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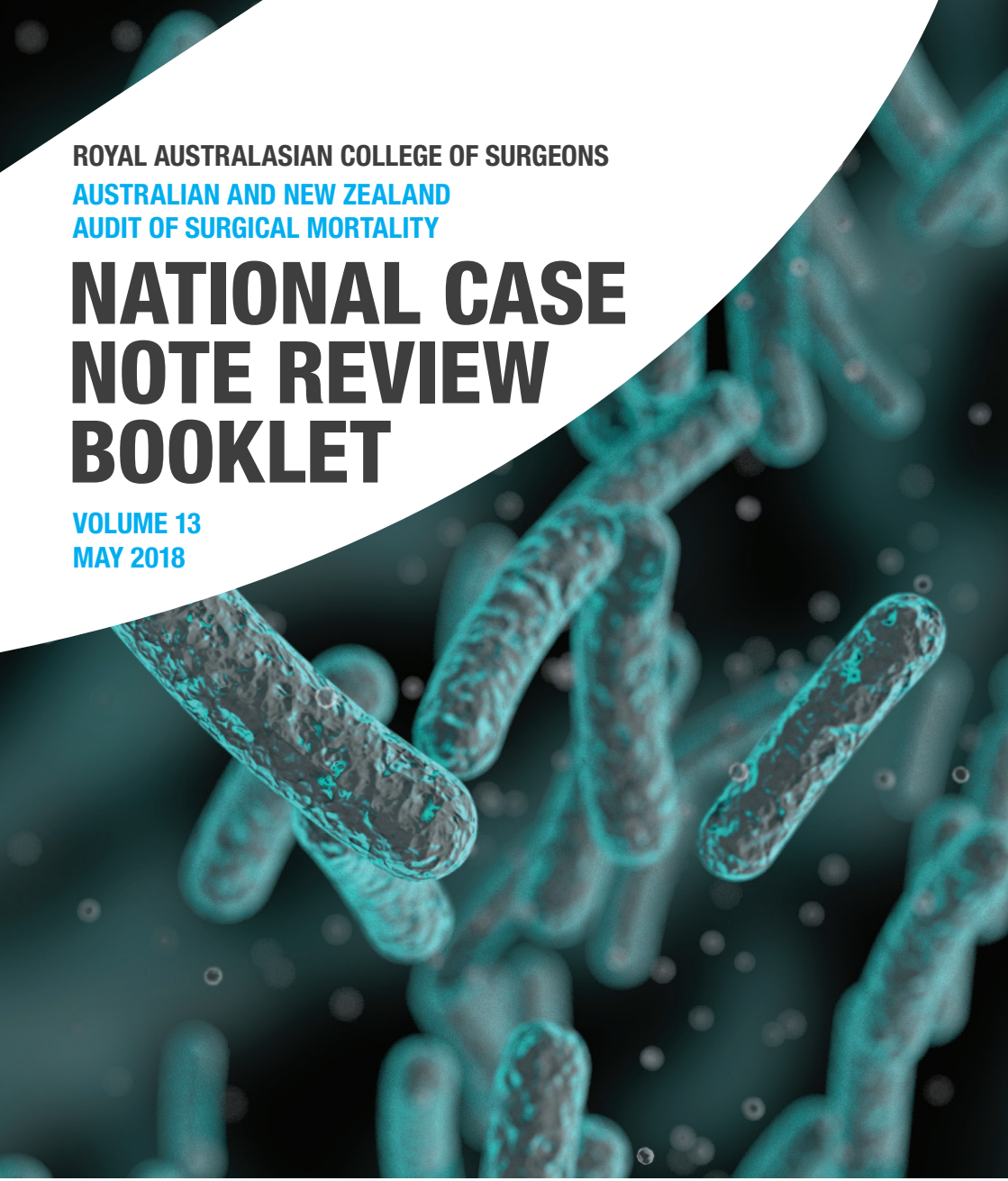

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ANZASM
Australian and New Zealand Audit of Surgical Mortality

Royal Australasian College of Surgeons
Australian and New Zealand Audit of Surgical Mortality
199 Ward Street
North Adelaide SA 5006
Australia

Telephone: +61 8 8219 0900
Facsimile: +61 8 8219 0999
Email: wendy.babidge@surgeons.org

Website: http://www.surgeons.org/anzasm

CONTENTS

Chairman's Report

The ANZASM Surgical Case Reports is now in its 13th edition and provides a range of vignettes leading to fatal outcomes for patients under the care of surgeons. This particular set of case reports focusses on septic complications. In recent years the availability and input of Infectious Disease Consultants has greatly enhanced our ability to draw on expert guidance for antibiotic management of patients who depart from normal postoperative care. This resource is not used as frequently as it probably should be and, where available, can do nothing but enhance patient care. Intensive care provides a mixed blessing with patients not infrequently developing serious hospital acquired infections during their ICU stay, requiring vigilance from not only the intensive care staff but also the surgical team.

With the plethora of antibiotics currently available, resistance to antibiotic treatment is becoming an increasing scourge for patients within our hospitals. The need to use judicious but timely antibiotics continues to provide a major challenge for us all. It is sometimes disappointing in a hospital setting to see the somewhat cavalier attitude that is displayed regarding patients who need barrier nursing. We all have an obligation to ensure that the protocols surrounding barrier nursing should be followed and that entering rooms of patients is appropriate and properly conducted. The leadership provided by the surgical team is vital for appropriate role models for junior staff, nursing staff and other clinicians involved in the care of our patients.

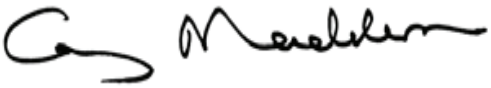
While we continue to have many highly technical solutions to complex infectious problems, prevention is always better than cure. This requires us all to be practising basic infection control, washing our hands between patients and following the five steps required by the current Australian Commission on Safety and Quality in Health Care (ACSQHC) guidelines.

Furthermore, appropriate theatre etiquette is essential. Appropriate use of surgical masks and the behaviours with surgical scrubs needs constant attention. While there is a lack of evidence that changing surgical scrubs when leaving the theatre area impacts on infection control, the evidence that wearing a white gown somehow or other magically prevents infection is similarly in an evidence-free zone. It would be my suggestion that in order to develop an appropriate culture around the operating theatre no-one should be seen outside the theatre complex in theatre scrubs, and that either changing

into alternatively coloured scrubs or civilian clothes should be the standard expected from all surgical facilities.

This collection of cases provides thought-provoking examples of severe problems leading to the death of surgical patients. We can all learn from these reports.

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



Professor Guy Maddern
Chair, ANZASM

ANZASM Clinical Editor's Report

This, the 13th booklet of surgical case reports, includes cases from most regions 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.

As in previous years this case note report booklet has cases from most regions and many specialties. Some of these cases may be familiar to some readers as some of these cases have appeared in regional reports. Some are new cases. All cases have infection as a common theme.

