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The Royal Australian
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College of Obstetricians
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Excellence in Women's Health



Australian and New Zealand
Audit of Surgical Mortality



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CONTENTS

CHAIRMAN'S REPORT	3
ANZASM CLINICAL EDITOR'S REPORT	4
RECOMMENDATIONS	5
CASE STUDIES	6
Case study 1: Missed mesenteric embolus with bleeding complications following failed peripheral thrombolysis	7
Case study 2: Assessment by a more senior member of the surgical team may have led to more aggressive intervention in the postoperative period	9
Case study 3: Consultant assessment needed for proper palliative care	11
Case study 4: Multiple delays in postoperative management.....	12
Case study 5: Doubtful diagnosis resulted in death after laparotomy	14
Case study 6: Delay in diagnosing a strangulated hernia	15
Case study 7: Delayed recognition of jejunal perforation.....	16
Case study 8: Delay in diagnosis of anastomotic leak potentially avoidable.....	18
Case study 9: Misdiagnosis results in unnecessary surgery	21
Case study 10: No apparent assessment plan of management	23
Case study 11: Ruptured thoracic aorta with late diagnosis.....	25
Case study 12: Poor monitoring and assessment after subdural haematoma	26
Case study 13: Communication failures and inaction in a case of missed small bowel obstruction.....	29
Case study 14: Septic shock undiagnosed for two days.....	32
SHORTENED FORMS	34
CONTACT DETAILS.....	34

Chairman's Report

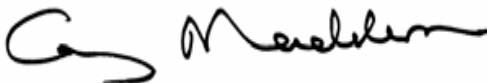
This is the 12th National Case Note Review Booklet from the Australian and New Zealand Audit of Surgical Mortality (ANZASM). On this occasion, the booklet focuses on the areas of misdiagnosis, delays in diagnosis, and insufficient preoperative assessment. All of these are factors in a busy surgical practice, with hospitals that are under increasing pressure - particularly within the public hospital environment. But such circumstances are no excuse for misdiagnosis, delays in reaching a diagnostic decision or, even harder to explain, insufficient preoperative assessment.

It is vital that we all avoid falling into the trap of assuming that the patient we are seeing is absolutely standard and is not deviating from our usual casemix. Some patients carry comorbidities and issues surrounding their care that can only be elucidated with careful history, examination and appropriate reflection.

The lessons told in this booklet again serve as a warning that we all have the potential to be misled, or less than vigilant, in our assessment and management of our patients. Fortunately, the outcome of such a lack of vigilance does not always end in death or serious morbidity; however, as this booklet clearly identifies, this can be the case. These lessons are being increasingly investigated and researched within the audit of surgical mortality. Ongoing publications continue to appear, identifying areas where improvements can be made and helping us achieve better outcomes for the patients entrusted to our care.

It is worth noting that surgical mortalities have fallen over the period of the audit. However, there is still room for further improvement, and hopefully a careful appreciation of this booklet will provide lessons for us all.

As always, we would be pleased to receive constructive suggestions and feedback.



Professor Guy Maddern
Chair, ANZASM

ANZASM Clinical Editor's Report

The 12th booklet includes cases from all states and territories and forms part of the feedback process that is seen as essential in the quality improvement processes of the audits of surgical mortality. A national booklet is produced to provide a wider readership for cases from various states. It also assists smaller states and territories that do not have enough cases to produce their own booklet and may have difficulty in adequately de-identifying cases. The larger states will continue to publish their own case note review booklets as well as contribute to the national booklet.

The cases in this booklet are focussed on patients for whom there was a delay in diagnosis or an incorrect diagnosis. Surgeons cannot always be correct in their diagnoses, but they must always be aware that their “atypical” case may be typical of another diagnosis. Sometimes the delay is not due to the surgeon but systems, radiologists, junior staff acting above their abilities and nursing staff. All persons involved in the care of patients must ask themselves the following questions: “Should this treatment or investigation be delayed at all?” and “Could I possibly be wrong?”.

Some of the cases have been edited to focus on a few points in a complex story or to reduce the length of the report. There is variability in the writing style as the text is, in general, written by assessors and treating surgeons and not by the editor.

There may be cases where readers may not entirely agree with the assessment and comments, but if we have stimulated you to think about the case we have succeeded in our aim. Correspondence and questions about specific cases are welcome, and while the ANZASM cannot provide identifying information, we may be able to explain the case in more detail than we have in this booklet.

As the ANZASM office is in the same building as the office of the South Australian Audit of Surgical Mortality (SAASM), it seemed logical that the final clinical editing process would be done by the clinical director of SAASM on behalf of ANZASM. I must emphasise that I did not write this booklet. The real authors are the treating surgeons, the clinical directors, and the first- and second-line assessors of the various states and territories. To the assessors and the treating surgeons we all owe a debt of gratitude, as this publication would not be possible without them. Please learn from these cases.

Glenn McCulloch

Clinical Director, SAASM

Clinical Editor, National Case Note Review Booklet, ANZASM

Recommendations

- In complex cases there needs to be clear, demonstrable leadership in patient management. There should be regular team meetings involving all disciplines to ensure that the treatment plan is understood by all.
- Communication remains one of the most critical factors in the delivery of safe, high quality patient care. Good communication between surgeon colleagues, other specialists, junior staff, nursing staff and allied health staff remains a cornerstone of quality care.
- All clinicians should provide clear and relevant records. Some of the cases in this report had record keeping deficiencies.
- The acute abdomen patient should be cared for in an acute surgical ward with staff who are competent to assess and deal with such cases. They should not be in medical wards.
- Junior medical staff should not be expected to make assessments and perform operations beyond their level of competence.
- Senior ward nursing staff should make sure that their juniors are able to handle their duties and have sufficient knowledge of the area of nursing in which they are working.
- Consultants should be actively involved in the care of their patients, including in the decision-making process. They have an obligation to make personal entries in the case record of the reasoning behind their decisions.

Case Studies

Case study 1: Missed mesenteric embolus with bleeding complications following failed peripheral thrombolysis

CASE SUMMARY:

This case involves a patient who was admitted to hospital with a history, provided by the ambulance officer, of bilateral hip pain that subsequently substantially resolved to a cold, numb, pale, pulseless right lower leg and lesser changes on the left. The patient had a past history of coronary artery bypass surgery, possible chronic renal failure and a ureteric stent. There was no past history of atrial fibrillation (AF) or peripheral vascular disease.

The patient was initially treated with heparin infusion and had an angiogram that showed the presence of a distal popliteal embolus. An arterial Urokinase infusion was instituted and the patient was transferred back from radiology and provided increased nursing care in the ward.

The same evening the patient was noted to have developed a haematoma in the right groin, and when this extended to produce pain in the right flank the Urokinase

infusion was stopped. Subsequent investigations showed that the haematoma had extended into the right flank.

The patient was subsequently stated to have developed worsening pain in the right leg, and as a result of this underwent popliteal artery exploration, embolectomy and fasciotomy.

After this operation the patient was transferred to an intensive care unit (ICU) where ventilation, haemofiltration and inotropic support occurred. The patient's haemoglobin (Hg) was 7.7 g/dL and this was treated with a blood transfusion.

