preventable factors that include smoking, alcohol abuse and illicit drug usage, all add to the risks of surgery.

As the scope and complexity of some surgical procedures advance, there can also be an additional layer of risk. High standards of training, constant self-reflection, striving for improvement, empathy and constant vigilance are among the demands of a safe and successful surgical career.

This ANZASM initiative has proven its value in improving patient outcomes over the years and constructive comment on cases presented is encouraged.

---

**Kingsley Faulkner**

# Case Studies

## Case 1: Appropriate decision-making for gliosarcoma debulking surgery

---

### Neurosurgery

#### CASE SUMMARY

A 76-year-old woman was admitted to a regional hospital after 2–3 weeks of functional and cognitive decline including confusion, anorexia, weakness, decreased mobility and falls. Prior to her acute presentation, the patient had been driving and living independently. Her medical history included bronchiectasis and obesity. At admission she registered 14/15 (confused) on the Glasgow Coma Scale.

A magnetic resonance imaging (MRI) scan revealed a lesion of 6 cm mass in the left parietal lobe. The patient was transferred to the neurosurgical facility for assessment and management. She had an acute kidney insult, presumably partly related to anorexia and the lack of desire to drink, and a urinary tract infection for which she was treated with appropriate antibiotics.

The patient underwent aggressive debulking surgery, which was uneventful, and returned to the intensive care unit (ICU). Her postoperative neurological status was unchanged from the preoperative status. A postoperative MRI scan revealed some anterior residual tumour.

The patient had a variable clinical course after admission to the ward, with periods of worsening but fluctuating confusion and somnolence. Histology revealed gliosarcoma, with the results and the poor prognosis conveyed to the family. After multidisciplinary team (MDT) reviews and discussions with the surgical team and the patient's family, palliative treatment commenced.

#### DISCUSSION

It is easy in hindsight to criticise the decision to undertake aggressive surgery to attempt to debulk this tumour, given the uncertainty regarding the diagnosis, the relative acuity of the presentation and the independent activities of daily living (ADL) pre-morbid. While the outcome was poor, at the time of the patient's presentation with no pathological diagnosis (and no preceding history of malignancy), no molecular histopathology and mass effect from the tumour, it would have been difficult to predict this patient's course of postsurgical

decompression. The subacute confusion could possibly be explained by the mass effect of the 6 cm tumour.

There was no indication that the treating team had discussed palliation with the family prior to proceeding to surgery. Acknowledgement of the options considered should be carefully documented in the case notes.

A prognosis is heavily influenced by age and functional status (ECOG [Eastern Cooperative Oncology Group] score or Karnofsky score)<sup>1-4</sup> and based on these factors one could say that the patient should not have had the operation. Equally, however, there are studies that suggest aggressive surgical debulking, even in elderly patients, can confer survival benefits. Being objective, and with these publications in mind, it's hard to be too critical of decisions made at the time.

## CLINICAL LESSONS

It is now almost impossible to obtain an oncological opinion in an MDT meeting without histopathology. One must always consider the option of palliative approaches from the outset. However, some neurosurgeons would support surgery for this patient for pathological diagnosis and to reduce intracranial hypertension, after which further adjuvant management versus palliation can be considered.

While conjecture exists in the literature, no one should criticise treatment strategies as long as the discussions and thought processes are carefully documented.

## RESOURCES

1. ECOG–ACRIN Cancer Research Group. Eastern Cooperative Oncology Group scores. 2022. Available from: <https://ecog-acrin.org/resources/ecog-performance-status/>
2. Oken MM, Creech RH, Tormey DC, Horton J, Davis TE, McFadden ET, Carbone PP. Toxicity and response criteria of the Eastern Cooperative Oncology Group. *Am J Clin Oncol*. 1982 Dec;5(6):649-655. PMID: 7165009.
3. Karnofsky D, Burchenal J. The clinical evaluation of chemotherapeutic agents in cancer. In: MacLeod C, ed. *Evaluation of chemotherapeutic agents*. New York, NY: Columbia University Press; 1949, pp:191–205.
4. Zubrod C et al. Appraisal of methods for the study of chemotherapy in man: Comparative therapeutic trial of nitrogen mustard and thiophosphoramidate. *J Chronic Dis*; 1960, pp:11:7-33.

## Case 2: Management dilemmas in a patient with perforated ulcer

### General Surgery

#### CASE SUMMARY

A 77-year-old man presented to the emergency department (ED) after 2 days of sudden onset abdominal pain. His medical history included mild but increasing cognitive impairment, hypertension, type 2 diabetes mellitus and chronic obstructive pulmonary disease (COPD). He had undergone an operative closure of a perforated marginal ulcer 4 years prior, and a Whipple resection for intraductal papillary mucinous neoplasms 2 years before that.

On presentation, the patient had a pulse rate of 120 bpm, temperature of 38.8°C and blood pressure of 160/78 mm Hg; the abdomen was diffusely tender with no rigidity. A computed tomography (CT) scan showed a large volume of free gas, moderate free fluid and other features consistent with proximal jejunal perforation. He was treated with intravenous (IV) fluids, triple antibiotics, proton pump inhibitors and nasogastric (NG) aspiration.

On day 2, the patient's vital signs had improved (atrial fibrillation [AF] resolved). The abdomen was tender in the left upper quadrant (LUQ) but soft. Albumin was noted to be low at 21–23 g/L (normal: 35–50 g/L). On day 3, the patient's general condition was stable, although he was intermittently confused, and oxygen saturation was 93–95% on 2 L/min. At 18:00 he was booked for upcoming surgery. The reason for a change in strategy was not documented in the medical record. Vital signs had not changed significantly.

On day 4, ketones had increased, which was attributed to fasting. A plan to examine the gastrointestinal tract using a diatrizoate contrast medium (Gastrografin study) was documented at 14:45. Clinically there was some 'confusion', but the abdomen was soft with no peritonism.