All surgical procedures have infection as a potential complication. This may be an infection of the surgical site, a systemic infection or respiratory infection, or an infection associated with an implanted device. With the advent of multiple drug resistant organisms and the increased usage of implant devices, infection will become a greater problem in surgery.

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 although some cases have been heavily edited. 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 and look at infection with renewed interest.

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 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: Sepsis in the patient with a total joint replacement

CASE SUMMARY:

After a fall 2 weeks prior, this elderly patient was admitted to hospital because of pain in the shoulders and the left knee. The patient had a high temperature and had suffered rigors.

The patient had undergone a total knee replacement (TKR) for osteoarthritis 5 years earlier. The TKR had functioned well. Poor lower limb skin was noted and multiple breaks in the skin were present on admission. The diagnosis of septicaemia was made and intravenous (IV) antibiotics begun. Blood cultures grew Staphylococcus aureus (S. aureus). The patient had been admitted to a medical ward, and after nearly a week it was noted that the patient's left knee was swollen. Orthopaedic consultation was requested.

Aspiration revealed a purulent fluid and the patient was taken to the operating theatre the following day to have the knee joint washed out. At the time of consent there appears to have been some issues relating to whether the TKR components could be removed at this surgery. It was not until several days later, following a second operation, that all the components and cement were removed and a cement spacer with antibiotic was inserted.

Nearly 2 weeks later the patient became confused, developed multi-organ failure, and died. The question arises as to whether the patient had been suffering from septic arthritis on admission. Medical record review confirmed the patient was admitted with shoulder and upper limb pain but there was no documentation of the lower limb status. There was no comment noted about knee joints. Was the knee joint the 'silent source' of the sepsis all the time?

CLINICAL LESSONS:

Beware the ageing patient with one or more total joint replacements who becomes febrile and may be septicaemic. This patient may well have had septic arthritis on admission but it remained unrecognised for too long.

In this patient there was a good case for removal of all components at the initial operation. This would have given this patient the best possible chance for the infection to clear. Consenting in this case may have been from a junior-level medical officer who did not understand the implications, or who did not truly

inform the relatives of the risk and benefit options.

A comprehensive history and examination when this patient was first admitted may have changed the course of this disease. Earlier consultant input may have been prudent. The consenting process should have been more careful and directional.

Infection may arise from lower limb abrasions or lacerations and spread to a joint replacement. Those joints that have been replaced should always be examined for any inflammatory signs, no matter what the symptoms.

Case study 2: Fatal peritonitis following replacement of gastrostomy tube

CASE SUMMARY:

A very elderly patient had a percutaneous endoscopic gastrostomy (PEG) tube inserted 7 months prior to the current presentation to hospital. Past medical history included dementia, asthma, ischaemic heart disease and hypertension. The tube had been changed on two previous occasions without incident. On this occasion the patient was referred to the emergency department (ED) as the tube was blocked. A 16FG PEG tube was inserted, which apparently flushed easily after this procedure with the patient being discharged back to the nursing home.

Tube feeds were recommenced and the patient became very distressed, necessitating a return to the ED at 00:30. The notes state that the patient was lying quietly in bed, afebrile, blood pressure (BP) 177/90, heart rate 80 regular, respiratory rate 18/minute, chest clear, abdomen firm with guarding and bowel sounds present. Attempts to flush the PEG tube occasioned immediate severe pain and discomfort. The balloon was deflated and only 2 mls water was obtained. It was thought that the tip of the tube was just below the skin, at about 1 to 1.5 cm. The PEG tube was removed and reinserted and the balloon inflated with 4 mls water. The tube was then snugged up against the stomach wall and the tube flushed with 15 mls water. No problems were encountered and the diagnosis was possible peritonitis secondary to PEG tube misplacement. The patient was referred for surgical opinion.

A contrast study was performed and radiopaque contrast was noted free within the peritoneal cavity. A decision was made to proceed with a laparotomy. This was performed later that day: 400 mL of free fluid was found within the peritoneal cavity, as

well as a small hole in the stomach wall adjacent to the side of the PEG. A large Foley catheter was inserted through the PEG site and the hole was oversewn and reinforced with an omental patch. Peritoneal lavage was performed, peritoneal drainage instituted and the abdominal wall closed.

The patient spent 3 days in the intensive care unit (ICU) before being successfully extubated and transferred to the high dependency unit (HDU). The postoperative course was complicated by ileus and a possible aspiration pneumonia, with acute pulmonary oedema and respiratory failure. Discussions were held with the family and it was resolved that further ICU care and resuscitative measures were not warranted. The patient deteriorated progressively, despite active medical intervention, and died peacefully from cardiorespiratory failure 8 days after admission. No autopsy was performed.

CLINICAL LESSONS:

This case illustrates a number of key issues. On the topic of reinsertion of PEG tubes, the clinical notes make mention of the PEG tube being replaced on at least three occasions. Clearly it had been in place for some considerable time, necessitating numerous previous replacements, and a well-formed percutaneous tract would have developed. Under these circumstances it is easy to remove and replace a PEG tube provided the replacement tube is inserted soon after the removal of the current tube. Any delay results in the rapid narrowing of the gastrocutaneous tract, making replacement difficult without dilatation. Unfortunately, the documentation surrounding the initial PEG replacement was almost non-existent. There were no indications of the elapsed time before replacement or of any difficulties experienced with the replacement.

However, it would appear that the ED registrar experienced no such difficulties when the patient was returned following the failed tube feeding at the nursing home. It can only be presumed that difficulty was experienced on the first attempt, when the tube was replaced, and that a gastric serosal tear occurred at that time along with the intraperitoneal placement of the tube.

The subsequent management of the case is entirely satisfactory and was conducted along recognised surgical principles with the knowledge and consent of the family.

The mortality audit has recorded several cases of patients developing similar problems after replacement or manipulation of enteral feeding tubes. As illustrated here, tube changes

should be regarded as a procedure which can result in peritonitis, usually in the setting of a frail and debilitated patient, with fatal consequences. Whenever there is any doubt about a tube position, a contrast study should clarify the situation.

The other notable aspect of this case was the delay in taking the patient to theatre. The definitive diagnosis of a contrast leak was made in the early morning, while the theatre time was noted as 18:00 hours. The exact reasons for this are unclear, but are presumably related to access problems to the emergency theatre.

Case study 3: Clinical deterioration post-colectomy indicates intra-abdominal sepsis until proven otherwise

CASE SUMMARY:

An elderly patient presented with a 6-month history of pneumaturia and recurrent urinary tract infections (UTIs). A computed tomography (CT) scan had shown a diverticular phlegmon with gas in the bladder, suggestive of a colovesical fistula. A laparoscopically-assisted resection of the colovesical fistula was performed. Intraoperatively it was not possible to dissect the inflammatory mass from the bladder and, quite appropriately, the procedure was converted via a Pfannenstiel incision to an open procedure. An anterior resection was performed with a stapled colorectal anastomosis. Both an air and a Betadine leak test were performed and were negative.