The following day the patient was noted to have abdominal pain. A subsequent computed tomography (CT) scan showed ischaemic gut, confirmed by the presence of elevated lactate in the blood. A laparotomy was performed that showed extensive ischaemic gut from the proximal small bowel to ascending colon, and this was judged inoperable. With the consent of the family, the patient was kept comfortable and subsequently died 2 days after admission.

CLINICAL LESSONS:

This patient presented to hospital with a surgical condition that was

treated by attempted thrombolysis. This process resulted in a significant complication of groin and retroperitoneal haematoma. The patient also had a history of chronic renal failure, but despite this underwent two CT scans, presumably with contrast, and lower limb angiography. This may well have resulted in deterioration of their renal function and the need for haemofiltration. The treating unit appeared to concentrate solely on the right lower limb ischaemia, whereas the ambulance history suggested that both lower limbs were initially affected.

The patient developed worsening renal failure, as well as gut ischaemia, suggesting the possibility of a shower of emboli rather than a single embolus affecting the right lower limb. No distal thrombus was retrieved from the right lower limb when popliteal embolectomy was performed. It was noted that during the embolectomy procedure the patient was given a further 100,000 units of Urokinase. Given the extensive retroperitoneal bleed that occurred with the previous Urokinase infusion, this may have exacerbated the problem. It may have been prudent to have explored the groin and ensured that the bleeding site was well controlled beforehand. The operative procedures, both embolectomy and laparotomy, were

otherwise carried out in a sound manner.

There were a number of deficiencies in the history and case notes. It appears that the initial assessment concentrated solely on the right leg.

There were no entries detailing the:

- discussions with the radiologists
- treatment options
- operative consent forms
- details of some aspects of the operations.

In conclusion, this patient would not have experienced the groin and flank haematoma complications had they undergone a formal popliteal artery exploration and embolectomy as an initial procedure. The ambulance officer notes and the initial finding in the emergency department (ED) indicate that the patient's problem was generalised rather than specifically related to the right lower limb. If this had been appreciated at the time of presentation, then earlier diagnosis may have been made of the chronic renal failure and possible ischaemia of the bowel. It is possible that even with limited procedures this patient may not have survived.

Case study 2: Assessment by a more senior member of the surgical team may have led to more aggressive intervention in the postoperative period

CASE SUMMARY:

This cachectic 50 kg 80-year-old patient appears to have died as a result of a leak from an ileocolonic anastomosis, 9 days after an extended right hemicolectomy (autopsy results were not available for review). There appears to have been a significant delay in the initial diagnosis, as the patient had a positron emission tomography (PET) scan identifying the lesion 5 months previously. This delay in diagnosis was not associated with the current treating team.

Following admission, the patient went on to have a colonoscopy that identified an obstructing lesion in the transverse colon, confirmed to be adenocarcinoma. The patient had anaesthetic and dietician review prior to proceeding to an extended right hemicolectomy and ileocolic anastomosis. The patient had appropriate preoperative anaesthetic assessment, intraoperative care and early postoperative care.

The patient's postoperative recovery was characterised by delayed return

of gut function and fluid balance issues. Fluids and light ward diet were initially commenced on postoperative day one. The patient opened their bowels on day three postoperatively but had abdominal distension and nausea. On day four the patient vomited requiring nasogastric tube (NGT) insertion. With ongoing ileus and vomiting on day five, the patient was noted to have a tender abdomen, but passed wind and tolerated clear fluids by day seven. The patient had low urine output on a number of occasions postoperatively, requiring fluid boluses and medical registrar review. The patient was felt to be intravascularly deplete secondary to hypoalbuminemia. The patient did not manifest overt signs of sepsis during this time, remaining afebrile and with a relatively normal full blood examination. Despite prophylactic heparin the patient was noted to have a tender calf and was found to have deep vein thrombosis (DVT), and this was treated with full anticoagulation.

On day eight following the operation the patient became hypotensive with blood pressure (BP) dropping. At its lowest, the patient's BP was 82/50 mm Hg and was associated with a tachycardia of 115 (irregular or new AF) and low urine output (30 mL from 6:00 pm to 10:00 pm). During this time the patient was reviewed by the surgical-covering hospital medical officer

(HMO), but a medical emergency team (MET) call does not appear to have been made. The HMO performed a fairly comprehensive and well-documented review of the patient, and felt that the patient was fluid overloaded. A decision was made to administer a small dose of intravenous (IV) furosemide (20 mg) at 9:45 pm. The patient demonstrated some response to the furosemide, but was anuric from 4:00 am on day nine associated with BP of 80/50 mm Hg. At 5:10 am the patient's BP dropped to 60/30 mm Hg and a MET call was made. The patient later arrested and was unable to be resuscitated. Although the autopsy results were not available for review, the patient had an anastomotic leak causing septic shock leading to death.

CLINICAL LESSONS:

This patient presented to hospital with conscious collapse secondary to anaemia from a transverse colon carcinoma. Of note was the fact that this tumour was evident on a PET scan obtained 5 months prior to admission, although this result does not appear to have been pursued. On day eight, with the episode of haemodynamic instability, the patient would appear to have met the criteria for a MET call. If a more senior staff member had reviewed the patient at this stage a postoperative leak may

have been suspected. Consideration may have been given to more aggressive intervention, such as high dependency unit (HDU) or ICU admission, antibiotics, CT scans and operative intervention.

This patient was at a higher risk than average for developing anastomotic leak due to their advanced age and very poor nutritional state prior to surgery. The patient's delayed return of gut function might have prompted a CT scan around day five or six postoperatively, but the patient did not demonstrate overt signs of sepsis at this stage. In retrospect, the patient was clearly becoming septic on day eight postoperatively with hypotension, tachycardia and end-organ hypoperfusion. It was not entirely surprising that the covering HMO, who was reviewing the patient for the first time, was unable to identify this. Review at this stage by a more senior member of the surgical team may have led to more aggressive intervention with a change in outcome. However, given the patient's underlying fragility they may not have survived the laparotomy and exteriorisation of the bowel that would likely have been necessary to control the sepsis.

Case study 3: Consultant assessment needed for proper palliative care

CASE SUMMARY:

An elderly patient in a care home fell on a Saturday afternoon. The patient arrived in a peripheral hospital ED at 5:00 am on the Sunday and was found to have a fractured hip. The background included dementia and hypertension, and the patient previously walked with a frame. The admission full blood counts included Hg 80 and white cell count (WCC) of 26,000.

The patient was transferred to a teaching hospital, arriving on the orthopaedic ward at 7:00 pm on the Sunday. A chest x-ray (CxR) revealed a left hilar mass and probable left lower lobe infection. The patient was reviewed by the anaesthetic team shortly after arrival and was thought “unlikely to be fit for OT [operating theatre] tomorrow”, “needs medical review” and “needs echo”. The first orthopaedic review appears to have been at 5:00 pm the next day (Monday), some 22 hours after arrival on the ward. There was no written evidence that a consultant was present. Antibiotics were commenced for the chest infection.