On day 5, the patient was given a glucose/insulin infusion. His condition otherwise was stable. He had no abdominal pain; respiratory rate was 20–22 breaths per minute. At approximately 14:30, a laparotomy was performed via LUQ incision. Extensive adhesions were encountered and a perforation at the gastrojejunostomy located. This was closed and patched. There is no mention of the degree of contamination but 'extensive washout' of the LUQ was performed.

On day 7, the patient had rapid AF and type 1 respiratory failure; oxygen saturations were in the low 90s. He was intubated and given diuretics; IV antibiotics continued.



The patient was extubated on day 10 and maintained oxygen saturation above 90%. He had metabolic acidosis and malnutrition (on total parenteral nutrition). NG feeding commenced on day 11. The patient was confused and distressed and did not appear to be recovering. A family meeting concluded with a plan to extubate and cease vasopressors. He was transferred to the ward at 03:00 on day 12. The surgical consultant confirmed that transfer to a palliative care pathway was appropriate, as deterioration had continued despite maximum medical care. The patient died on day 13, 8 days after surgery.

## DISCUSSION

Nonoperative management of perforated peptic ulcer is an accepted course of action; the difficulty is defining the patient cohort for success. The plan for conservative treatment initially was reasonable because the perforation had likely occurred 48 hours before presentation and there were no definitive signs of peritonitis. The strategy appeared to be appropriate because the initial derangement in vital signs settled over the following 24 hours and the abdomen remained soft. However, 48 hours after presentation, the patient was booked for surgery. It is not clearly documented why the plan changed.

The surgeon indicated 'new' AF had developed, inflammatory markers were increasing and tenderness in the LUQ had increased. Surgery took place 42 hours after booking. Closing the perforation rather than formal resection was appropriate, given extensive adhesions and the patient's age and general condition. Unfortunately, the patient struggled postoperatively. He developed type 1 respiratory failure requiring intubation and ventilation and there were additional clinical issues with metabolic acidosis, AF and deconditioning. Despite intensive medical care, his condition deteriorated and end-of-life care was instituted following a family meeting.

It appears there was consultant input (surgeon and intensivist) into the management of this case, although 2 surgeons were involved sequentially in the patient's management and documented details of decision-making and handover are lacking. Communication with the family—especially defining goals and limits of care—was not always clear.

It is unclear if an immediate operation after presentation or persistence with the nonoperative option would have made a difference to the outcome—this is debatable. The patient's general condition, comorbidities and frailty remain significant factors in the outcome.

## CLINICAL LESSONS

It is not apparent why the operation was delayed for 42 hours once management was changed to surgery.

The importance of documenting consultant input into clinical decision-making and the reasoning behind those decisions is again highlighted.

## Case 3: Questionable decision to operate

### Cardiothoracic Surgery

#### CASE SUMMARY

A 78-year-old man presented with a febrile illness and was initially thought to have cholecystitis. His medical history included previous coronary bypass surgery and an aortic valve replacement with a porcine prosthesis (Mitroflow valve). His comorbidities included type 2 diabetes, AF, previous permanent pacemaker, chronic renal disease grade 2, hypertension, dyslipidaemia and previous stroke.

*Streptococcus mutans* was grown from a blood sample and treatment with appropriate antibiotics commenced. An echocardiogram suggested prosthetic valve endocarditis. The patient was transferred for consideration of surgery due to the echocardiographic appearance of vegetation on the prosthetic valve and the suggestion of an aortic root abscess. During hospitalisation prior to transfer, the patient had multiple medical emergency team (MET) calls for hypotension.

Following transfer, it appears that the patient was clinically stable, afebrile and had no clinical picture of prosthetic valve endocarditis. The records indicate his blood cultures had been negative for 5 weeks.

Based on the echocardiogram, it was decided to proceed with aortic valve replacement. A third-time sternotomy was performed. It appears that the ascending aorta could not be cross-clamped for reasons not outlined in the surgeon's note. Presumably, the operation was performed with ventricular fibrillation. No clear evidence of an active aortic root abscess was documented. Dehiscence of the prosthesis was observed. The aortic valve was replaced with a Perimount prosthesis.

Postoperative complications included bleeding requiring transfusion and takeback for cardiac tamponade and haemopericardium, vasoplegia with high vasopressor requirements, acute renal injury, delirium/agitation/confusion, respiratory failure requiring reintubation and ventilator-associated pneumonia. The patient was able to leave ICU but 2 days later suffered a pulseless electrical activity arrest and was unable to be resuscitated. There was no autopsy report.

#### DISCUSSION

The indication for surgery was unclear in this case and one wonders why conservative or percutaneous methods were not considered first.

Overall, given the risks, the eventual outcome was not surprising. In all probability, this patient had *Streptococcus mutans* prosthetic valve endocarditis that was successfully treated by antimicrobial therapy. The surgeon's note is not clear, but there seems to have been no evidence of an active aortic root abscess. The dehiscence of the prosthesis may have been a healed abscess.

Prosthetic valve endocarditis is not necessarily an indication for an operation, as many patients can be managed medically and successfully treated with antibiotics alone. This patient is an example where the prosthetic valve endocarditis appeared well managed by conservative means, with 5 weeks of negative blood cultures and stable echocardiogram findings.

There would have to be a compelling reason for surgery in a clinically stable patient who is afebrile with no clinical evidence of endocarditis and prolonged negative blood cultures, particularly a patient who has undergone 2 previous cardiac surgical procedures. Had failure been difficult to manage medically, again assuming no ongoing sepsis, percutaneous means of plugging the leak could have been considered in an effort to avoid surgery.