The initial postoperative course was unremarkable. Several days later the patient began to deteriorate, with increasing respiratory distress, falling saturations and increasing oxygen requirements. By the fourth postoperative day it was clear that there was a serious problem. The patient was tachycardic and hypotensive with a distended abdomen. The patient's white cell count (WCC) at that stage was 3.96. The case notes indicate that a CT pulmonary angiogram and CT abdomen were requested to "rule out pulmonary emboli or anastomotic leak". Despite a note from the ICU resident that a radiographer was to be called in for this, the CT scan was still not performed. Thereafter the patient's condition deteriorated over the course of the day. The patient exhibited increasing inotrope and oxygen requirements and required intubation. It was agreed that the patient should be returned to theatre, but before this could occur the patient arrested and succumbed.

CLINICAL LESSONS:

It seems quite clear that there was a major intra-abdominal catastrophe

developing over the 24 hours or so prior to the patient's demise, and it is likely that this was an anastomotic leak. While this cannot be stated with absolute certainty without knowing the results of the coroner's autopsy, the rapidity of clinical deterioration would support this assessment.

There are several specific questions that merit addressing:

1. Was an anastomotic leak preventable? A review of the operation notes suggests that the splenic flexure was mobilised and that appropriate air tests were performed. All reasonable steps seem to have been taken to ensure an appropriately constructed anastomosis.
2. Were there any perioperative factors that may have contributed to an anastomotic leak? The short answer is no. The patient's fluid balance seemed appropriate and there was no hypotension. The patient was on suitable antibiotics.
3. Was there timely intervention? It is well recognised that intra-abdominal sepsis may initially present with respiratory distress. While the surgical team identified this as a possibility, there does not seem to have been appropriate, or appropriately urgent, review of the patient and clinical situation after the morning ward round on the day of death. The responsible surgeon comments in the surgical case form that the registrars were dealing with other emergencies, but the severity of deterioration both overnight and later in the day should have led to greater priority being placed on more timely management.

The treating surgeon commented that this patient's deterioration was rapid and that the only window for intervention was on the morning of death. It is likely that the patient was entering a downward spiral thereafter and that intervention was unlikely to be successful unless it was undertaken in a more timely fashion.

Clinical Director's comment: It should be noted that the autopsy did not show an anastomotic leak, but it did find an area of ruptured diverticulitis above the anastomosis with faecal peritonitis. The assessor was right in the diagnosis of peritonitis from a leaking colon, though for the wrong reason.

Case study 4: Missed sepsis postoperatively

CASE SUMMARY:

A patient in their 80s was admitted with an acute type A aortic dissection. That same day the patient underwent an extensive reconstruction of the aortic root

and aortic arch. The operation was complicated by coagulopathy that required significant blood product transfusion and the use of recombinant activated human factor VII. The patient went to the ICU with the chest opened. Once the patient was more stable and the bleeding was controlled the sternum was closed. The postoperative care period was prolonged due to the presence of multi-organ dysfunction.

The patient was discharged to the ward and required extensive nursing support for the duration of the hospital stay, but was making reasonable progress. However, there was a major deterioration in the patient's condition on day 22, with the patient found unresponsive at 06:40. A medical emergency team (MET) call was made and the patient was transferred back to the ICU but death occurred later that day. The patient was said to have gram-negative septicaemia with Escherichia coli (E. coli). No cardiac, aortic or pericardial pathology was noted in coroner's deposition.

CLINICAL LESSONS:

The comments from the first-line assessor include a concern about the lack of detail in the reporting, including a lack of information about the operation performed. A second concern was regarding the events that preceded the patient's sudden collapse with septicaemia from the UTI. In particular, whether there were any findings that could have alerted the treating team and led to earlier diagnosis and treatment of the condition.

The notes from the treating hospital were available for review but the report from the coroner was not included. The medical record from the hospital is highly satisfactory. There were entries on every postoperative day from the surgical team.

The sudden deterioration and cardiac arrest was not anticipated. There was a note from the aged care team that raised concerns regarding diarrhoea and an increase in the WCC from 9.5 to 11.4 $x10^9$/L. The observation chart did not show any fever or tachycardia to suggest sepsis. Requests for a chest and abdominal x-ray, sputum, cardiopulmonary review, and faecal microculture and sensitivity were suggested. It is not clear if these were performed. No mention was made of a urine culture. Within 24 hours of the arrest the patient died.

Given the information provided, it appears that the patient died from a hospital-acquired infection related to instrumentation of the urinary tract. The death was therefore preventable. The patient had a urinary catheter in situ for 14 days following the

operation. After removal the patient developed urinary retention. There was then a traumatic reinsertion of the catheter with frank blood and clotting. That catheter was removed immediately, and another indwelling catheter was inserted following discussion with the urology unit. There was ongoing blood in the urine and blood at the meatus, although it seems that this settled over time. Two days prior to death there was a note from the nursing staff that the urine had heavy sediment. The catheter was removed on the day prior to death. As the laboratory results were not included in the medical record, it was not possible to review the results of any urine cultures that may have been sent.

This case highlights the difficulty in diagnosing severe sepsis in elderly, deconditioned patients. Often these patients do not exhibit the classical signs of sepsis. It is important that the surgical team maintain a high index of suspicion to line and catheter related sepsis.

- As mentioned in the assessor's report, postoperative sepsis can often be missed in elderly patients, especially following major surgery when the clinical signs of infection are subtle.
- The use of prophylactic antibiotics prior to invasive procedures (including urinary tract instrumentation) is important when a prosthetic aortic graft is in situ.[1]

REFERENCE:

1. Nishimura RA OC, Bonow RO, Carabello BA, Erwin JP, 3rd, Guyton RA. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2014;129(23):2440-92.

Case study 5: Untreated known Aspergillus infection causing ruptured mycotic mesenteric aneurysm

CASE SUMMARY:

A patient in their mid-60s attended an outpatient vascular surgical review for management of an abdominal aortic aneurysm. The patient had multiple pre-existing medical comorbidities, including peripheral vascular disease previously treated with a right femoral popliteal bypass graft, and a left femoral embolus that resulted in an above-knee amputation. The patient was a smoker until 2 weeks prior to the operation with chronic respiratory disease that was complicated by a cavitating pulmonary lesion caused

by infection with aspergillosis (noted in a CT scan of the chest performed during an admission to hospital 2 months previously with a fractured right leg). Other comorbidities included alcoholic liver disease with acute liver failure, hypotension, chronic renal impairment, deep vein thrombosis, recent chronic anaemia and depression. It was noted in the vascular surgery review that a respiratory registrar had advised that it was not necessary to treat the aspergillosis pulmonary infection if it was asymptomatic.