The next orthopaedic note, made at 1:00 pm on the Tuesday (some 40 hours after admission), was by

the intern with no evidence of any consultant input. The intern wrote “has been cancelled for theatre again today... hopefully tomorrow”. The echocardiogram was done that afternoon.

At 6:00 pm that day, 48 hours after admission to the orthopaedic ward, the patient was seen by the orthogeriatric team. There was a note, for the first and only time in the entire folder, that the patient had “known myelodysplasia” and was “transfusion dependent”. Although not precisely stated, this appears to have been a previously established diagnosis. The note stated that the mass on the CxR was “not for further investigations due to age—likely neoplasm. Plan—review post-op”.

Some 5 hours after that review a MET call was made. Cardiopulmonary resuscitation (CPR) was undertaken and appears to have lasted some 50 minutes before being terminated. The patient was referred to the coroner due to the fall in the care facility. A postmortem revealed a primary bronchogenic cancer.

CLINICAL LESSONS:

The orthopaedic consultant returned the audit proforma marked “terminal care” and did not complete the rest of the proforma. This does not seem consistent with the care offered this patient, in particular:

- the patient was clearly being worked up for theatre
- the patient was sent for an echocardiogram in anticipation of the surgery
- the patient was commenced on antibiotics for a chest infection
- a not for resuscitation form was not completed
- CPR was commenced and lasted for almost 1 hour.

There was no evidence in the notes that the patient was ever seen by the consultant orthopaedic surgeon. This may explain the disconnect between what was written on the audit proforma (terminal care) and the actual care received. Had the consultant reviewed the patient it is likely that the patient would have been assessed as highly unlikely to survive any surgery. The patient could then have been offered proper palliative care.

There was a delay of over 12 hours before the patient was transferred from the care home to the peripheral hospital ED. There was a further delay of over 12 hours before the patient arrived in an orthopaedic ward. A delay of 24 hours to surgery following a hip fracture increases mortality. Such falls are a predictable event, and the care home and peripheral hospital need to review their processes to speed up such

referrals. Although this patient's death was not in any way related to the apparent lack of consultant input, the lack of consultant decision making was not conducive to good terminal care.

Case study 4: Multiple delays in postoperative management

CASE SUMMARY:

A patient in her early 80s presented to a clinic with ischaemic ulcers on the right medial malleolus that were failing to heal and were complicated by cellulitis. She was on warfarin because of a previous embolus and also had a past history of ischaemic heart disease, type 2 diabetes, hypertension and hypercholesterolemia. She was a non-smoker. Warfarin was ceased and the patient was changed to Clexane 1 mg/kg twice daily in preparation for surgery. A superficial femoral artery stent was inserted to improve circulation in the right leg and the ulcer was debrided 3 days later. Warfarin was recommenced 6 days after the angiogram. There was intermittent wound bleeding but the Hg level was noted to have fallen by 2 g/dL over 24 hours. Four hours after this drop it was noted a MET call was made because of hypotension, right lower back pain and collapse.

The MET recommended urgent CT and transfusion if ongoing bleeding was clinically suspected, and recommended fresh frozen plasma and admission to the HDU if the CT demonstrated bleeding. Four hours elapsed before the surgical team booked a CT abdomen, and after another 1.5 hours the first unit of blood was commenced with a note at that time that the patient was still waiting to have the CT scan (at 9:00 pm). The patient had an asystolic arrest 40 minutes later and died, almost certainly from a retroperitoneal haemorrhage.

CLINICAL LESSONS:

The patient had a number of risk factors for peripheral vascular disease, including diabetes, hypertension and hypercholesterolemia. Peripheral vascular disease and ischemic heart disease had also been diagnosed. An experienced clinician would have assumed that the patient was also likely to have renal vascular perfusion impairment. The patient's estimated glomerular filtration rate was in the low 60-to-80 range. Whilst some would accept this as being "normal", other laboratories would consider this level as early renal impairment.

Despite this the patient was given a dose of Clexane 1 mg/kg twice daily. That was just within acceptable levels for full anticoagulation of a fit

and well patient with normal renal function, but this patient was elderly with known peripheral vascular disease. Furthermore, the patient had a high probability of significant renal disease. The only indication for the use of Clexane appeared to be for the prevention of DVT/pulmonary embolus. The patient was given too much Clexane - half of the provided dose would have been appropriate.

When warfarin was recommenced several days later it was noted that the patient's Hg fell from 9.1 to 7.6 in a 24-hour period. At this time the patient was going through a transition phase from Clexane to warfarin and was being doubly anticoagulated. Four hours later a MET call was made after the patient became hypotensive and unresponsive on the ward. There was no evidence that anyone at that time considered that the patient might have intra-abdominal or retroperitoneal haemorrhage, and no urgency seems to have been placed on getting a CT of the abdomen to look for a source of blood loss. Four hours after the MET call, on the evening ward round, it was noted that the patient's Hg had fallen even further to 7.2. A CT abdomen was booked, again without any apparent urgency, and it took a further 1.5 hours before the first unit of blood was commenced.

IN SUMMARY:

- a significant fall in Hg which was not noted but not acted upon
- the significance of a noticeable period of hypotension was overlooked
- the request for blood replacement was seriously delayed
- A CT looking for the source of bleeding was not performed with any urgency.

The patient's death was preventable. It occurred as a result of over anticoagulation in a patient with borderline renal impairment, combined with a failure to heed and address the ample warning signs. The hospital needs to look at whether a registrar or senior clinician was aware of the Clexane dose, and whether a member of the surgical team was available to assess the patient when the MET call was made.

Case study 5: Doubtful diagnosis resulted in death after laparotomy

CASE SUMMARY:

An elderly patient in reasonably good health presented several times to an ED with abdominal pain, constipation, and red blood per rectum. There had been a similar episode several months earlier. The

patient had a past history of many comorbidities, including asthma and chronic obstructive pulmonary disease (COPD) resulting from a historical pattern of smoking. The patient had a past history of intra-abdominal operations by a number of specialists.

A Meckel's diverticulum scan demonstrated increased activity in the mid-to-lower abdomen. It was thought that the patient probably had ectopic gastric mucosa in Meckel's diverticulum. There was no obstruction on small bowel series. The decision was made to perform a semi-urgent laparotomy and consider resection of the diverticulum. Preoperative bowel preparation was undertaken, an anaesthetic review was performed, and a HDU bed was booked for the postoperative period.

The patient proceeded to surgery. Laparoscopy initially showed multiple adhesions and conversion to laparotomy soon followed. Extensive adhesions and a frozen pelvis were found. There were some tears noted in the distal bowel. Meckel's diverticulum was not found but a 20 cm portion of small bowel was resected with a stapled anastomosis. An appendectomy was also performed.

Despite a cephalosporin allergy the patient was given ceftriaxone as antibiotic prophylaxis, which

resulted in a marked facial rash. The patient also received postoperative antibiotics and DVT prophylaxis. The postoperative course was managed by the acute pain service. Total parenteral nutrition (TPN) was started immediately after the operation through a peripherally inserted central catheter.