This patient had healed prosthetic valve endocarditis. The leaflets of the excised aortic prosthesis were culture negative. Histology of the leaflets showed gram-positive cocci on the surface of the leaflets embedded in fibrin. These gram-positive cocci were dead bacteria.

## CLINICAL LESSONS

In this case, assuming the patient was not in failure from the paravalvular leak, every effort should have been made to avoid further surgery. This elderly patient with multiple significant comorbidities could have been managed with an appropriate course of antimicrobial therapy. The aortic regurgitation due to the healed abscess and dehiscence could have been monitored by echocardiography.

## Case 4: Avoiding futile surgery may include avoiding inappropriate transfers

### Neurosurgery

#### CASE SUMMARY

A 53-year-old man presented to hospital A (elective, non-acute neurosurgery unit) with recurrent falls, a history of post-traumatic stress disorder, possible seizure disorder and ankylosing spondylitis. He had alcoholic liver disease classified as Childs–Pugh score C and continuing ethanol dependence (blood alcohol level on admission 0.42 g/dL). Blood tests revealed low platelets at  $49 \times 10^9/L$  (normal range  $150\text{--}400 \times 10^9/L$ ), abnormal INR (international normalised ratio) of 1.9 and elevated bilirubin at  $108 \mu\text{mol/L}$  (normal range  $1.71\text{--}20.5 \mu\text{mol/L}$ ). He was on lactulose and rifaximin for hepatic encephalopathy. A CT scan demonstrated small-volume intracranial traumatic subarachnoid haemorrhage and moderate-volume extracranial scalp haematomas. The patient was admitted under general medicine and deemed inappropriate for neurosurgical intervention.

There is no documentation of further falls (therefore trauma), but on day 3 the patient was found to have deteriorated. A progress CT scan demonstrated increased intracranial haemorrhage without mass effect. Intraparenchymal haemorrhage had extended into the middle cerebellar peduncle with oedema in the adjacent brainstem. Enlargement of a single temporal horn was reported. The patient was administered vitamin K 10 mg and Prothrombinex with INR decreasing to 1.5 but still not normalising. Platelets were also administered, resulting in a rise only to  $73 \times 10^9/L$  indicating likely sequestration of platelets in the context of alcoholic liver disease. The neurosurgeon requested the patient be transferred to a hospital with an acute neurosurgical unit.

At hospital B, the patient was not accepted to ICU because he was inappropriate for neurosurgical intervention. He was referred to and accepted by hospital C. The patient was well-known to the gastroenterology team at hospital C for hepatic encephalopathy and coagulopathy due to hepatic synthetic dysfunction.

At hospital C, the patient had repeat administration of vitamin K 10 mg and Prothrombinex, which failed to improve the coagulopathy. An external ventricular drain (EVD) was inserted but the patient's condition failed to improve. Improvement would have been expected given the low opening pressure of 5 cm  $\text{H}_2\text{O}$  (normal value 20 cm  $\text{H}_2\text{O}$ ). A subsequent tract haemorrhage was detected after insertion of the EVD.

Discussion with the family prior to insertion of the EVD, had confirmed that the

patient would not want to survive with significant morbidity. Palliative care was provided and the patient died 3 days after insertion of the EVD.

## DISCUSSION

Despite this patient being neurologically intact on admission to hospital A, there remained a distinct possibility of a poor functional outcome. At the point of deterioration (and transfer to hospital C), a poor functional outcome was highly probable. The futility of surgery should have been considered.

The decision not to offer surgery at the outset (hospital A) was correct. The patient was admitted under the general medical unit and managed conservatively, including possible palliation in the event of neurological deterioration. Goals of care should have been discussed with the family at this time and a ceiling of care placed. This would have been consistent with the wishes of both the patient and his family.

The deterioration was unlikely to have been due to the dilatation of a single ventricular horn, so the diagnosis of hydrocephalus is tenuous. It was always more likely due to the global nature of the intracranial haemorrhages unfolding on serial CT scans, in the context of a coagulopathic and encephalopathic patient with alcoholic liver disease (Childs–Pugh C). In this case, surgery of any kind was always likely to be futile.

As palliation was the appropriate course, interhospital transfer to an acute neurosurgical unit was unnecessary. Unnecessary transfers should be given due consideration because they can cause distress to patients and their families. While not appropriate, there will be an increasing number of patients that will be transferred due to the hospital systems in which we now work. This case highlights the difficulty with the current fragmented management within healthcare and hospital settings, increasing subspecialisation, communication issues and medicolegal concerns.

This case also highlights the importance of good communication. At hospital C, the family was accepting of the patient's effectively terminal chronic liver condition and the significance of what was to be his final admission.

## CLINICAL LESSONS

From the onset this patient's course of deterioration was completely predictable. After his deterioration the transfer and following interventions were all futile.

The importance of identifying the futility of care when considering invasive interventions—no matter how minor—in patients with highly morbid/mortal comorbidities, must be considered. It is often more difficult to make the decision

not to operate, but such cases present critically important training opportunities. This case highlights the importance of good communication with patients, their families and caregivers, which can often be an important step in avoiding futile surgery.

## Case 5: Sometimes patients just need blood

### Orthopaedic Surgery

#### CASE SUMMARY

A 63-year-old man was admitted electively for non-union of a fractured proximal humerus.

The 3-hour operation took place in the morning, involving removal of a broken plate and insertion of a humeral nail. The procedure was associated with significant blood loss. The patient's blood pressure was low throughout surgery and in recovery, so the anaesthetist ordered a full blood count; haemoglobin (Hb) was 83 g/L, with the last preoperative Hb reading being 123 g/L.

On postoperative day one the surgeon was informed that the patient's Hb was 74 g/L, but no action was taken. The patient appeared to be haemodynamically stable. However, the physiotherapist noted that the patient was lightheaded and dizzy on mobilising, and his wound was oozing.

