CHASM

Collaborating Hospitals' Audit of Surgical Mortality

CASEBOOK2015

NSW GOVERNMENT Health

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists

Royal Australasian College of Surgeons

CLINICAL EXCELLENCE COMMISSION

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Introduction

The Collaborating Hospitals' Audit of Surgical Mortality (CHASM) reviews all deaths of patients who were under the care of a surgeon, or where a surgeon had major input to care, irrespective of whether or not an operation was performed. The audit process encourages reflection and surgical learnings and is governed by special privileges which allow all communications to remain confidential.

This is an opportunity to remind surgeons that participation in a state-based audit of surgical mortality is now compulsory to meet the requirements of the Continuing Professional Development Program of the Royal Australasian College of Surgeons (RACS).

The annual casebook for 2015 reports on a variety of cases, which have all undergone a second line assessment, i.e. case notes review. The cases have been identified for their surgical learnings and it is in this spirit that we wish to share these learnings with our colleagues. We hope you find them instructive.

Partnership with the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)

RANZCOG has been a partner of CHASM since late 2012, with Dr Susan Valmadre, NSW State Chair of RANZCOG, being a member of the CHASM Committee. All deaths related to a gynecological procedure are now referred to CHASM for peer review with feedback provided to the treating gynaecologist.

Documentation

Improving the quality of documentation in clinical records is an area for future efforts. Several assessors commented on the occasional shortcomings in this area.

These issues may vary from no notation as to whether the patient has been seen by a consultant, and if so, what the opinions regarding management were, entries that are undated, that are written in retrospect and some that are illegible. In particular, there have been reflections on the lack or paucity of documentation when there has been an unexpected change in a patient's condition and the subsequent progress in an evolving clinical scenario.

When complex patients are being managed by a number of consultants, it is especially important to document their opinions. A second line assessor commented on a case where there had been a major disagreement in the management plan between surgeon, anaesthetist and the medical director, but none of this was highlighted in the notes. Decisions regarding the management plan should be articulated in the notes e.g. management of anticoagulants. Clinical notes should be free of abbreviations (except where generally accepted), be concise, objective and contemporaneous.

Acknowledgement

I would like to acknowledge the contributions of so many surgeons who have given their time to be assessors for CHASM. Thank you to all involved.

My special thanks to the second line assessors whose reports form the basis of this casebook. They have spent many hours in reviewing clinical notes and writing considered and objective reports.

I also wish to thank Professor Allan Spigelman, Dr Warren Hargreaves and Associate Professor John Ireland for their contributions to this year's casebook.

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Associate Professor Lewis Chan, Head of Urology Department, Concord Repatriation General Hospital and Dr Laura Ahmad, Consultant Geriatrician, Aged Care Department, Royal North Shore Hospital have provided a review of surgery in older persons. Thanks to both for their incisive reflections.

A special mention of appreciation to Paula Cheng, Manager of CHASM, and her dedicated staff for their diligent efforts to ensure that CHASM has an efficient process and that surgeons receive their feedback in a timely manner.

I hope that you find this year's casebook of value and would welcome your feedback.

Peter Zelas
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Obstetrician & gynaecologist

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Beware the intrathoracic stomach

CASE 1

An elderly patient underwent an uneventful, major orthopaedic procedure after a thorough preoperative assessment, apart from a chest x-ray. Postoperatively the patient developed chest pain, nausea and vomiting. He was seen by the medical team for a possible cardiac event. An electrocardiogram (ECG) showed ST depression with normal troponins. A computed tomographic pulmonary angiogram (CTPA) excluded pulmonary embolism but showed a giant hiatus hernia with intrathoracic stomach.

The patient further deteriorated and was transferred to the intensive care ward where he required intubation with a working diagnosis of aspiration pneumonia. His chest x-ray noted "large intrathoracic stomach", with comments by a clinical team that it had been present for more than two years and was deemed to be chronic. His abdomen was noted to be distended but not tender.

Over the subsequent four days, the patient was seen by the surgical team, who considered a diagnosis of resolving pseudo-obstruction. The patient continued to deteriorate and this prompted a computerised tomography (CT) scan, which demonstrated a perforated viscus, one week following the onset of chest pain. At operation, an infarcted stomach with perforation due to gastric volvulus was identified. The contents of the hiatus hernia were reduced and a partial gastrectomy and gastropexy were undertaken. Postoperatively, the patient developed fungaemia and died four days later.