The patient was returned to the ward stable but appeared confused. Shortly thereafter, the patient was reviewed and noted to have tachycardia and significant hypoxia. The patient remained afebrile but the abdomen was distended and the wound erythematous.

The patient then became increasingly breathless throughout the day and persistently hypoxic. Discussion with the family determined that the patient was not for resuscitation. The patient continued to deteriorate and death followed.

CLINICAL LESSONS:

The indication for this procedure must be questioned. There was a history of melaena but the patient was haemodynamically stable and the Hg was normal. Gastrointestinal bleeding has many causes in the elderly patient and most do not benefit from surgery.

The diagnosis of bleeding diverticulum was a long shot. As surgeons, we need to think very

carefully about operating on the elderly when they are stable and perhaps have very limited indications for serious surgery. The most difficult lesson for many surgeons, and one that is particularly difficult to teach to our registrars, is when not to operate.

Case study 6: Delay in diagnosing a strangulated hernia

CASE SUMMARY:

An elderly patient presented to the ED with two main issues:

1. Dysphagia, chest pain and weight loss. The tentative diagnosis was an oesophageal malignancy with partial obstruction.
2. An irreducible left groin hernia with associated pelvic pain.

The patient was oxygen dependent from COPD. The ED medical officer and admitting medical registrar documented the clinical signs of strangulated hernia with tachycardia. A surgical consult was not requested until the morning after admission. Nursing notes indicated that the patient was deteriorating. Surgical assessment took place almost 24 hours after the patient's initial presentation to the ED. A CT scan confirmed the diagnosis of a strangulated hernia.

Within 3 hours of diagnosis, and

after appropriate discussions with the patient, family and ICU staff, the strangulated left femoral hernia was explored under spinal anesthesia. A small bowel resection was required due to the gangrenous changes. Postoperatively, the patient was in the ICU without ventilation. Inotropes were required for hypotension and the NGT was difficult to pass due to the oesophageal lesion. The ICU events included acute kidney injury, acute pulmonary oedema, supraventricular tachycardia and rapid AF, delirium and paralytic ileus. Attempts at oral fluids were unsuccessful.

Regular and documented discussions were held between the patient, family, and treating staff regarding the patient's prognosis and levels of care. The ICU discharge to the ward occurred after 2 days. In the ward the patient failed trial of void, had ongoing ileus requiring TPN, and had septicemia from a presumed pulmonary source complicating the COPD. The patient was readmitted to ICU for supportive care (oxygen, antibiotics and TPN). After discussions with the family and the treating team, the patient was again discharged to the ward after 2 days. Rapid deterioration occurred on the ward and the patient died within a few hours.

CLINICAL LESSONS:

There were two clinical lessons

arising from this case.

Firstly, there was a delay in recognition. The importance of the strangulated hernia was not understood by the medical unit. Ischaemic small bowel in the strangulated hernia may have been present from the time of admission. Early surgery may have avoided the need for small bowel resection. Any delay in treating ischaemic bowel will be associated with a worsening prognosis. The strangulated hernia needs surgery.

Secondly, there was a delay in diagnosis. The use of preoperative CT was unnecessary and further delayed the case. Strangulated hernias can be confidently diagnosed and treated on the basis of clinical findings alone. There was enough evidence in this case for that diagnosis to occur. The diagnosis of strangulated hernia is a clinical one. The renal insult would definitely have been exacerbated by the use of IV contrast.

Case study 7: Delayed recognition of jejunal perforation

CASE SUMMARY:

An elderly patient was involved in a low speed head-on motor vehicle accident. There were severe comorbidities including an implanted

defibrillator and stented ischaemic heart disease that required the patient remain on clopidogrel.

On presentation to the ED the patient had a patent airway, but obvious rib fractures with a flail chest and fractured sternum. The BP and pulse were stable and the Glasgow Coma Scale (GCS) score was 15. Left upper quadrant tenderness was noted and the initial CxR showed severe contusion. In the setting of SaO₂ 85% and pO₂ of 61.9mmHg the patient was electively intubated and an ICC placed on the left side.

A FAST (focussed abdominal sonography in trauma) scan revealed free fluid that was apparently confirmed on CT (formal report not in the notes). The CT showed a splenic laceration and may have shown active extravasation. An electrocardiogram (ECG) raised the possibility of a myocardial event. The patient was reviewed by the consultant and admitted to the ICU for conservative management.

Within the ICU the patient became hypotensive and developed arrhythmias requiring inotropes and amiodarone. Cardiac enzymes suggested a myocardial event. Twenty-four hours post-accident the patient's abdomen remained soft but the patient continued to be hypotensive. An echocardiogram showed an under-volumed and poorly

functioning heart. Subsequent volume expansion was unsuccessful and the patient became oliguric. Thirty hours into the admission the patient was taken to theatre where a laparotomy was performed. Laparotomy findings were of a perforated jejunum with a small amount of bile-stained fluid and a contained splenic laceration. The perforation was oversewn and a splenectomy was performed by the consultant.

The patient returned to the ICU with further increasing inotropes. The patient was markedly acidotic and still anuric. A decision was made to not escalate treatment and the patient died 41 hours after admission.

CLINICAL LESSONS:

The assessor did not conclude that a major adverse event had occurred in the management of this patient. It would appear from the notes that the patient suffered a myocardial event and primary pump failure, rather than a septic death from delayed recognition of the perforation.

Small bowel perforation following blunt trauma is well-recognised but is fortunately uncommon (less than 1%). The patient generally presents with peritonism or free air on imaging. However, it is difficult to diagnose, and published studies exist showing the inability of both

CT and ultrasound to diagnose an immediate perforation post-trauma. One factor for this is that a mesenteric haematoma may lead to subsequent ischaemic perforation causing a delayed rupture. Initially, this patient had no peritonism. Unfortunately, the formal CT report was not provided in the documentation, and the several authors of the various notes that are in relation to the report have interpreted it differently.

The final decision for laparotomy would appear to have been made in expectation of finding ongoing bleeding and not a cause for sepsis. It is doubtful that with this patient's comorbidities and injuries that any different outcome would have been observed even if the patient had been taken to theatre immediately.

This case does raise two issues in regard to the missed injuries:

1. the accuracy of serial clinical exams in an intubated patient
2. understanding the limits of your investigations.

The answer to the first issue has been studied and the accuracy has been shown to be low. As a result, there must be a low threshold to re-image multi-trauma patients who are deteriorating.

The second issue refers to the fact that ultrasound and CT can both

diagnose the presence of fluid but cannot determine its content. It is possible that a diagnostic peritoneal lavage may have revealed the fluid content and led to an earlier diagnosis.

A final point of note was found within this case. Great care must be taken when transcribing hospital notes. The consultant's operation findings of "bile stained fluid and blood", which is what would be expected from the upper small bowel perforation, became "faeces throughout the peritoneal cavity" in the ICU notes.

Case study 8: Delay in diagnosis of anastomotic leak potentially avoidable

CASE SUMMARY:

An elderly man presented for a resection of an obstructing rectosigmoid carcinoma. His background history included emphysema, asthma and some respiratory impairment and hypertension.