There is no record of any blood tests undertaken on postoperative day 2, but an iron transfusion was ordered by the surgeon and administered later that afternoon. The patient was reported to be well and still haemodynamically stable. Later that afternoon an arrest code was called when he was found unresponsive. Despite appropriate resuscitation the patient was pronounced dead.

The coroner's report found the patient died from acute myocardial infarction with a background of significant coronary atherosclerosis.

#### DISCUSSION

From the case notes available there is little information on this patient's medical conditions. The brief anaesthetic notes documented no medical history. Preoperative nursing notes indicated that the patient did have shortness of breath on exertion. The surgeon reviewed the patient daily and made appropriate notes in the medical record. Communication and written records appear to be satisfactory. The patient was on appropriate deep vein thrombosis prophylaxis.

The surgeon was informed, but no apparent action was taken on postoperative day one, even though the low Hb (74 g/L) was a significant drop from the preoperative reading. No repeat blood tests to check Hb were recorded. The nursing staff noted that the wound continued to ooze. A repeat check of Hb either later on postoperative day one or at least on the morning of day 2 may have changed the management and impacted the outcome for this patient. A blood



transfusion was not given even though the patient had lost a significant amount of blood. Instead, the surgeon ordered an iron transfusion.

It could be argued whether an iron transfusion was appropriate for this patient. The patient likely needed packed red cells as a blood transfusion. From the information available, it seems an iron transfusion was *not* appropriate. The coroner considered whether the events could have resulted from the iron transfusion, but thought this unlikely.

For most patients, Hb drops for 2–3 days following major surgery. If this patient's Hb had been assessed on postoperative day 2 it likely would have been lower than on day one. A blood transfusion for this patient may have altered the outcome.

## CLINICAL LESSONS

Blood loss is common in major surgery and should be carefully monitored postoperatively. A symptomatic patient with Hb of 74 g/L one day after surgery must be treated expeditiously for anaemia with a blood transfusion.

In the immediate postoperative period (with acute loss of blood), a blood transfusion is far more appropriate than an iron transfusion due to a faster correction to the lost blood, which will help stabilise the patient. An iron transfusion in this setting is less likely to be helpful. Decision-making here should be regarded as very poor and early consultation with a physician colleague would have been appropriate.

## Case 6: The dilemma of futile surgery

### General Surgery

#### CASE SUMMARY

A 65-year-old man was admitted to the ED with sudden onset of severe epigastric pain, diarrhoea, peripheral circulatory shutdown, hypothermia and high lactate. His medical history included diabetes mellitus, hypertension and ischaemic heart disease. The patient was on aspirin and clopidogrel. At afternoon admission he had 10/10 epigastric pain.

Blood tests indicated severe metabolic acidosis and acute multiorgan failure (pH 6.63, lactate 13 mmol/L, potassium 6.8 mmol/L, white cell count  $15.9 \times 10^9/L$ ). He was too unstable for a CT scan. Immediate resuscitation included IV fluids, IV antibiotics and treatment for hyperkalaemia. Guidance was provided from the ED consultant within 60 minutes of admission.

At 90 minutes post-admission the patient had a cardiac arrest and required 16 minutes of cardiopulmonary resuscitation (CPR). Urgent surgical review recommended immediate exploratory laparotomy to exclude ischaemic bowel. While awaiting surgery, he suffered a second cardiac arrest requiring 6 minutes of CPR. There were discussions with the family about the patient's extremely high mortality risk—99% NELA<sup>1</sup> (National Emergency Laparotomy Audit) risk of death, 100% risk POSSUM<sup>2</sup> (Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity). The patient's family still requested surgery despite the high mortality risk.

The urgent laparotomy excluded ischaemic bowel. After returning to ICU, the patient died after a third cardiac arrest.

#### DISCUSSION

This is a case of an extremely unwell patient (moribund) with an uncertain diagnosis and very limited time for assessment.

The ED management and resuscitation were acceptable. During the patient's rapid deterioration, the decision-making process and family discussions were recorded and acceptable.

The surgical decision to exclude ischaemic bowel can be justified within the context of futile surgery and the anticipated poor outcome. The patient's good quality of life before this event (despite comorbidities) and the family's strong request for surgery make the decision reasonable. With the luxury of retrospective

analysis, however, one would question the role of laparotomy and whether alternative diagnoses were fully considered.

## CLINICAL LESSONS

Using medical futility as an ethical and legal argument to justify unilateral withdrawal of life-sustaining treatments against a family or surrogate's wishes is laden with difficulties.

In an urgent and deteriorating situation such as this, decisions need to be made quickly and without the benefit of time-consuming investigations. The doctor is likely to be more dispassionate and evidence-driven than are family members confronted by an impending death but the decision to decline or undertake treatment remains legally and ethically that of the patient. Discussions with patients and their surrogates are vitally important and must be fully documented.

## RESOURCES

1. National Emergency Laparotomy Audit <https://data.nela.org.uk/riskcalculator/>
2. Physiological & Operative Severity Score for the enUmeration of Mortality and Morbidity

[The POSSUM scoring system: an instrument for measuring quality in surgical patients] - PubMed (nih.gov) <https://pubmed.ncbi.nlm.nih.gov/17192224/>

## Case 7: Probable massive pulmonary embolus following complicated laparoscopic cholecystectomy

### General Surgery

#### CASE SUMMARY

A 67-year-old woman was admitted for elective laparoscopic cholecystectomy, having been previously documented as having gallstones with probable cholecystitis. She had history of a significant pulmonary embolism following a varicose vein operation and was maintained on 2.5 mg of apixaban (Eliquis) twice daily.