An elective open repair of an abdominal aortic aneurysm and bilateral common iliac artery aneurysm was completed in approximately 5.5 hours. A bifurcation graft was performed with an infrarenal proximal anastomosis, a right limb anastomosis to the right external iliac artery, a left limb anastomosis to the left iliac bifurcation, and a separate graft from the left iliac limb to the right internal iliac artery.

The patient was transferred to ICU for postoperative management, including treatment of hypotension, acute renal failure, low haemoglobin fibrinogen and albumin, an episode of melena, and respiratory infection. The patient developed pneumonia that was treated with antibiotics but a sputum culture revealed growth of the *Aspergillus* organism. On the advice of the infectious disease department, it was decided that it was not necessary to treat this with antifungal agents (because it was considered unlikely to be pathogenic). The patient recovered sufficiently to be discharged from the ICU on day 11.

The patient's condition suddenly deteriorated on day 12 due to an intra-abdominal haemorrhage from mesenteric arteries. The diagnosis was confirmed by imaging and angiography that demonstrated at least two separate sites of haemorrhage. It was decided to avoid an exploratory laparotomy and to treat the haemorrhage with an endovascular coil embolisation procedure. This was performed on two separate occasions but failed to control the haemorrhage. The patient's condition continued to deteriorate due to ongoing haemorrhage and/or mesenteric ischaemia. The decision was made to treat the patient palliatively and death occurred on day 13.

CLINICAL LESSONS:

The cause of death in this case was clearly an acute intra-abdominal haemorrhage from bleeding mesenteric arteries. The cause of the haemorrhage was unknown, but it is very unlikely that it was due to either the aneurysm repair or the

subsequent postoperative care. However, the patient was known to have recently had a cavitating lung lesion due to an aspergillosis pulmonary infection. This organism has been documented as the cause of mycotic aneurysms, and of haemorrhage of extracranial and intracranial carotid arteries and the aorta, particularly in immune compromised patients.

Although it appears that there are no reports in the medical literature of mycotic aneurysms of mesenteric arteries caused by infection with this organism, it is reasonable to consider that this organism could cause mycotic aneurysms of other arteries including mesenteric arteries. As such, it may have been a possible cause of the mesenteric haemorrhage. This patient was known to have an aspergillosis pulmonary infection prior to the operation, and also during the postoperative care. The decision was made not to treat this either before or after the operation on the grounds that it was asymptomatic, apparently without factoring in the possibility that this organism could cause an active and systemic infection in a patient whose resistance to infection was compromised by pre-existing medical comorbidities and very major surgery.

In retrospect, the patient should not have undergone an elective major operation without prior treatment of the pre-existing aspergillosis pulmonary infection. It is likely that the decision to avoid an exploratory laparotomy was correct, as it is very unlikely that the patient would have survived the procedure. The decision to treat the patient palliatively was entirely appropriate. Two comments regarding this case are appropriate:

- Treatment of any systemic infection prior to insertion of a prosthetic graft should be considered.
- Mycotic aneurysm from *Aspergillus* infection has been reported and should be considered.[2,3]

REFERENCE:

2. Tonolini M, Petulla M, Bianco R. Mycotic visceral aneurysm complicating infectious endocarditis: Imaging diagnosis and follow-up. *J Emerg Trauma Shock.* 2012;5(2):201-3.

3. Oderich GS, Panneton JM, Bower TC, Cherry KJ, Jr., Rowland CM, Noel AA, et al. Infected aortic aneurysms: aggressive presentation, complicated early outcome, but durable results. *J Vasc Surg.* 2001;34(5):900-8.

Case study 6: UTI not excluded prior to trial of void

CASE SUMMARY:

An elderly patient developed urinary retention 3 months prior to the present admission following a fall at home. A urinary catheter was inserted and left in place. One month after the fall the patient was admitted to the same hospital for a trial of void that failed. On that occasion a urine culture isolated S. aureus and the patient was commenced on a short course of antibiotics. Prior medical history included chronic renal failure, ischaemic heart disease, hypertension, and depression.

The present admission was for a further trial of void. There was no documentation of a further urine culture being performed or ordered. At the time of admission the patient was not on antibiotics. A bladder scan in the afternoon showed nearly a litre in the bladder. The nurses attempted to insert a catheter but nothing drained. A catheter was then inserted by a doctor and drained creamy purulent-looking urine. The patient was mildly disorientated, but apyrexial and haemodynamically stable. Investigations showed the creatinine had risen from 300 two months previously to 1,000, and there was a leucocytosis with a WCC of 23,000 and a C-reactive protein (CRP) level of 185 nmol/L.

An ultrasound showed no evidence of upper tract obstruction. IV antibiotics were commenced and a subsequent urine culture showed enterococcus, for which the antibiotics were appropriate. It was presumed that the urinary sepsis was the cause of the renal deterioration. Clinical examination suggested the patient was euvolemic and the urine output was reasonable. However, daily weights were not obtained nor was a consultation with a nephrologist. The following day the urology team handed over the patient's care to the medical team.

Despite what seemed like adequate hydration, renal function failed to improve. In the days following admission under the medical team the patient was assessed by the after-hours resident medical officer because of blood in the stool. A distended, tender abdomen was noted. The impression was of possible upper gastrointestinal disease or diverticular disease. At that time the patient was receiving a 3 unit transfusion for anaemia. Shortly thereafter the after-hours medical resident was again asked to review the patient, and noted generalised body pain with tenderness to palpation over his entire abdomen. The patient was

mildly confused and the patient's pain was put down to general hypersensitivity from the acute renal failure. Decreased urinary output was noted.

The following day a CT scan of the abdomen showed marked colonic diverticulosis only. The radiologist also commented on inflammation in the left paracolic gutter with thickening of the left adrenal and left Gerota's fascia, but a homogeneous pancreas. The following day the serum lipase was 1,500 and a diagnosis was made of pancreatitis. The patient continued to deteriorate and died several days following the diagnosis of pancreatitis and just over a week following the original admission. The cause of death was listed as urinary sepsis and pancreatitis.

CLINICAL LESSONS:

UTI is a common complication of urinary catheterisation. This was treated on the first admission. However, no proof of cure was confirmed by obtaining further urinary specimens. The patient was readmitted for a second trial of void without a further urine culture performed prior to this and without being commenced on antibiotics.

The admission notes were brief and the patient may not have been examined until found in retention that evening. Established urinary sepsis was probably present even prior to admission given the deteriorated CRP levels and raised inflammatory markers. All of this may have been prevented with a simple urine culture and appropriate antibiotic treatment before removing the catheter. Removing a catheter in a septic patient with purulent urine probably contributed to the demise.

Transfer to the medical team was appropriate. Their management of the acute-on-chronic renal failure was possibly suboptimal. The fluid balance seemed to be an issue and daily weights were not performed, nor was a nephrology consult obtained. With hydration and antibiotic therapy the CRP would have been expected to fall, whereas it remained at its elevated level throughout his admission.