The surgery took place on an elective list and clearly the operative findings exceeded the surgeon's expectations. The bulky tumour was adherent to the pelvic sidewall and had invaded the posterior wall of the bladder and the ileocaecal junction. Accordingly, the patient's surgery was far more extensive

than had been anticipated, with a partial right hemicolectomy with primary anastomosis. The posterior wall of the bladder was resected, and an anterior resection of the sigmoid colon was performed. The descending colon and rectum were anastomosed using a stapled technique. The postoperative course was initially managed in the ICU. In the early postoperative stage there were cardiovascular problems, primarily intermittent AF. The patient was discharged from ICU on the second postoperative day.

Management was then continued on the surgical ward. During this time episodic AF occurred, with management supervised by a cardiologist until there was sufficient concern to prompt admission to the nursing specialist unit, 3 days later. The patient's medical deterioration continued, and prompted a readmission to the ICU on the seventh postoperative day. Upon readmission to the ICU, the resident medical officer identified that the patient had developed sepsis and questioned the potential for an anastomotic leak. A CT scan did not support this diagnosis.

Deterioration continued over subsequent days and the patient required increasing respiratory support, progressing to type II respiratory failure. Ongoing

treatment for AF was required; the patient appeared to develop pulmonary sepsis with significant microorganisms in the sputum. The patient also developed a lower abdominal wound infection.

There was a further deterioration overnight on the 12th postoperative day, with an identified increase in lower abdominal pain and the identification on x-ray of a pneumoperitoneum. The patient was returned to the operating theatre for a laparotomy to confirm and correct the anticipated leak, undertake lavage and allow the formation of a defunctioning ileostomy. Care was continued in the ICU. There was prolonged ventilatory support and a tracheostomy was performed some 6 days later.

The patient's condition remained reasonably stable until an acute cardiovascular event featuring bradycardia and hypotension 9 days after the second procedure. A specific cause for this was not identified. Over the next 2 weeks, the patient's condition progressively worsened. Inotropic support was withdrawn on the 19th day of the second ICU admission, and the patient succumbed later that day.

CLINICAL LESSONS:

This case reflects some of the issues around adverse events and how they

are classified and assessed in the mortality audit.

1. An anastomotic leak is by definition an adverse event, in that it is an unfavourable outcome of surgical treatment. However, this does not necessarily imply that the event was the result of technical inadequacies or carelessness on the part of the surgical team. In this particular case the patient was always going to be a high-risk candidate. The tumour required treatment for palliation of symptoms. A leak from one of the anastomoses was not surprising, and the fact that it occurred was not the main issue. The lessons from the case are centred on the recognition and management of the problem once it occurred.
2. The patient underwent surgery that was far more extensive than had been intended. Prior to surgery it was anticipated that the patient would undergo an anterior resection alone, but they ended up requiring an anterior resection of the sigmoid colon with limited right hemicolectomy and partial bladder resection. Whilst technically achievable and done with all due diligence, the colorectal anastomosis resulted in an anastomotic leak, and this led to multiple organ failure and death. Had the patient not been subjected to the anastomosis it is arguable that death would not have followed.
3. Based on the report by the surgeon the anastomosis was performed carefully and competently, and certainly surgery did not appear to have been rushed. A question that should be raised in such cases is whether the surgical procedure planned may be too much for a patient with severe respiratory disease.
4. The identification of the anastomotic leak was almost certainly delayed by several days in this case. A patient who develops unexplained AF after major abdominal surgery with an anastomosis must be considered to have an anastomotic leak, until proven otherwise. A CT scan was performed without contrast, and that did not allow the anastomotic leak to be demonstrated.
5. Where responsibility for care of the patient is shared, such as when the patient is in the ICU, the assessment of the presence or absence of an anastomotic leak must be driven by the surgeon. There is little to fault in the management of this patient, apart from the delayed recognition of the anastomotic leak. One suggestion that may be of benefit

in a suspected leak is a CT Scan after the introduction of rectal Gastrografin.

Case study 9: Misdiagnosis results in unnecessary surgery

CASE SUMMARY:

A middle-aged patient presented to the ED with sudden onset of headache and mild right-sided abdominal pain radiating through to the back. The patient had significant comorbidities including chronic renal failure, hypertension and a history of renal transplantation. Prior to presentation the patient had vomited, become faecally incontinent and had collapsed (striking his head but with no loss of consciousness). On admission, hypotension and acidosis were noted and a diagnosis was made of septic shock.

Appropriate rapid and aggressive resuscitation was commenced in the ED with insertion of femoral arterial and venous lines and parenteral broad spectrum antibiotic administration. Clinical input was gained from surgery, renal and ICU. Ultrasound of the abdomen, CxR and CT scan of the head were performed. Acute cholecystitis was diagnosed by the radiologist who reported a “necrotic gall bladder”.

The patient was noted to be moderately obese, anuric and acidotic with pH levels below 7.2. A FAST Scan did not demonstrate any obvious free intra-abdominal fluid. The patient was intubated, ventilated, commenced on inotropes and admitted to the ICU. The initial abdominal examination mentioned no mass or significant abdominal guarding, only mild right upper quadrant tenderness. A presumptive diagnosis was made of septic shock due to acute cholecystitis and/or cholangitis. “Dark bile” was obtained from percutaneous cholecystostomy performed by a radiologist.

As there was no clinical improvement and the patient remained anuric, laparoscopic cholecystectomy was planned for the following day. At operation, an oedematous but not gangrenous gallbladder was described. The laparoscopic cholecystectomy appeared to be uneventful.

The patient did not improve despite ongoing support following surgery. The day after cholecystectomy, a CT scan demonstrated a dissecting abdominal aortic aneurysm with pericardial effusion and some degree of tamponade. This was considered inoperable by the specialist vascular surgeon and, once diagnosed, the patient’s treatment was palliative.

CLINICAL LESSONS:

There was a delay in making the correct diagnosis, which probably did not significantly contribute to the outcome, but did result in an unnecessary surgical procedure. Had this diagnosis been made earlier, appropriate palliative care could have been implemented from the outset.

Sepsis with hypovolemic shock is an appropriate differential diagnosis in a patient presenting with peripheral collapse and peripheral circulatory failure. However, for this presentation of headache, faecal incontinence with sudden collapse and minimal abdominal signs, consideration should have been given to other differential diagnoses, including aortic catastrophes. It was not clear whether the original ultrasound commented on the abdominal aorta. It was also not clear from the notes at which level of medical expertise the diagnosis of acute cholecystitis was made. Once made, it does not appear to have been questioned, despite the lack of support from clinical signs or a response to percutaneous cholecystostomy.

This case study illustrates that a provisional diagnosis must always remain just that until confirmed, and must always be subject to revision and change. It would have seemed prudent to attempt to confirm the diagnosis of acute gangrenous

cholecystitis by further imaging prior to subjecting this exceedingly high-risk patient to surgery. Unless there is pericholecystic gas to suggest gas-producing organisms, an ultrasound cannot reliably diagnose necrosis of the gallbladder. This diagnosis should have been viewed with circumspection. The liver function tests (LFTs) were completely normal, yet a necrotic gall bladder or ascending cholangitis might be expected to be associated with some LFT abnormality.