The laparoscopic cholecystectomy was difficult, due to significant inflammation of the gallbladder and bleeding. Visualisation of Calot's triangle structures was not easy, but the cholangiogram was documented as clear. A drain left in situ fell out on day one post-surgery, but an ultrasound 2 days later showed no collection. The patient then became distended with vomiting and a CT scan revealed a small bowel obstruction related to a para-umbilical hernia. She was taken for laparotomy for release of the trapped bowel but was found to have bile-stained fluid in the peritoneal cavity. A drain was placed in the gallbladder fossa. The patient was managed in ICU, with a significant output of bile from the drain. She had acute renal impairment and was started on total parenteral nutrition.

Five days post-laparotomy, a hepatobiliary iminodiacetic acid (cholescintigraphy) scan showed a significant bile leak from the gallbladder fossa, tracking to the LUQ. The following day, the patient proceeded to an endoscopic retrograde cholangiopancreatography (ERCP) with stent placement. The leak was noted to be from the region of the junction of the common hepatic duct and the common bile duct. The leak appeared to be resolving, and she was discharged from ICU 3 days later.

For the first 5 days of the overall admission, the patient had been on twice daily subcutaneous heparin injections, which then switched to three times daily. Heparin was briefly withheld for the ERCP. In the ward, the patient had persistent fever. During the ward round, thought was given to imaging with a percutaneous drainage, if necessary, and heparin was ceased at this time. However, no procedure was immediately undertaken; heparin was not recommenced.

A CT-guided aspiration of the LUQ fluid was eventually undertaken 6 days later. No pus or bile was found; the drain was removed and apixaban restarted. By this time, the patient had been without thromboembolic prophylaxis for 6 days. The following day, she was febrile and clammy and complaining of right lower

quadrant pain. Before further investigations could be instituted, the patient arrested and could not be revived. The diagnosis was presumed to be a massive pulmonary embolism. The case was referred to the coroner.

## DISCUSSION

The small para-umbilical hernia causing the bowel obstruction was described as ‘separate to the entry point for the laparoscopic cholecystectomy’. It is reasonable to expect this would not have been noticed at the time of the laparoscopic cholecystectomy. The drain was placed well enough at that time to provide drainage of the biliary leak. Although not described, this was presumably done more by feel than by direct vision.

An ERCP and stent was undertaken as part of the management, with apparently good effect.

The left subphrenic collection was ultimately aspirated, without concerning features in the fluid. Inflammatory markers and liver function tests had been normalising up to that point. Nonetheless, she became febrile again, with renewed abdominal pain just before her death, so it is possible the bile leak or intra-abdominal sepsis had not fully resolved. The patient succumbed before this could be investigated further, although the sudden nature of her death is more in keeping with pulmonary embolism.

The coroner confirmed the cause of death as pulmonary embolism.

## CLINICAL LESSONS

The patient was without thromboembolic prophylaxis for 6 days in the latter part of her admission. This is a cause for concern, given her history and her acute illness, and probably contributed to her demise. Cessation of such medications should not occur without a signature. Similarly, all perioperative team members should routinely check that appropriate thromboembolic prophylaxis guidelines are being comprehensively followed.

The reason for the lower dose apixaban cannot be determined from the case file review.

# Case 8: Poor intraoperative decision-making contributing to unexpected intraoperative death after bypass surgery

## Cardiothoracic Surgery

### CASE SUMMARY

A 63-year-old man was scheduled for elective coronary artery bypass surgery, pulmonary vein isolation and stapling of left atrial appendage (LAA). He presented with exertional angina and coronary angiogram-confirmed triple vessel coronary artery disease with moderate left ventricle impairment. The patient was a current smoker, with relatively preserved lung function. Significant comorbidities included morbid obesity (body mass index 44), poorly controlled type 2 diabetes mellitus on insulin treatment, hypertension, dyslipidaemia and permanent AF of 5 years duration.

The operation started around 08:00. The operation report in the file (received by medical records some 10 months after surgery), repeatedly highlights technical difficulties in all aspects of the operation. The left internal mammary artery and long saphenous vein were harvested, and grafts fashioned to the left anterior descending artery (LAD) and the diagonal, distal obtuse marginal and acute marginal arteries. The LAA was stapled off, with no details provided regarding the type of stapler used.

During weaning from cardiopulmonary bypass, bleeding was noted behind the heart, which was eventually diagnosed as atrioventricular disruption. This could not be repaired despite multiple attempts. The patient could not be weaned from cardiopulmonary bypass and ultimately exsanguinated on the operating table.

### DISCUSSION

Access to the base of the LAA is difficult in patients with bulky hearts and deep chests—both conditions described as being of major concern for this patient. It is hard to justify the decision to proceed with stapling of the LAA in these circumstances, particularly as there was no real indication such as intolerance to anticoagulation, previous embolic events or documented LAA thrombus.

The cause of bleeding was almost certainly bleeding from the site of the LAA stapling. True atrioventricular disruption is not described as a complication after coronary artery bypass graft surgery. Use of stapling devices for occlusion of the LAA is known to be associated with bleeding complications. Newer, non-traumatic devices such as the AtriClip are now available, particularly for patients with poor tissue quality, such as this patient.

## CLINICAL LESSONS

The death of this patient was avoidable. The decision to proceed with stapling of the LAA directly caused the bleeding complication that ultimately led to the patient's death. This represents a complete loss of situational awareness. It is strongly recommended that a proper root cause analysis be performed by the hospital.

# Case 9: Attributing falling postoperative haemoglobin to a faulty blood pressure cuff results in death following cholecystectomy

## General Surgery

### CASE SUMMARY

A 57-year-old woman was transferred from a regional hospital to a tertiary hospital following diagnosis of cholelithiasis complicated by mild pancreatitis. She was initially transferred for potential ERCP. She had severe comorbidities including type 2 diabetes, obesity, end stage renal failure (on dialysis) and hypertension.