Surgical learnings

- Gastric volvulus is an uncommon but a well recognised condition. Surgeons, anaesthetists and intensivists should be aware of the significance of an intrathoracic stomach and its potential for volvulus. In this patient, there had been chest pain and deterioration without a working diagnosis, apart from aspiration. The significance of the hiatus hernia seen on the CTPA and postoperative chest x-ray was not considered.
- The deteriorating patient. This case reminds us of the importance of considering and revisiting management plans when the patient is not progressing along the expected pathway.
- Chest x-rays should be included in the preoperative assessment of elderly patients.

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Learnings from colonoscopy

CASE 2

A patient in the eighth decade of life, without major comorbidities, was admitted with an acute abdomen three days following a routine screening colonoscopy. The patient did not report any pain for the first two days following the procedure.

On admission, the patient was experiencing severe abdominal pain and general and lower abdominal peritonism, was afebrile and had a pulse rate of 100 per minute. The white cell count was 9.5 x 10^9/L (reference range 3.7 - 9.5 x 10^9/L). A CT scan showed a localised perforation of the sigmoid colon, either related to diverticulitis, or an iatrogenic cause. A decision was made to manage the patient conservatively with intravenous fluids and antibiotics.

Two days later, the patient was noted to have an erythematous rash involving the scrotum and left lower abdominal wall. The pain and peritonism remained unchanged. On the fourth day in hospital, a second CT scan showed an increase in size of the inflammatory mass and an associated ileus/bowel obstruction.

The patient was booked for surgery but this was delayed for 24 hours because of a lack of theatre availability. At operation, faecal peritonitis was present and a Hartmann's procedure was undertaken but the patient died from sepsis and multi-organ failure.

Surgical learnings

- Delay to surgery. The conservative management of a localised, colonoscopic perforation, while initially a reasonable option, should be followed by close clinical observation. If there is no improvement, then surgery should be undertaken expeditiously. In this patient, one could argue there was a case for earlier intervention, if not at the time of presentation, then when it was apparent that there was no clinical improvement and the patient developed abdominal wall and scrotal erythema. Elderly patients do not tolerate sepsis related to a perforated viscus well.
- The delay to surgery because of a lack of theatre availability is a recurring concern reported to CHASM and can contribute to patients' adverse outcomes. In this patient, it would have been reasonable to escalate the urgency of the need for surgery to senior hospital management and not taken "no" for an answer.

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More learnings from colonoscopy

CASE 3

A patient in the tenth decade of life, with multiple comorbidities (respiratory, cardiovascular and renal disease and assessed as ASA 3[1]) and living at home independently, underwent a colonoscopy for investigation of severe left sided pelvic pain when opening her bowels. The colonoscopy did not identify any abnormalities and the patient was discharged on the same day without any symptoms. Four days later, the patient was admitted to hospital with abdominal pain and sepsis. A laparoscopic lavage for four-quadrant purulent peritonitis with placement of drains was undertaken. The patient gradually declined and died five days postoperatively.

Surgical learnings

- Indication for colonoscopy. Colonoscopy in the very elderly requires careful consideration. In this case, the CHASM assessor questioned the indication for the colonoscopy and was of the opinion that it was unlikely to provide useful information in this clinical setting.
- Laparoscopy vs laparotomy. In this case, laparotomy may have been a preferred option. One can understand the reticence to undertake a major procedure on an elderly patient, but a "second choice operation" as reflected on by the CHASM assessor, may not have been the best answer.

CASE 4

An elderly patient was admitted for a surveillance colonoscopy after having undergone a right hemicolectomy for a malignant polyp a year earlier. She lived independently at home. The medical history included a cerebrovascular accident for which long term Clexane was prescribed, obesity, a cardiac pacemaker, atrial fibrillation, congestive cardiac failure, a pulmonary embolus in 2011, diabetes, and ischaemic heart disease. She was graded as ASA 3.

The Clexane was last administered to the patient two days prior to the colonoscopy but the surgeon was not involved in the management of the anticoagulation.