Surgical decision making in the initial stages of the management of this patient could possibly have been better. Quite apart from the fact that there were no records written by a senior surgical team member in the first 24 hours, there was nothing written to show that consideration was given to any diagnoses other than a necrotic gall bladder. CT scans of the abdomen or chest were not considered and there was no clinical assessment to indicate differential pulse characteristics in the upper and lower limbs, or clinical signs of a dissecting aneurysm.

There are also some concerns about the choice of clinical management. If there was a necrotic gall bladder, then cholecystostomy was not appropriate and was even likely to lead to more complications. Drainage followed by removal of a necrotic

gall bladder by open or laparoscopic cholecystectomy is the best way to manage a patient with metabolic acidosis and septic shock secondary to that problem.

Case study 10: No apparent assessment plan of management

CASE SUMMARY:

A frail, elderly person with a known history of transitional cell carcinoma of the bladder was admitted with acute renal failure and high creatinine levels. Comorbidities included chronic obstructive airway disease, diverticular disease and urinary tract infections. There had been a recent cystoscopy prior to admission. While there was no information in the notes about events prior to this admission and there was no pathology report available, it was implied that this was muscle invasive disease.

A CT scan on admission demonstrated bilateral hydronephrosis with an obstructed left system due to a large distal ureteric calculus, and an obstructed right system of uncertain cause, possibly related to known carcinoma of the bladder. An attempt was made to gain access to both ureters in a retrograde fashion but failed due to technical reasons. It was unclear whether this procedure was performed by a consultant urologist

or trainee. Bilateral nephrostomies and antegrade double-J (JJ) stents were inserted over the subsequent weeks of the patient's admission. The patient ultimately died of multi-organ failure.

CLINICAL LESSONS:

The case notes were reasonably adequate. More information about the events leading to this admission would have been helpful, such as details of the original cystoscopy and underlying pathology. Most of the doctors' entries into the notes failed to note the time of entry, leading to possible confusion, and this is an area that requires improvement. There was no reference to any consultant urologist input throughout the case.

The patient had problems with fluid balance issues throughout the admission. After the insertion of the right nephrostomy tube, the resident medical staff seemed to fail to understand the significance of the poor urine output through the tube, particularly in the context of a patient with acute renal failure. It was not until 2 days later that the first medical note was made about this issue. It took nearly a week for this to be addressed with the insertion of an antegrade JJ stent.

The residents' assessments and responses to the poor urine output

were of variable quality with some being substandard. The fluid charts would suggest that the patient was in a significant positive fluid balance throughout the admission but this was not commented on.

It was more than 2 weeks after presentation before any attempt was made to relieve the obstruction to the left kidney. The significant delays between recognising clinical issues and responding appropriately in this frail, elderly patient with multiple comorbidities will almost certainly have contributed to the ultimate demise.

Some examples of areas of concern include the following.

- Although admitted with acute renal failure and evidence of bilateral ureteric obstruction, it took 48 hours from the time of admission until the original procedure was performed.
- It may have been more advisable to place a nephrostomy tube in the left rather than the right kidney. It is likely that this would have been the better option given the history of an obstructing calculus in the left kidney compared with malignant obstruction of the right kidney. No notes were made regarding the reasons for the decision to place the initial nephrostomy tube in the right kidney rather than the left.

- It took 48 hours for the medical staff to note that the inserted nephrostomy tube was not draining. The implications of this in terms of either a misplaced nephrostomy tube, or an indication of poor function, were never expressed and were possibly not understood by the medical staff. It was not until nearly a week later that an antegrade JJ stent was inserted.
- Most of the notes were made by junior residents, often the covering doctor. There was no clear evidence of consultant urologist input throughout the case.
- When clinical deterioration occurred, there was no attempt to clear the left ureter until nearly 3 weeks after admission.

The quality of care received by this patient was inadequate. Given the considerable comorbidities there was only ever going to be a short window of opportunity to reverse the processes. It took over 2 weeks to clear both ureters, by which time multi-organ failure was established and there was little chance of reversal. More timely intervention may have altered the outcome. There was no documented evidence of consultant urologist input.

These comments must be taken in the context of an elderly patient with multiple comorbidities and possibly

an advanced malignancy (although absolute evidence for that was not provided in the notes).

Case study 11: Ruptured thoracic aorta with late diagnosis

CASE SUMMARY:

A middle-aged patient known to be a heavy smoker presented to the ED with a day of severe upper abdominal and retrosternal pain, and drowsiness. On admission, the patient's pulse was 83 and oxygen saturation was 93% in room air. BP was recorded as 243/153 on the right and 173/100 on the left arm. Past medical history included hypertension, hypercholesterolaemia, obesity and sleep apnoea. Regular medications were recorded as Coversyl and Lipitor.

The patient was seen promptly by an ED doctor who organised a full blood examination, LFT, urea and electrolytes, ECG, abdominal x-ray and requested a surgical review from the general surgical registrar which occurred 2 hours after arrival. The ECG result was recorded as "no acute changes". The possibility of an acute cardiovascular event does not seem to have been considered and a CxR does not appear to have been performed. Initial Hg was not provided in the medical notes.

Five milligrams of morphine were given intravenously prior to the patient being seen by the surgical registrar with the consultant 4 hours after presentation. At this time the patient was noted to be "unwell and grey looking". Differential diagnosis included haemorrhage into hepatic lesion, acute myocardial infarct or dissection of the abdominal aorta. An urgent CT of the abdomen was reviewed by the radiology and surgical registrars and deemed to be grossly normal.

The surgical registrar, who had not detected any serious abdominal signs, was concerned that no diagnosis was given and contacted the medical registrar for an opinion. A troponin and CxR were requested. Arterial blood gas now indicated hypoxia, hypercapnia and acidosis. Troponin level was normal. Review of the CxR raised the possibility of a widened mediastinum. A request for urgent CT chest to exclude thoracic aortic aneurysm was refused by the radiology registrar who said "it could be done in the morning".

There is no record of the medical registrar seeing the patient until a Code Blue was called 8 hours after presentation. Eleven hours after presentation to the ED, an arrest led to intubation and CPR. The cardiothoracic team felt surgery was not indicated given the moribund

state. An urgent transthoracic echocardiogram showed “negligible cardiac output” and pupils were noted to be fixed and dilated. Treatment was ceased.

Retrospective review of the CT abdomen showed aortic enlargement in the upper slices. A presumed diagnosis of ruptured thoracic aneurysm was made based on this finding.

CLINICAL LESSONS:

A request for an urgent CT chest in the presence of a newly widened mediastinum in a patient who is unwell and grey should not be denied. This was an error of serious concern. The enlarged aorta noted retrospectively on the CT abdomen was missed in the initial report.

The ED assessment of this patient, who had multiple cardiovascular risk factors and presented with retrosternal and upper abdominal pain, was inadequate. There was no record of this patient being reviewed by the ED team after a surgical referral was made in the late afternoon, until the time of the patient’s arrest some 7 hours later.

Although ruptured thoracic aorta is associated with a high mortality rate, earlier diagnosis with appropriate investigations and referral may have changed the outcome for this patient.