After appropriate investigation and consultation, it was found that ERCP was not required, due to an absence of stones in the bile duct and resolution of jaundice. The patient throughout had normal blood pressure (BP) and no difficulties or challenges in recorded vital signs. Inflammatory markers were also improving, in keeping with mild pancreatitis. It was decided to proceed with cholecystectomy.

Laparoscopic cholecystectomy was performed on day 3 of admission. Preoperative preparation included assessment from the renal and anaesthetic teams and involvement of intensive care should it be needed postoperatively. The procedure was performed by a senior registrar with the consultant present. All ports were inserted under vision—the umbilical via an open technique; the epigastric port was a 12-mm port. The consultant reported a normal-appearing gallbladder with minor adhesions in Calot's triangle, leaving the senior registrar to finish the operation (concluded at 15:30). There were no reported complications during the procedure. There were no records of whether the ports were removed under vision.

A MET call for hypotension (systolic BP <90 mm Hg) occurred at 05:50 and concluded that the patient had hypovolaemia secondary to preoperative starvation and dialysis. Heart rate was normal and no other symptoms were reported. A second MET call for hypotension occurred at 06:30. The opinion was that the low blood pressure was secondary to dialysis and a cautious bolus of fluid was given. There was a transient improvement before the BP dropped again. The patient was reviewed again at 07:15, noting that she had a total of 750 ml of crystalloids and 100 ml of 20% albumin, with another 100 ml of 20% albumin ongoing at that time. The team attributed the ongoing low BP to difficulty in gaining measurements, as the patient was obese. A third MET call was activated at 09:00. Although the intern noted a fall in Hb, the MET team and the surgical registrar concluded this was asymptomatic hypotension of non-surgical cause



amidst issues with measuring the BP postoperatively. Another MET call for hypotension occurred at 16:30. There is no record of Hb retesting and this was again considered asymptomatic hypotension of uncertain cause.

At 02:25 of postoperative day 2, another review (reason unclear) by the night registrar documented that the blood Hb had been dropping from a preoperative level of 127 g/L to 100 g/L at 06:00 on postoperative day 1, to 84 g/L at 10:00, 75 g/L at 18:00 and 70 g/L by midnight. The notes record 'impression – post op bleed'. A CT scan with contrast requested the next morning showed a haematoma in the epigastrium extending towards the right side, likely to be a bleed from the superior epigastric artery.

Further review by the surgical fellow and senior registrars instigated a plan for embolisation, which was agreed after discussion with the consultant (the only time a consultant discussion was recorded in the notes). Due to the concern of rising potassium, no blood transfusion was initiated. It was decided that the patient would have a blood transfusion concurrently with dialysis, scheduled to occur the night after embolisation.

The radiological embolisation was challenging but successful. The patient then proceeded to dialysis. Hb at commencement of dialysis was 57 g/L.

After initiation of dialysis, the patient suffered a cardiac arrest and prolonged CPR. She was transferred to ICU for continuing management; however, a significant hypoxic injury involving the brain and liver was evident. The patient failed to recover from the hypoxic brain injury and passed away a few days afterwards.

## DISCUSSION

This patient, who presented with a common surgical problem, had significant comorbidities. The decision to proceed with cholecystectomy was appropriate. Even if the blood pressure cuff was thought to be faulty, the fall in Hb at the first 2 MET calls should have been investigated with CT. This delay in diagnosis sealed her outcome. Once the complication was identified, the choice to embolise a bleeding epigastric artery may have been appropriate. In isolation, superior epigastric vessel injury is salvageable and survivable, but the outcome is influenced by comorbid conditions, and delays to diagnosis and treatment.

The reason for failure to rescue in this case is attributing postoperative hypotension and anaemia to a faulty blood pressure cuff. Communication between the junior team, the surgeon and physicians should have been far better. Consultant leadership in this case seems to be almost completely absent despite the serious nature of the complications. The patient's arrest was likely due to a significant volume depletion that caused cardiogenic or hypovolaemic shock, which resulted in the significant hypoxic brain injury. Incorrectly attributing the

low BP in the immediate postoperative period to difficulty in measuring BP in a non-invasive manner caused significant delay in recognising the complication. The surgical team failed to appreciate that falling postoperative Hb is due to haemorrhage until proven otherwise.

A rare complication such as a bleed from a port site was overlooked because the main procedure was straightforward. It is not clear why a 12-mm epigastric port was used. Believing that a straightforward cholecystectomy could not have contributed to the patient's hypovolaemia, the team tried to explain the low BP by technical challenges in measuring BP, but did not account for falling Hb. An earlier review with the surgical consultant and physician involvement would have guided the team to a better way of diagnosing and managing the patient's complication.

## CLINICAL LESSONS

Postoperative hypotension in a patient who transiently responds to fluid boluses is a postoperative bleed until proven otherwise.

It is also good practice to pay attention to the ports equally during insertion. A correctly placed epigastric port cannot injure the superior epigastric vessels. It is likely this port was placed off midline and/or angled, resulting in vascular injury. Ports need to be removed under vision as an injured vessel may not bleed during surgery due to the tamponade effect of the port.

A postoperative fall in Hb in the setting of multiple MET calls requires intervention and imaging. If this was done, the diagnosis would have been made some 36 hours earlier. In a multimorbid patient a multidisciplinary approach to treatment is required (to consider the best ward for care, timing of transfusion, and timing and type of intervention).

## Case 10: Elective bypass using bilateral radial grafting in a patient with diffuse triple vessel disease

### Cardiothoracic Surgery

#### CASE SUMMARY

An 82-year-old man was admitted electively to undergo a triple coronary artery bypass graft. He presented with progressive dyspnoea and angina occurring on minimal exertion despite a marked reduction in activity. He was an ex-smoker with a history of bowel resections, radical prostatectomy and hypertension. He had known mild mitral regurgitation that had not deteriorated, a mildly dilated left ventricle with severe hypokinesia of the basal inferior wall and septum, and an ejection fraction of 56%. Coronary angiography showed severe diffuse disease. He had previous bilateral varicose vein stripping and moderate renal impairment.