Finally, there was a delay of a little less than a week in the diagnosis of pancreatitis. An earlier diagnosis may not, however, have changed the patient's management, as he was already nil by mouth and being treated with IV fluids.

Case study 7: Obstructed kidney not decompressed

CASE SUMMARY:

An elderly patient was admitted with symptoms of right renal colic. The significant past history included myelodysplasia, chronic renal failure, atrial fibrillation (AF) and urinary retention requiring long term idiopathic dilated cardiomyopathy. On admission, a CT scan confirmed right hydronephrosis secondary to two distal ureteric stones, one measuring 6 mm and the other 4 mm.

In view of the past history a conservative approach was suggested, since on admission there was no clinical evidence of associated sepsis or an infected, obstructed system. The patient was admitted for analgesia and observation. In particular, several notes were made about the need to inform the specialist in charge if the patient developed a fever. A catheter specimen of urine identified mixed growth only. The WCC on presentation was elevated at approximately 20,000, which was not unexpected in view of the myelodysplasia. The pain was relatively well controlled requiring occasional doses of opiate analgesia.

After 2 days the chronic renal failure was acutely exacerbated with a CRP rise from 134 to 283 nmol/L.

There was now lethargy with early onset respiratory difficulty and reduced oxygen saturation. The WCC increased dramatically from around 20,000 to almost 115,000 and an urgent haematological consultation was undertaken to exclude an acute leukaemic transformation of the known myelodysplasia. A medical review was also undertaken since at this stage the patient's mental state deteriorated with confusion and hallucinations. Throughout this period the patient remained entirely afebrile. The tachycardia was stable and constant since admission and was presumed to be secondary to AF.

The patient's mental state deteriorated further and required haloperidol for confusion. There was increasing respiratory distress requiring oxygen. Two medical reviews strongly considered sepsis and blood cultures were undertaken and IV antibiotics commenced. The renal function at this stage had stabilised and pain was reasonably well controlled. However, the patient's mental state and respiratory distress gradually worsened, and after 2 more days the patient arrested and died. The subsequent blood culture results confirmed gram negative bacteria in the blood.

CLINICAL LESSONS:

An infected obstructed kidney is an acute surgical emergency that

requires urgent decompression of the obstructed system either by an ureteric stent inserted cystoscopically or a percutaneous nephrostomy. The urgency of this situation is so well known that every patient with renal colic is closely monitored for two important clinical parameters that may alert the specialist for infection. Firstly, a fever is generally a reliable indicator of infection in otherwise well patients with renal colic. Secondly, the presence of leucocytes or an infection on urinalysis is a good indicator for urgent decompression. The WCC may be elevated to less than 20,000 in noninfected renal colic. Renal tenderness is also a nonspecific finding.

In this case these two clinical parameters were masked or not present due to the patient's underlying medical condition. The failure to mount a febrile response was most likely secondary to the underlying haematological condition. Secondly, a catheter specimen from a patient with a long-term catheter will always either show mixed growth or evidence of a UTI, which is usually colonisation that does not require treatment. The raised WCC was higher than would be expect from simple renal colic, but again might have been explained by the haematological condition. The tachycardia may also have been explained by the AF.

This patient was a difficult diagnostic dilemma whereby the usual indicators for sepsis were not present or were masked. In retrospect, there were other indicators to suggest the patient was septic, including deterioration of the patient's mental state, agitation and confusion, and the worsening respiratory distress.

The record keeping in the notes was excellent and there were many entries in the notes requesting close monitoring of the patient's temperature so that intervention could be undertaken if the patient was febrile. This case is a reminder that the absence of a temperature does not exclude infection, especially in patients who are elderly, immunosuppressed or have an underlying haematological condition. A high index of suspicion for sepsis is required in such patients, as evidence of sepsis can be as subtle as an alteration in their mental state.

Case study 8: Fulminant emphysematous pyelonephritis

CASE SUMMARY:

An elderly patient was admitted with severe sepsis, coagulopathy and a recent fall. Imaging with CT scans confirmed a fracture of the cervical spine at the level of C2 and C5. An abdominal CT scan showed

a grossly dilated left pelvicalyceal system with renal calculi. The findings were in keeping with emphysematous pyelonephritis. The patient was coagulopathic with a high international normalised ratio (INR) level, and was haemodynamically unstable with a tachycardia and hypotension. The decision was made to drain the left kidney with a percutaneous nephrostomy tube rather than proceed to an immediate nephrectomy. There was some delay in obtaining the nephrostomy tube through the interventional radiologist at the treating hospital. The patient was then admitted to the ICU confused, hypotensive, with a systolic low BP reading and severely septic.

A nephrostomy tube was placed using radiological guidance under general anaesthesia and a bloody aspirate was obtained. This subsequently grew *E. coli* and was treated with the appropriate antibiotic.

Despite maximum intensive care support and the placement of the nephrostomy tube, the patient failed to improve with ongoing sepsis, worsening renal function and acidosis, as well as respiratory failure. The urology team deemed the patient's condition too unstable to proceed with nephrectomy and palliative treatment was instituted. The patient subsequently died.

CLINICAL LESSONS:

Emphysematous pyelonephritis is a severe infection of the kidney often associated with stone formation and obstruction. It carries a high mortality rate and the ideal treatment modality is either immediate nephrectomy (if the patient is stable enough), or percutaneous nephrostomy tube to stabilise the patient. There have been reports of patients improving significantly with percutaneous nephrostomy with a delayed nephrectomy then being performed.

Given the severe sepsis, it is questionable whether the patient would have survived a major operation like a nephrectomy in the setting of an infected and obstructed kidney. Although the patient did receive a general anaesthetic for the nephrostomy tube, this is a quick procedure with a low risk for significant complications.

It is unfortunate that there was some delay in obtaining the nephrostomy tube, although an earlier nephrostomy tube may not have changed the eventual outcome.

Case study 9: Delay in diagnosis of pseudomembranous colitis

CASE SUMMARY:

An elderly patient with severe hip osteoarthritis had a past history of hypertension, chronic renal failure, gout and emphysema. Biochemistry on admission showed an elevated CRP (283 nmol/L) and hyperkalaemia (5.7). An uncomplicated total hip arthroplasty was performed. A stat dose of perioperative antibiotic was continued for 4 days. The patient-controlled analgesia was ceased on the second day and substituted with oral narcotic analgesia, principally oxycodone.