A polyp was identified in the transverse colon at the colonoscopy but was not removed because of the risk of bleeding. The plan was to discuss the findings with the patient after the procedure and schedule definitive management at a later date.

The colonoscopy proceeded uneventfully under sedation and the patient was discharged later in the day. The following day, the patient was admitted to another hospital with a cerebrovascular accident from which she did not recover.

1 The American Society of Anesthesiologists (ASA) Score is a global score that assesses the physical status of patients before surgery. ASA 3 denotes a patient with severe systemic disease.

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Surgical learnings

- Surgeons' responsibilities. The management of all aspects of a patient's care is the responsibility of the surgeon. In this case, it was presumed that the patient had been reviewed by a cardiologist. However, there is a lack of documentation as to the decision to cease the Clexane. As a decision had been made not to remove any polyps identified, the Clexane should not have been discontinued before the colonoscopy. This highlights the importance of close communication with all clinicians involved in a patient's care.

- Decision to colonoscope. Surveillance colonoscopy in the follow up of patients who have had colorectal polyps and cancer needs to be carefully considered for older patients with multiple comorbidities. The Charlson comorbidity index[2] may be a useful reference for decision making in this regard with risks rising above 2. This patient's Charlson comorbidity score was at least 4, if not higher.

2 The Charlson comorbidity index predicts the ten-year mortality for a patient who may have a range of comorbid conditions, such as heart disease, AIDS, or cancer (a total of 22 conditions). Each condition is assigned a score of 1, 2, 3, or 6, depending on the risk of dying associated with each one. Scores are summed to provide a total score to predict mortality.

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Review all the notes, document and consult

CASE 5

A patient was referred to an emergency department with a three week history of a "flu-like" illness, fever, and tiredness associated with profound anaemia. The full blood count showed a haemoglobin level of 63 grams per litre (g/L) and suggested leukaemia or myelodysplasia.

The medical team undertook investigations for the cause of fever and a CT scan identified a "huge mass of the sigmoid" and an adjacent abscess. The patient was referred to the surgical team who noted fever, tachycardia, and "mild central abdominal tenderness".

The following day on the ward round (without the consultant), the patient was noted to be afebrile with a soft abdomen. Surgery was discussed with the consultant, but there was no further documentation until a postoperative review. There was no consultation with either the medical or haematology team prior to surgery.

Two days later, the patient underwent drainage of a pericolic abscess, an anterior resection and ileostomy. Postoperatively, he developed confusion and coagulopathy. A bone marrow biopsy revealed acute myeloid leukaemia and haematology advice was for palliation only. The patient died one week following surgery.

Surgical learnings

- Review all the charts and test results. Clinicians must review the results of all investigations. In this case, haematology malignancy was suspected when the patient was initially seen, but this was not followed up or further investigated.
- Clinical communication. This case demonstrates the importance of interdisciplinary communication. The patient was initially admitted under the medical team who requested a surgical consultation. There was no further medical or haematology review before surgery.
- Decision to operate. The patient was noted to have minimal abdominal signs and required only one dose of morphine following admission and the vital signs remained stable. It may have been useful to canvass alternatives to surgery, e.g. percutaneous drainage of the abscess.
- Documentation. From the clinical notes, the degree of consultant input into the patient's management is unclear. Accurate and clear documentation is critical for patient care, as it enables tracking of the care that has been provided and sharing of key clinical findings and decision making with other clinical teams.

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How urgent is it?

CASE 6

A patient was referred to a hospital by his general practitioner with an incarcerated, inguinal hernia. He had been in moderate pain for two days. He initially attended the emergency department and was discharged home. The pain had mostly settled apart from some discomfort in the inguinal region and vague abdominal pain. His hernia was non-tender and the abdomen was soft.

The patient appeared to be a poor historian. His past medical history included coronary bypass grafting, coronary artery stenting and hypertension.

On the evening of his admission, the patient underwent a repair of the inguinal hernia. Postoperatively, the patient experienced angina and was heparinised. The heparin was ceased on postoperative day two after a large scrotal haematoma was noted. On postoperative day three, the patient became febrile and had two MET[3] calls for bradycardia and later, angina. He was therefore recommenced on heparin.

On postoperative day four, the patient had a coronary angiogram and four stents inserted into his coronary arteries. During that time, the patient had temporary asystole and experienced further chest pain and was admitted to the intensive care ward.