Due to the lack of a venous conduit, it was elected to proceed with bilateral radial grafting. A complete median sternotomy was performed. Extensive adhesiolysis throughout the pleural space was required to mobilise the lung and gain access to the mammary and also to allow for the mammary to enter the pericardium. Several enlarged internal mammary artery lymph nodes were excised and sent for histology. The pericardium was opened, where extensive pericardial adhesions required further adhesiolysis before cardiopulmonary bypass could be instituted via an ascending aortic and 2-stage right atrial venous cannula. The patient's temperature drifted to 34°C. Haemofiltration was applied during bypass. Additional adhesions were divided on bypass, but the coronary arteries remained very difficult to visualise. The aorta was cross-clamped and room temperature blood cardioplegia supplied antegradely and retrogradely. Repeat retrograde doses were given during the procedure and antegrade doses after completion of each proximal anastomosis.

All vessels were difficult to find due to the extensive adhesions. The right coronary and posterior descending arteries were extensively dissected but found to be inoperable due to heavy calcification and distal disease. The left ventricular branch was opened from the mid to distal third, where it was still diseased. Probing in both directions yielded no lumen, so the arteriotomy was extended, but a 1 mm probe still would not pass. The vessel was grafted with a patch graft using the right radial. Runoff was acceptable but relatively poor. The proximal anastomosis was performed to the right anterolateral aspect of the aorta. The circumflex marginal artery was grafted from the mid to distal third just prior to its terminal bifurcation, where there was still considerable disease and runoff again was only average. The diagonal was dissected but felt to be completely

inoperable. The mid to distal junction of the LAD was opened, where it was a very diseased, barely 1.5 mm vessel. Probes of 1 mm would only pass a short distance in either direction. The left internal mammary artery (LIMA) was brought into the pericardium via a separate incision anterior to the phrenic nerve (after further dissection of pleural adhesions) and anastomosed end-to-side to the LAD. All anastomoses were technically extremely difficult due to the disease and the small vessel sizes, but they appeared to be satisfactory on completion.

After removal of the cross-clamp, the heart returned initially to a rhythm of bradycardia with little electrical output. Atrio-ventricular sequential pacing was instituted. After a short period, sinus rhythm recurred and only atrial pacing was required for rate. The heart then separated from bypass without difficulty or requirement for inotropic support. Intraoperative transoesophageal echocardiography (TOE) showed that ventricular function was as preoperatively and there were no ischaemic changes on electrocardiogram (ECG). The heart was decannulated without incident, but haemostasis took considerable effort due to generalised ooze and the extensive raw areas from the division of pleural adhesions. A 28F PleuraFlow drain was inserted in the left chest and a regular 32F mediastinal drain also used. The pericardium was extensively closed. The sternum was closed routinely with 4 figure-of-8 cable wires and insertion of a PainBuster catheter.

The patient was stable at completion of the procedure—in sinus rhythm with atrial pacing for rate, with no ischaemic changes and reasonable function on TOE comparable to preoperatively. He was returned to ICU, where the initial cardiac output was a little low, but otherwise he remained stable for the first 2 hours. Subsequently, he suddenly developed progressive hypotension requiring increasing inotropic support. There were no ischaemic changes on ECG, but emergency trans-thoracic echocardiography confirmed poor global cardiac function without evidence of pericardial effusion or tamponade. The patient's condition continued to deteriorate with increasing inotropic support and brady-arrhythmias. CPR commenced and after a short period the Lund University cardiopulmonary assist system (LUCAS) machine was attached, which attained good blood pressures although the patient remained acidotic.

It was felt that immediate reoperation was not feasible in view of the initial poor vessels and the lack of any further available conduit. Preparations were made to place the patient on peripheral extracorporeal membrane oxygenation (ECMO) in ICU while the catheterisation lab was readied for angiography. The lab became available before ECMO was instituted and the patient was taken there on the LUCAS device. Coronary angiography confirmed that the native LAD and circumflex had both occluded such that there was effectively no native flow. The left radial artery graft to the marginal artery appeared occluded for its whole length. Additionally, the proximal right radial artery and the LIMA both seemingly had flow however they appeared to be occluded in their distal thirds with no distal flow.

In view of the clinical situation and particularly the unavailability of conduit it was felt that re-do surgery was not feasible. A brief attempt was made to angioplasty the LAD but this was unsatisfactory. Resuscitation ceased and the patient died at 17:50. The case was reported to the coroner.

## DISCUSSION

In this case, the decision to operate, intraoperative management and postoperative care could all be vastly improved.

First, is the decision to operate at all. The surgeon's assessment of risk of death was stated as considerable. The reasoning is unclear, but if it was due to the condition of the coronary arteries—stated intraoperatively as being extremely poor—this should have been known and recognised from the preoperative angiogram and should have been prohibitive to surgery.

Regarding the technical aspect of the surgery, it was stated in the operative summary that the coronary arteries were not probe-patent to a 1 mm probe at the site of the anastomosis. However, they were grafted at that site regardless of this finding. This makes no sense and is a recipe for disaster: the grafts would definitely not remain patent, causing additional potential compromise to the native coronary arteries. This appears to have occurred in this situation and led to the death of the patient.

In the original SCF submission it is stated that the patient was initially stable for 2 hours postoperatively in ICU before a rapid deterioration. In fact, the medical notes reveal this was not the case. The patient was returned to ICU in a poor state with an initial cardiac index of only 1.3. In less than an hour he was in extremis, culminating in death. The patient was having CPR and being transferred to the catheterisation lab only 75 minutes after returning to ICU.