Case study 12: Poor monitoring and assessment after subdural haematoma

CASE SUMMARY:

This elderly patient had been living alone in a retirement village and had a past history of congestive cardiac failure, COPD, epilepsy and recent cataract surgery. Regular medications included Salbutamol and Aspirin. The patient fell and struck her head on the road while out walking and briefly lost consciousness. The ambulance was called to the scene and the patient presented at the hospital ED in the mid-afternoon.

The ambulance officers recorded a GCS of 15, a left eyebrow laceration/haematoma, facial droop and “reduced movement”, but there was no specific mention of a paretic limb. In the ED, a CT of the brain and cervical spine was performed, and it appears that the only doctor who formally saw and examined the patient was a junior doctor, working as the overnight surgical ward resident. Shortly before midnight, this junior resident noted: “PEARL. Neuro X4 limbs – no abnormality detected. Some movement limited by pain however”, indicating that there were no major neurological abnormalities.

The CT of the brain demonstrated a right-sided (presumably acute)

subdural haematoma with a 3.5 mm midline shift, and a haemorrhagic contusion of the left frontal lobe. The CT of the cervical spine demonstrated no fractures but raised the possibility of an epidural haematoma and ligamentous disruption. A note was made that the neurosurgery registrar had reviewed the CT scans and discussed management of the patient with the resident. The patient was to be admitted to the ward on 4-hourly neurological observations and kept nil by mouth, with CT scans to be repeated the next day. There was no mention of the need for an HDU bed nor the action to take should the GCS decrease overnight.

The patient remained in the ED overnight. In the early hours of the morning the ED recorded the GCS as 15, even though the patient's eyes were closed and there was a question mark as to whether the patient was orientated. Apart from mild weakness of the left leg, the limb strength was recorded as normal. However, at 2:15 am the patient was recorded with a GCS of 12 and severe right leg weakness and no attempt was made to check the pupils. There was no mention of any attempts to notify medical staff of the marked deterioration in neurological status. It seems that the patient was not checked by the nursing staff again until

nearly 7:00 am, when the patient was found comatose and asystolic with evidence of having vomited. A Code Blue was called, and after prolonged resuscitation cardiac output was regained and the patient was transferred to ICU. By then the patient was too unstable to have a repeat CT of the brain or undergo surgery. The patient was declared dead by around midday, less than 24 hours after the initial head injury.

The recognition and management of neurological deterioration in this patient was significantly delayed. Until the patient was in an irredeemable state it is reasonable to suppose that if the deterioration had been recognised at an earlier stage, the patient would have had a reasonable chance of survival.

CLINICAL LESSONS:

If all of the medical and nursing documentation concerning this patient's admission were provided to the reviewer, then it was clearly inadequate. There was no entry from the neurosurgery registrar involved in the patient's initial assessment. There was also no indication as to whether that registrar personally saw the patient and the CT scans, or merely received a verbal account of the patient and the CT results.

The ED nursing staff totalled up the GCS incorrectly, recording a

total of 15 instead of 14. The only documentation from the nurses were two sets of observations taken more than 4 hours apart, and a retrospectively written entry in the progress notes. Even this limited documentation was poor. The resuscitation and ICU notes were the most comprehensive part of the case notes, but by then the patient's death was assured.

There are several issues associated with this case, as outlined below.

- This patient had a moderate severity closed head injury, as evidenced by the description of the fall, the eyebrow laceration/haematoma, the brief loss of consciousness and the CT findings of a subdural haematoma with midline shift as well as parenchymal bleeding. The patient presented to the ED fairly quickly and this should have been considered when the clinical condition was evaluated. There is a well-recognised potential for head injured patients on anticoagulants to keep bleeding intracranially, so while the patient might have been neurologically intact early on, there was always a significant potential for deterioration. It would have been more appropriate to continue hourly or 2-hourly observations throughout the night in a high dependency environment.
- The area of greatest concern is that this patient experienced a significant deterioration in GCS without any medical action being taken until it was too late. I wonder if this was due to inexperience of the nursing staff, inadequate handover from the ED, or both. The normal procedure is for the registrar to be contacted should the GCS score fall by two or more points, or the patient develop new neurological deficits, such as limb weakness.
- The patient was presumably placed in the non-HDU area of the ward as the patient was not sighted again until the next set of observations were taken, which were more than 4 hours later. Even if the doctors had not specified nursing in an HDU, the nursing staff should have protocols to admit all patients with moderate or severe head injuries to HDU.
- The final area of concern is the adequacy of neurosurgical assessment in the ED by the nurses and doctors. Inaccurate totalling of the GCS score and glib statements like “neuro exam grossly NAD, some movement limited by pain” would not have

made it any easier for other staff to appreciate a deterioration in the patient's neurological condition.

Subdural haematomas in elderly patients after low velocity injuries are common and there is a tendency to be overly dismissive of them. They are not acutely life-threatening in most cases, and it is reasonable not to operate on them at the time of presentation if the patient has no or mild deficits and is stable. Elderly patients with acute subdural haematomas must be managed in such a manner that acute deterioration will be recognised and acted upon promptly.

Case study 13: Communication failures and inaction in a case of missed small bowel obstruction

CASE SUMMARY:

An independent, elderly patient was admitted with increasing agitation and confusion, offensive smelling urine and lower abdominal pain following a laminectomy complicated by a urinary tract infection. The patient had undergone an abdominoperineal resection 10 years previously. On admission the patient was afebrile, tachycardic and normotensive. Abdominal

examination revealed lower abdominal tenderness (no rigidity or guarding). Urine analysis showed leucocytes and blood. The full blood count was essentially normal. The patient was admitted under the care of the ED physician with a diagnosis of urosepsis. Urine micro culture and sensitivity, blood cultures and other investigations were requested, and the patient was started on IV gentamicin and amoxicillin. The next day the patient was still confused and was now febrile.

A nursing entry noted "stoma is not active". The patient was reviewed by the on-call medical team who noted lower abdominal tenderness, concurred with the diagnosis of urosepsis and accepted the patient to the medical unit. The following day the patient was still complaining of abdominal pain and had tenderness to light and deep palpation. The colostomy bag was still empty. An urgent abdominal CT scan was requested.

The CT scan was performed the following day and showed a distal small bowel obstruction. A NGT was inserted and a surgical review requested. That evening the patient was reviewed by the on-call surgical registrar (A), who noted "nausea, vomiting", the "stoma stopped working", the patient "looks fine", "afebrile" and that the NGT had

drained 2 litres of fluid. The registrar also detailed “lower abdominal tenderness”, the presence of “bowel sounds” and a C-reactive protein (CRP) of 370 but a normal WCC. The registrar documented discussion of the abdominal CT scan with the radiologist and noted “bowel obstruction with a huge stomach and duodenum”, “gas in the lower small bowel wall” and “gas in the left iliac fossa”.

The registrar documented the discussion with the on-call general surgical consultant (A), who felt that there was possible bowel perforation and infection, and that the patient would benefit from conservative therapy overnight.