The following day, blood cultures taken two days previously to investigate his fever, were reported to be positive. Subsequently, the patient developed a productive cough, fever, increased respiratory rate, and then abdominal distension. Before any investigations could be undertaken, the patient developed rapid atrial fibrillation, became hypotensive, had a cardiac arrest and could not be resuscitated.

Surgical learning

- Timing of surgery. At the time of admission, the patient had a non-tender incarcerated hernia. It may have been prudent to defer the operation until such time as a complete preoperative evaluation was undertaken, especially in the context of previous coronary artery disease and reported angina. An abdominal x-ray and/or a CT scan may have been useful in providing objective evidence of the degree of any bowel obstruction, especially as the patient was a poor historian.

3 Medical emergency team.

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Surgery in older persons - perioperative considerations in optimising outcomes

Lewis Chan, Urologist, Concord Repatriation General Hospital

Laura Ahmad, Consultant Geriatrician, Aged Care Department, Royal North Shore Hospital and Chair, NSW Agency for Clinical Innovation (ACI) Orthogeriatrics Subcommittee

Almost half a million Australians are over the age of 85 and 15 per cent of the Australian population are over the age of 65[1]. Surgery in older patients carries increased perioperative risks. An Australian study demonstrated that the odds ratio for 30-day mortality increases by 1.09 per year over the age of 70, having non-cardiac surgery[2]. Falls represent about half of hospital admissions for accidental injuries, with many involving fractures of the femur. Local guidelines have been developed for hip fracture care[3]. Laparotomy and bowel resection represent one of the common operations in both elective and emergency surgery in the elderly[4].

Case reviews in CHASM highlight consistent issues in care of these conditions with multiple antecedent comorbid conditions, frailty, polypharmacy/anticoagulation, fluid management, and sepsis being contributing factors in many surgical deaths.

The challenges in optimising outcomes in surgery of older patients involve meticulous preoperative assessment/decision-making and postoperative care, in addition to the performance of the surgery itself. This involves close collaboration between surgical, medical, nursing and allied health staff. However, the availability of medical consultation services such as orthogeriatric liaison services does not abrogate surgeons in the overall responsibility of care of our patients.

Preoperative identification of comorbid conditions allows early involvement of medical/geriatric medicine teams to assess risk and optimise these conditions. Careful medication history can identify issues of polypharmacy (more than five medications) and of specific medications (such as anticholinergics), which can predispose to postoperative complications such as falls or delirium. Uncontrolled pain is also a risk factor for delirium, and is often undertreated, particularly in patients with premorbid cognitive deficits. Knowledge about social support and functional assessment including activities of daily living are important in postoperative/discharge planning.

The consent process for surgery should include discussion of the patient's wishes regarding the planned surgery, limitation of care, including any existing advance care directives, with appropriate involvement of family/carers. Identification of cognitive impairment/dementia is also important, not only to recognise increased risk for postoperative delirium, but also to assist in planning appropriate facilities and staffing for postoperative care.

In 2012, the American College of Surgeons and the American Geriatrics Society jointly released best practice guidelines for the geriatric surgical patient[5]. The guidelines highlight 13 important areas requiring preoperative assessment in geriatric patients: cognitive impairment and dementia; decision-making ability; postoperative delirium; alcohol and substance abuse; cardiac status; pulmonary status; functional status, mobility, and falls risk; frailty; nutritional status; medication regimen; counseling; preoperative testing; and patient-family and social support system (see checklist). Similar concerns were raised in a review of the care received by older patients undergoing surgery conducted by the United Kingdom National Confidential Enquiry into Patient Outcome and Death, highlighting the need for closer collaboration between surgical and medical teams, with prompt and early involvement of senior clinicians in decision making.