Three days later the patient developed a tachycardia, became confused and had a fall. Neurological observations were instigated and antibiotics recommenced when it was noted that the patient was febrile. The next day the patient was lethargic, confused and incontinent of faeces. A medical registrar noted abdominal distension. The CRP had increased to 310 nmol/L. The clindamycin was ceased and MS Contin commenced. The next day the medical registrar noted a distended tympanitic abdomen and peritoneal oedema. *Clostridium difficile (C. difficile)* had been cultured from the stool. The cephazolin was ceased and a working diagnosis was made of toxic megacolon. Vancomycin orally was commenced that evening and a surgical review recommended. The surgical registrar suggested a CT scan if there was any deterioration.

Early the next day the medical registrar again noted hypotension, *C. difficile* and acute-on-chronic renal failure. The patient was transferred to the HDU and then to the ICU some time later. A CT scan around midday showed thickening of the colon consistent with pseudomembranous colitis. Various lines were inserted, in the course of which the patient arrested and could not be resuscitated. An autopsy was not performed but the probable cause of death was *C. difficile*.

CLINICAL LESSONS:

This death was not primarily caused by the surgery. The patient exhibited a number of risk factors for *C.difficile* and toxic megacolon: age over 65, hospitalisation, multiple antibiotics and narcotic administration. The first symptoms of infection were present when the patient had diarrhoea and abdominal distension. Despite *C.difficile* being cultured, the diagnosis was considered but not made, and appropriate treatment was not instituted. The CT scan confirmed the diagnosis but was undertaken too late to alter the

outcome. It is unlikely that the minor head injury was significant. It is also unlikely that the procedure being undertaken at the time of arrest was causative of it.

It is worthy of note that over the 5 days prior to admission to ICU the patient was assessed by over 10 doctors, many on only one or two occasions. It is unfortunate that continuity of care cannot be provided in these settings.

Case study 10: Possible complication of methotrexate

CASE SUMMARY:

An elderly patient underwent an elective open neck exploration and parathyroidectomy for primary hyperparathyroidism. There was a background of hypertension as well as rheumatoid arthritis that was being treated with prednisolone and regular methotrexate. It was not clear from the medical record whether the patient underwent any preoperative investigations, as they may have been done outside the hospital, but the patient did not attend a preanaesthetic clinic. The operation was uncomplicated and the patient was reviewed by the consultant surgeon the next day and discharged home well. The calcium and parathyroid hormone levels were checked, however there was no record of a full blood picture being undertaken.

The patient re-presented on the fifth postoperative day with a 3 day history of a painful, erythematous and swollen neck wound consistent with cellulitis. There was also significant mucositis and this was preventing good oral intake. Blood investigations showed significant abnormalities: acute renal impairment, neutropenia and raised inflammatory markers (CRP 243 nmol/L). The patient was admitted in order to treat the cellulitis with IV antibiotics. That night the patient developed AF and was admitted to the critical care unit. The next day the patient's WCC was 0.7 $x10^9$/L, and a haematology review suggested that the WCC changes could have been due to sepsis, or were perhaps related to the use of methotrexate. The antimicrobial treatment was broadened to include fungal and viral infections, in addition to bacterial infections.

Four days after admission the patient was transferred to the care of the haematology team. The next few days were characterised by slow clinical improvement despite the ongoing issue of decreased oral intake due to mucositis. Results of the blood investigations were worsening with features of bone marrow suppression: thrombocytopaenia, the haemoglobin fell into the 70 g/L range and a WBC less than $1x10^9$/L. Filgrastim was

prescribed to stimulate neutrophil production.

Approximately 8 days after readmission the patient's conscious state deteriorated, with the Glasgow Coma Scale score fluctuating at around 8 or 9. A CT scan of the head and abdomen did not find a primary cause. Further blood tests suggested liver failure, with markedly abnormal liver functions, increasing renal impairment and encephalopathy. The most likely diagnosis was hepatorenal syndrome on a background of sepsis and immunosuppression, secondary to methotrexate and prednisolone. CRP levels continued to rise, reaching 361 nmol/L, and the conscious state deteriorated. Palliative care commenced following discussions with the family, and the patient died approximately 6 days later, 2 weeks after readmission.

CLINICAL LESSONS:

This patient appears to have died as a result of wound infection and the resulting systemic sepsis. This was most likely exacerbated by immunosuppression secondary to the methotrexate and prednisolone used to treat the rheumatoid arthritis. There was a suggestion that methotrexate toxicity may have been present due to the patient overdosing, but there was no precise evidence in the medical record to confirm this. The methotrexate level was 0.01 mg at re-presentation, however it is not clear how this should be interpreted, as the timing of the patient's last dose was unknown.

This appears to be an unexpected and possibly rare complication. The patient died from systemic sepsis resulting from the wound infection, despite good efforts to treat the sepsis. As preoperative blood tests were not made available for this review, the possibility of the neutropenia being present preoperatively could not be ruled out. Further investigation is needed in order to confirm that the treating team did not fail to identify the preoperative presence of neutropenia.

Case study 11: Fulminant sepsis from an infected TKR

CASE SUMMARY:

A 64-year-old male was admitted for a TKR. His main comorbidity was a mechanical heart valve that required long term warfarin therapy. This was appropriately reversed preoperatively and the TKR surgery was uneventful. The Warfarin was re-commenced after a suitable interval. The patient did have increased swelling, pain and a central wound blister postoperatively secondary to his

Warfarin therapy. He was discharged 8 days postsurgery without any problems other than a central wound blister.

Over the next few weeks he was noted to have moderate pain and swelling with an improving central wound blister. This was thought to be due to a resolving haemarthrosis secondary to his surgery and Warfarin therapy. Four weeks postsurgery he was noted to have gradually improving pain and swelling with a CRP of 27 mg/L. Two weeks later he was seen in a dressing clinic and was noted to be improving. Three days after this clinic visit he was readmitted with very severe pain in his knee. On admission he remained systemically well, with his heart rate, BP, temperature and respiratory rate all within normal limits. His INR was 2.8, CRP 20 mg/L and WCC 20. The provisional diagnosis was haemarthrosis and the plan was for analgesia, rest and elevation. A plan was also made to washout the haemarthrosis the following day, and the haematology team was contacted to advise on warfarin reversal.

The following morning the patient's WCC had reduced to 7 but the CRP had increased to 280 mg/L. The patient suffered a rapid deterioration mid-morning. The diagnosis was septic shock and acute renal failure secondary to septicaemia. He was resuscitated and taken to the ICU where inotropic support was required. Once stabilised, he was taken to theatre the same day for washout of the knee joint. The knee joint was noted to contain blood but no frank pus. Gram positive cocci were grown from both the blood cultures and the knee samples. Despite ongoing support in the ICU the patient continued to deteriorate and died from multiple organ failure the following day.

CLINICAL LESSONS:

Patients on warfarin therapy often have more pain and swelling following TKR surgery than the average patient. In the 7 weeks prior to this patient's final admission there was little to suggest infection. The patient's pain and swelling were improving and the CRP was gradually reducing towards a normal level. In a readmission with severe pain at 7 weeks postsurgery, the two main differential diagnoses would be haemarthrosis and deep infection. This patient had a normal heart rate, BP, temperature and respiratory rate, all of which are not indicative of an infection. He also had an INR of 2.8 that would predispose him to a further bleed into the knee. The only clinical indications that this was more than just a haemarthrosis at this stage were the pain levels and raised WCC.