A generally tender abdomen was noted the next day and at laparotomy there were extensive small bowel adhesions in the pelvis from previous radiotherapy, and 2 feet of intact gangrenous mid small bowel. The “distal half of the small bowel was matted and fixed in the true pelvis” and “freed with blunt finger dissection”. The gangrenous small bowel was resected and a side-to-side stapled anastomosis performed, some serosal tears repaired and an appendectomy performed. This was done by surgical registrar (B) taking 3.5 hours.

Postoperatively the patient was managed in the ICU but failed to

progress. The patient had a second emergency laparotomy by the same surgical registrar (B), assisted by general surgical consultant (B). There was a small bowel anastomotic leak. The anastomosis was taken down, a proximal jejunostomy formed with an end mucus fistula, as well as a gastrostomy and feeding jejunostomy. Postoperatively the patient experienced considerable problems with malabsorption. A variety of feeding methods were employed including jejunostomy feeds, TPN, gastrostomy feeds, and re-feeding jejunal effluent through ileostomy. The patient eventually demised 2 months postadmission.

CLINICAL LESSONS:

There are a number of matters that are of concern in this case. There was a clear delay in diagnosis. While in hospital, the patient complained of abdominal pain for 4 days prior to the first operation. The stoma bag was not active for this period, and yet no plain abdominal x-ray or surgical review was sought by the medical team until day four of admission. There was a delay in getting a CT scan by the radiology department (more than 24 hours) in a patient with peritonitis.

The first surgical review of the patient was by general surgical registrar (A). The subsequent discussions between registrar (A) and on-call

general surgical consultant (A) are of concern. There was a failure to appreciate that the patient had a high-grade bowel obstruction with focal peritonism, this in turn being suggestive of ischaemic gut. Clinically, the stoma had not worked and the NGT had drained 2 litres of fluid in under 6 hours. There was no mention of whether the fluid was bile-stained or faeculent. The documented “lower abdominal tenderness” and presence of “bowel sounds” suggests inexperience, with no mention of percussion or rebound tenderness and guarding. Moreover, the knowledge of a raised serum CRP of 370, and a radiologist’s verbal report of the abdominal CT scan showing a “bowel obstruction with a huge stomach and duodenum”, “gas in the lower small bowel wall” and “gas in the left iliac fossa”, should have raised alarm bells. The decision to manage this patient conservatively overnight was an error of clinical judgment.

Supervision was an issue, as was seniority of the operating surgeon. There are doubts as to whether it was appropriate for surgical registrar (B) to perform surgery of this magnitude without a consultant. The length of the procedure (3.5 hours), the numerous (4 to 5) serosal tears, the use of “blunt finger dissection” to take down “matted and fixed” post-radiotherapy small bowel pelvic

adhesions, and the performance of an appendectomy when the pathology was in the pelvis and the left iliac fossa, all suggest inexperience. The subsequent small bowel anastomotic leak also supports this as small bowel anastomoses are usually very forgiving.

This case highlights a major systemic issue in the relationship between registrars and consultants in the acute surgical setting. It is now frequent practice for consultants to be on call with registrars of whom they have little knowledge or experience in terms of their clinical and operative skills. In this case there were two registrars and two consultants involved in the management of a patient with an adhesive proximal small bowel obstruction with compromised small bowel. There was a delay in diagnosis (4 days), a failure to act surgically when the evidence was clear that the patient had ischaemic/gangrenous small bowel, and the first operation was carried out by an inexperienced registrar without a consultant present. While it is easy to blame poor outcomes on inexperienced registrars, ultimately the responsibility must always lie with the supervising consultant surgeon. The onus is on consultants to make sure they know the competencies and limitations of the registrars they are on call with.

Case study 14: Septic shock undiagnosed for two days

CASE SUMMARY:

An elderly patient was admitted to a peripheral hospital with a 3-day history of abdominal pain, vomiting and diarrhoea. Past history included diabetes, rheumatoid arthritis, a recent colonoscopy that showed diverticular disease, and anaemia of unknown origin with recurrent transfusion. Drugs included anti-inflammatory and immunosuppressive medication.

The patient presented to an ED in the morning. The nursing triage notes indicate a hypothermic shock (systolic BP 85): "Pain ++ guarding. Abdomen very tender on palpation". The patient was admitted to the ward under the physicians and the HMO wrote: "Patient states faeces coming from vagina. BP 57/39".

Despite the above history, a diagnosis of gastroenteritis was made, IV fluids were given, and the medical consultant was notified. This elderly patient was diabetic, immune compromised by drugs, had abdominal pain of uncertain origin and was in shock. A surgeon should have seen the patient. The next morning the patient was seen by the medical team and progress notes state: "still having diffuse abdo pain

- diffuse tenderness". The patient was still hypotensive, hypovolaemic and tachycardic. There was still no request for a surgical opinion.

In the early afternoon of the same day a medical ward round took place. The notes indicate the following: "Patient complains of diffuse abdominal pain.... Generalised guarding of abdomen. Pain worse - left lower quadrant. Rebound tenderness. Impression ? Diverticulitis. Plan. Start IV antibiotics. Surgical review. Transfused 2 units packed cells". The doctors were sitting on a case of peritonitis in a shocked patient who, despite past history, was being treated conservatively.

Two hours later a surgical review was requested. The surgical registrar diagnosed acute diverticulitis with dehydration and suggested further medical treatment. In the early evening of the same day, some 30 hours after presentation, the patient was hypotensive (systolic BP 80), pale, hypothermic and with "tender, guarding/rigidity abdomen". A CT scan showed perforated diverticulitis with free air fluid. The entry in the notes was: "Plan. Discuss with medical consultant. If remain unstable, transfer to ... hospital".

The next morning the patient was confused, shocked and febrile. Generalised peritonitis was

recognised and an urgent transfer was undertaken. The patient subsequently had surgery but died of complications of faecal peritonitis.

CLINICAL LESSONS:

It is of concern that the obvious septic shock was not only missed at presentation, but remained undiagnosed for 48 hours. It is of even greater concern that a CT scan showing pneumoperitoneum was not acted on. Under the best of circumstances perforated diverticulitis has a prohibitive mortality, but a delay such as this makes survival impossible. The hospital and staff should review the patient care protocols.

Shortened Forms

AF	atrial fibrillation	HDU	high dependency unit
ANZASM	Australian and New Zealand Audit of Surgical Mortality	Hg	haemoglobin
BP	blood pressure	HMO	hospital medical officer
COPD	chronic obstructive pulmonary disease	ICC	inserted central catheter
CPR	cardiopulmonary resuscitation	ICU	intensive care unit
CRP	C-reactive protein	IV	intravenous
CT	computed tomography	LFT	liver function test
CxR	chest x-ray	MET	medical emergency team
DVT	deep vein thrombosis	NAD	neuroaxonal dystrophy
ECG	electrocardiogram	NGT	nasogastric tube
ED	emergency department	PET	positron emission tomography
GCS	Glasgow Coma Scale	SAASM	South Australian Audit of Surgical Mortality
		TPN	total parenteral nutrition
		WCC	white cell count

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Notes

A series of horizontal dotted lines for writing notes.

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