There were multiple signs both intraoperatively and postoperatively that this patient was in trouble, but these signs were ignored or treated inappropriately.

## CLINICAL LESSONS

Surgery cannot fix every problem. It is often better to be open with patients about their overall poor prognosis rather than attempt time-consuming and resource-heavy operations with almost inevitable tragic outcomes.

# Case 11: Inappropriate gastrectomy in a patient with advanced gastric cancer

## General Surgery

### CASE SUMMARY

A 67-year-old man was admitted to a major regional hospital for investigation of anorexia, weight loss and abdominal pain. His medical history included 35 years of smoking (ceased 4 years prior to presentation) with mild to moderate COPD, a cardiac pacemaker and rheumatoid arthritis requiring immunosuppressant medication. The consultant anaesthetist assessed him as ASA grade 3 (American Society of Anesthesiologists physical status classification system)—a patient with severe systemic disease.

On day one of admission an endoscopy revealed a fungating distal gastric tumour, malignant on biopsies. The patient was scheduled and consented for gastrectomy, which took place on day 2. Haematology and biochemical blood tests were ordered prior to surgery but no radiology tests. During the operation, the tumour was found to be locally advanced, infiltrating the pancreas, with nodal and liver metastases and mild ascites. A partial gastrectomy was performed with Billroth II anastomosis.

Pathology confirmed a small-cell neuroendocrine tumour with an adenocarcinoma component, extension of tumour into the omentum, a possible small perforation and involvement of the proximal resection margin. The clinical plan was to seek an MDT review with a view to palliative chemotherapy.

Postoperatively, the patient was managed in a high dependency unit. On day 4, he developed paralytic ileus with increasing analgesic requirements. CT scans on day 6 identified basal lung atelectasis; however, a contrast swallow showed no obvious anastomotic leak. On day 10, the patient deteriorated with severe abdominal pain and copious bilious fluid leaking through the old surgical drain site, indicating an anastomotic or duodenal stump leak. Haemoserous fluid began to drain from the surgical incision, suggesting deep wound breakdown. After discussion with the patient and family considering the advanced malignant disease, palliative care commenced. The patient died on day 13.

### DISCUSSION

The first major area of concern in this case is the inadequate preoperative workup. The cancer appears to have been diagnosed from the endoscopy on

day one. Surgery was performed the next day. There was insufficient time for a proper workup, including CT staging and optimisation of comorbidities, or for the patient and family to consider treatment options. Preoperative CT scans would have identified the retroperitoneal invasion and nodal and liver metastases subsequently found during the operation. The scans help to determine whether the cancer is operable in the first place, to identify the intent of treatment be it curative or palliative, and to plan surgery when necessary.

The second major area of concern for this case is the decision to undertake a major gastric resection in a patient with significant comorbidities and probable advanced disease. There was clinical suspicion that the patient had locally advanced disease. The presentation included abdominal pain interfering with sleep and affecting quality of life, suggesting malignant infiltration of the pancreas or coeliac plexus, or metastatic disease. The patient's ability to survive a major gastric resection was doubtful, given the ASA grade 3 assessment on admission. The operation seems to have been done hastily in a patient whose comorbidities suggested a significant risk of major postoperative complications. The condition was incurable, thus a gastrectomy was inappropriate from both curative and palliative points of view. The patient's major complaint was pain, without obstruction or significant bleeding.

Based on the presentation of the patient, there was no need to rush the surgery. Proper assessment and optimisation of a patient who has significant comorbidities would have been the appropriate course. An MDT approach should have been considered early after the pathology was identified. This would have allowed the treating surgeon to appreciate the advanced stage of the cancer and devise an appropriate nonoperative palliative treatment, including pain management and comfort measures. A proper operative risk assessment would have also indicated that this patient would not survive such a major surgery.

## CLINICAL LESSONS

A complete loss of situational awareness by the surgeon is demonstrated in this case. Preoperative staging with chest and abdominal CT scans and an MDT process remains the current recommended practice in gastric cancer operations. Modern communication technologies allow an MDT opinion to be obtained easily, even in regional centres. Almost certainly, this would have recommended palliative chemo/immunotherapies, coeliac plexus block perhaps to relieve pain, and the possible option of gastro-duodenal stenting, if required, to relieve symptoms and give the patient extra time. These measures would have saved the patient a totally inappropriate, unnecessary and ultimately fatal major procedure.

# Abbreviations

ADL	activities of daily living
AF	atrial fibrillation
ASA	American Society of Anesthesiologists
BP	blood pressure
COPD	chronic obstructive pulmonary disease
CPR	cardiopulmonary resuscitation
CT	computed tomography
ECG	electrocardiogram
ECMO	extracorporeal membrane oxygenation
ECOG	Eastern Cooperative Oncology Group
ED	emergency department
ERCP	endoscopic retrograde cholangiopancreatography
EVD	external ventricular drain
Hb	haemoglobin
ICU	intensive care unit
INR	international normalised ratio
IV	intravenous
LAA	left atrial appendage
LAD	left anterior descending artery
LIMA	left internal mammary artery
LUCAS	Lund University cardiopulmonary assist system
LUQ	left upper quadrant
MDT	multidisciplinary team



MRI	magnetic resonance imaging
NELA	National Emergency Laparotomy Audit
NG	nasogastric
POSSUM	Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity
SCF	surgical case file
TOE	transoesophageal echocardiography



# Notes

A series of horizontal dotted lines for writing notes, spanning the width of the page.



Royal Australasian  
College of Surgeons  
Australian and New Zealand  
Audit of Surgical Mortality  
24 King William Street  
Kent Town SA 5067

**Telephone:**

+61 8 8219 0901

**Email:**

[anzasm.racs@surgeons.org](mailto:anzasm.racs@surgeons.org)

**Website:**

[www.surgeons.org/anzasm](http://www.surgeons.org/anzasm)