Unfortunately over the 12 hours prior to his death the patient's general condition deteriorated rapidly, with fulminant sepsis causing multiple organ failure and the CRP increasing from 20 to 280 mg/L. It would have been very difficult to anticipate such a dramatic deterioration based on the patient's clinical state and blood parameters the previous evening. The management thereafter was appropriate, with full ICU support and a prompt washout of the knee in theatre once resuscitation was underway and Warfarin reversed. Gram positive cocci were obtained from both blood cultures and intraoperative knee samples - this is likely to have been the source of the patient's sepsis.

In retrospect, an earlier washout of the knee may have altered the outcome. The level of pain and the raised WCC could have prompted an earlier washout of the knee, but the decisions made based on the clinical information available at the time were not unreasonable, particularly as the patient was fully warfarinised. This case does highlight the importance of interpreting a reassuringly low CRP in such a patient with great caution, especially in a patient with acute severe pain following a joint replacement.

Case study 12: Delay in managing sepsis secondary to anastomotic leak

CASE SUMMARY:

A young patient with obesity and sleep apnoea was admitted for an elective proctectomy and ileoanal pouch with a defunctioning loop ileostomy. The previous history included an emergency colectomy for severe ulcerative colitis.

It does not appear that the patient was on medication at the time of admission to hospital. The initial postoperative course was unremarkable apart from a spike in temperature 2 days following the surgery, which seemed to be an isolated event.

Four days after surgery there was a wound discharge and the patient was noted to be somewhat dehydrated with a fairly high stomal output. IV Tazocin was commenced, presumably for ongoing wound discharge. By 20:00 on the fourth postoperative day, a MET call was placed because of the hypotension. The patient was hypotensive, febrile and turbid fluid was noticed in the pelvic drain. In addition, the patient was oliguric and had a distended and tender abdomen with ooze from the wound. The clinical assessment was that of septic shock. Bloods included a CRP of greater than 500 mg/L.

After discussion with the consultant surgeon the patient underwent an urgent CT scan at 20:45. This showed a collection and an anastomotic leak. The patient was transferred to the ICU at 22:00 and was commenced on Noradrenaline. The consultant surgeon and intensivists discussed the CT scan and clinical condition and decided to continue with medical management.

The following day, the surgical team and intensivists decided a laparotomy was required. The BP had returned to 110 mm Hg systolic, pulse rate was approximately 120 beats per minute and the patient was in AF. The operation commenced at 15:00, approximately 18 hours after the patient's MET call and the CT scan that confirmed an anastomotic leak.

At laparotomy there was purulent material throughout the abdomen. The drain was removed and replaced with Yeates drains in both paracolic gutters and pelvis, and the abdomen lavaged. The patient was taken back to the ICU, was ventilated and on inotrope support. A further lavage was undertaken 2 days later and minimal further contamination was noticed, but the patient died in the ICU that evening.

CLINICAL LESSONS:

The laparotomy could possibly have been performed on the night of the diagnosis of the anastomotic leak and the MET call diagnosis of septic shock. If a patient has a confirmed anastomotic leak and septic shock requiring Noradrenaline in the ICU, then a laparotomy seems to be an emergency requirement.

There is no doubt that things did progress rapidly in this case. IV antibiotics were commenced the day before the MET call and were not having an impact on the progression of the patient's sepsis. Early surgery was required.

Case study 13: Vascular graft always a suspicion for infection

CASE SUMMARY:

This diabetic patient with a history of stroke presented with left foot ulceration and rest pain. He underwent a left iliofemoral endarterectomy with vein patch. The left groin wound was noted to be discharging within a few days of the operation and he was started on Tazocin. The antibiotics were discontinued on postoperative day 9 following which the WCC rose to 15.2 x 10^9/L . A Code Blue was called for recurrent seizures on postoperative day 11. The CT brain was reported as unremarkable.

He was transferred to the ICU where it was reported that the left

groin wound was discharging “very wet fresh ooze”. Further MET calls occurred on the day of admission to ICU for seizures; sepsis was suspected.

In the early hours of postoperative day 12 he progressed to cardiac arrest with bradycardia / ventricular tachycardia and a Haemoglobin of 56. A large retroperitoneal haematoma was detected and cardiopulmonary resuscitation commenced. The vascular unit was notified and the decision was made to not to proceed with surgical salvage. The patient was pronounced dead 4 hours later.

CLINICAL LESSONS:

This case highlights the importance of wound monitoring and clinical detection of wound sepsis that requires surgical drainage. A discharging wound overlying a vascular anastomotic site in conjunction with a rising WCC should arouse suspicion of infection. In this case persistent infection led to this catastrophic event. An ultrasound or CT scan may have been helpful to detect a collection around the patch, although the decision to return to theatre is often based on clinical findings.

With retrospective wisdom, by the time the patient was experiencing seizures with WCC 15.2, the wound should have been explored to avoid secondary haemorrhage.

Case study 14: Antibiotics can kill

CASE SUMMARY:

This 71-year-old woman, who was undergoing regular haemodialysis for chronic renal failure related to insulin dependent diabetes, was initially booked to have revision of a failing arteriovenous fistula used for the haemodialysis. She presented to the ED with what was described as an abscess on the left second toe and was treated with antibiotics. She was admitted under the renal unit on the next day and started on IV antibiotics. While in hospital she was seen by the vascular unit. They performed an ultrasound that showed a superficial femoral artery occlusion. A CT angiogram showed diffuse iliac artery disease. A week later she underwent iliofemoral angiography during which she had iliac stents placed in the common iliac artery and external iliac arteries. This was described as uncomplicated; however, she had quite a lot of oozing from the puncture site postangiogram.

Throughout the stay in hospital she continued to have haemodialysis, and this continued after she was discharged.

She was readmitted to hospital for the elective ligation of arteriovenous fistula tributaries 11 days after the initial operation. This once again was uncomplicated. She continued to have haemodialysis following the treatment and 3 days later reported that she had loose bowel actions.

This was diagnosed as infective colitis and a CT scan the next day showed diffuse thickening of the colonic wall. Stool cultures indicated infection with *C. difficile*. She was started on metronidazole and limited IV fluid replacement due to her renal failure.

Two days later she developed severe abdominal and back pain and collapsed; a MET call was made.

At the time no specific diagnosis was made apart from the likelihood of ischaemic bowel causing the problem. This was confirmed by the presence of metabolic and lactic acidosis. The patient was assessed by the renal, surgical and intensive care teams and the decision was made that she was too unwell to survive open surgery. In conjunction with the family the decision was made for her to undergo palliation.

This patient was high risk throughout her hospital course due to immunosuppression, low body weight (36.5 kilograms), regular haemodialysis, diabetes, past stroke, ischaemic heart disease associated with AF and being on Warfarin, and peripheral vascular disease (multilevel; associated with gangrenous changes in the left second toe and heel and sacral pressure areas).

CLINICAL LESSONS:

The initial treatment of the toe and iliac artery disease was appropriate; however, it would appear that the use of the antibiotics resulted in the colonisation of the colon with *C. difficile*. This resulted in infective colitis 10 days later. CT investigation at the time confirmed the presence of thickened colonic wall resulting in the onset of the diarrhoea. She was appropriately treated for this with metronidazole and limited IV therapy due to her renal failure. Blood tests showed increased WCC.

Due to the acute nature of the terminal event no other investigations were performed, although a further CT scan was planned.

When the severe abdominal pain developed the patient was assessed as not being able to withstand a surgical insult and survive it. Given those circumstances the appropriate measures were undertaken in consultation with the family.

It would appear that these events were unavoidable.

Case study 15: An unusual neurosurgical infection.

CLINICAL SUMMARY:

The patient was an older male admitted for elective surgery of a right hemifacial spasm. He normally walked 4-to-8 kilometres a day. He had stopped smoking 10 years ago. He had experienced a previous stroke and developed epilepsy, which was quite stable on anti-seizure medication. He had no history of ischaemic heart disease or diabetes. The patient had normal renal function, but had been on the medication Plavix as a preventative measure since the ischaemic stroke. He had developed a hemifacial spasm that did not respond to medication, and was referred for elective microvascular decompression of the right seventh cranial nerve for refractive hemifacial spasm. An adequate preoperative review was completed.

Despite the two volumes of notes provided, notes from the first admission, including the operation report, were not available. As such, no comments can be made upon operative technique. In particular, no comment can be made about the closure of the dura and the wound, which were highlighted as a potential risk by the first line assessor.

The patient presented 1 week following the surgery for suture removal, and was noted to be hypertensive but afebrile. His wife remarked that he had a headache and had become quite agitated the day prior to suture removal. The patient had been recommenced a few days prior to this on Plavix. He was admitted for monitoring.

He remained hypertensive despite medical treatment, and started to suffer from seizures. The sutures had been removed. Due to his refractory hypertension and frequency of seizures, he was admitted to intensive care where he progressively declined. A CT Scan showed a subarachnoid haemorrhage, but an angiogram revealed no aneurysm or other cause. He developed hydrocephalus and, appropriately, a ventricular drain was positioned without incident.

He showed progressive signs of poor neurological improvement and became septic throughout this admission, with blood cultures of *S. aureus*. Culture of the cerebro-spinal fluid was negative. The notes indicate that the wound appeared to have erythema at the time of the suture removal, but this was thought to be normal. It was noted throughout the admission that the wound became more erythematous and then swollen. The series of scans do not make any comment

other than postoperative changes. As the patient became more septic, the wound became more swollen despite the correct antibiotics being utilised. A decision was made to take the patient to theatre and remove the infected bone flap. It was noted that there was pus both extra-durally and intra-durally. This was not clearly evident on any of the scans. A further washout of the pus from a redo craniotomy was performed. However, throughout the admission the patient remained septic and continued to have seizures. He went into acute renal failure. He had persistent refractory hypertension throughout the admission. Unfortunately, the patient had a progressive decline in clinical and neurological state throughout the admission despite full and collaborative aggressive treatment from multiple medical specialities, which seemed appropriate. The decision was made to palliate the patient with the family's agreement.

CLINICAL LESSONS:

Cranial wound infections from elective procedures are exceptionally rare but they do occur. Risks are related to patient factors such as obesity, malignancy, smoking and diabetes, none of which applied in this scenario. In posterior fossa craniotomies, infections are related to the closure of the wound, specifically the dural closure and the possibility of CSF leak. There were no operative notes available, so this aspect of the case could not be commented on. The wound was described as moist at the time of suture removal, which may have been a hint of developing infection.

The timing of suture removal was discussed by the assessors. Suture removal at 7 or 10 days is common in various units. It is difficult to see how a difference of 3 days would determine the presence and progression of a deep wound infection. The infection was probably the result of bacterial contamination at the time of the original surgery.

An infected craniotomy following elective surgery is exceptionally rare and at times difficult to detect, but when they do occur they are not often lethal. Despite this, in this case it appears to have been the primary cause of the patient's demise.

Case study 16: Fournier's gangrene – urgency missed

CLINICAL SUMMARY:

The patient was a man in his 60s who had an extensive past history of type 2 diabetes, renal impairment, pulmonary oedema and ischaemic heart disease. He was admitted with a 3 day history of scrotal and lower abdominal swelling, fever and

general deterioration. The initial diagnosis was Fournier's gangrene. He was admitted to the HDU and treated with antibiotics and IV fluids. There was a urology consultation at the time of admission, but according to the notes the contact was at the resident medical officer level.

Approximately 48 hours after admission he became hypotensive and needed inotrope support. There had been a CT scan of the abdomen/pelvis that was reported as showing soft tissue swelling of the scrotum and lower abdomen. The presence of obvious gas in the scrotum was not reported by the radiologist.

Consultant urology review took place 6 hours after the development of hypotension and 54 hours after admission. The decision was that the patient was not fit for operation and he died 4 hours later.

CLINICAL LESSONS:

Fournier's gangrene is often misdiagnosed (not so in this case) or the urgency of wide surgical debridement is not appreciated. In this case it is uncertain whether he would have survived early operation, but the point must be made that without early correct diagnosis and rapid and early surgical debridement, the chances of survival are greatly diminished.

Shortened Forms

AF	atrial fibrillation
ANZASM	Australian and New Zealand Audit of Surgical Mortality
BP	blood pressure
CRP	C-reactive protein
CT	computed tomography
ED	emergency department
HDU	high dependency unit
ICU	intensive care unit
INR	international normalised ratio
IV	intravenous
MET	medical emergency team
PEG	percutaneous endoscopic gastrostomy
SAASM	South Australian Audit of Surgical Mortality
TKR	total knee replacement
UTI	urinary tract infection
WCC	white cell count

Contact details

Royal Australasian College of Surgeons
Australian and New Zealand Audit of Surgical Mortality
199 Ward Street
North Adelaide SA 5006
Australia

Telephone: +61 8 8219 0900
Facsimile: +61 8 8219 0999
Email: wendy.babidge@surgeons.org

Website: http://www.surgeons.org/anzasm

Notes

Notes

Royal Australasian College of Surgeons
Australian and New Zealand Audit of Surgical Mortality
199 Ward Street
North Adelaide SA 5006
Australia

Telephone: +61 8 8219 0900
Facsimile: +61 8 8219 0999

Email: wendy.babidge@surgeons.org

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