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Preoperative assessment checklist for the older patient

- Perform complete history and physical examination
- Conduct cognitive assessment, including the patient's ability to understand the purpose and likely outcomes of the planned surgical procedure
- Identify the patient's treatment goals and expectations in light of anticipated and unexpected treatment outcomes
- Assess risk factors for postoperative delirium and screening for substance abuse/dependence, including alcohol
- Perform cardiac evaluation following guidelines/algorithm for patients undergoing non-cardiac surgery
- Assess risk factors for thromboembolism and postoperative pulmonary complications and implementing suitable preventive strategies
- Document functional status and falls history
- Assess nutritional status and considering implementation of preoperative interventions for high-risk patients
- Take a complete medication history, including non-prescription medications (such as fish oil increasing risk of bleeding), making needed perioperative adjustments, and minimising polypharmacy
- Assess the family and social support system

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The Deteriorating Patient

CASE 7

A patient underwent a laparoscopic mesh repair of a large symptomatic incisional hernia. The patient felt that his quality of life was severely compromised and requested repair of the hernia. The operation took in excess of three hours and necessitated multiple adhesiolysis. On day one postoperatively, the patient was noted to be febrile and this was attributed to atelectasis. An abdominal CT scan after 48 hours revealed large fluid collections. A decision was made not to aspirate due to risk of mesh infection. The patient's condition fluctuated over the next five days, and on day eight, the abdomen was noted to be very tender. Percutaneous aspiration demonstrated bowel contents, and a laparotomy confirmed faecal peritonitis due to a perforation of the distal small bowel which was resected without anastomosis. On day 10 postoperatively, a relook laparotomy and ileostomy were performed. The patient developed multi-organ failure and died on day 14.

CASE 8

An elderly patient underwent a laparoscopic hand-assisted ileocolic resection and adhesiolysis for a malignant polyp in the ascending colon. Postoperatively, he developed confusion and abdominal distension, presumed to be due to ileus. He then had a recurrence of atrial fibrillation and recurrent fevers with an elevated white cell count. An abdominal CT scan showed "lots of free fluid", but no evidence of an anastomotic leak. The possibility of an injury to the ureter was entertained and this delayed a more definitive approach until a percutaneous drainage showed bilious fluid. A laparotomy was undertaken and identified a 5 millimetres (mm) perforation in the distal ileum which was oversewn with an omental patch.

Three days later, nursing and intensive care unit (ICU) entries noted greenish brown fluid from an intra-abdominal drain and in the wound, but this was considered to be residual intra-abdominal sepsis. This drainage continued and led to a laparotomy, where a pinhole leak was identified at the anastomosis, which was resected and an end ileostomy was performed. There was recurring leak from the stapled end of the transverse colon, then continuing sepsis and a tracheostomy was advised. The family unanimously requested not to proceed with the tracheostomy and treatment was withdrawn.

Surgical learnings

- Not improving along "expected" trajectory: have a high index of suspicion. In both cases, there was significant delay in recognising an anastomotic leak and this had in turn resulted in delay to surgery and contributed to the eventual outcome for both patients.
- The clinical picture in Case 7 was blurred by an associated respiratory infection and there was a delay in recognising the evolving intra-abdominal sepsis. The CHASM assessor commented that there appears to have been a reliance on imaging to diagnose an acute surgical problem and this had resulted in delaying the diagnosis.
- In Case 8, a CT scan was suggested on day four by a member of the clinical team, but was not acted on for a further 48 hours. The presence of free fluid in a patient who is unwell should be a prompt to consider the most likely diagnosis of an anastomotic leak.
- Need for steroid replacement. The patient in Case 8 was on long term prednisone 5 milligrams (mg) daily. Was it necessary to replace the steroids postoperatively? The CHASM assessor was of the opinion that this may have masked the earlier presentation of events as they unfolded.

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"Talk and die"

CASE 9

A patient in her late eighties and living independently, was struck by a car door and knocked to the ground. There was no loss of consciousness, and the Glasgow Coma Scale[4] (GCS) was 15. The patient had rheumatoid arthritis for which she was prescribed with prednisone and methotrexate but she was not on any anticoagulants.

On admission to the emergency department, the patient was assessed as ASA 2[5] with a GCS of 14 at 14:56 hours. There were no focal neurological signs. A CT of the brain showed a small bilateral acute subdural haematoma, frontal traumatic subarachnoid haemorrhage extending to the temporal lobes, and a 1.2 centimetres (cm) frontal contusion, but no midline shift. There were several fractures of the temporal bone with some associated pneumoencephalus.

The patient was initially managed in the emergency department.

At 17:04 hours, the patient's GCS was 15, but by 18:30 hours, it had decreased to 10 or 11 although she was obeying commands. There was a comment charted in her medical records: "no need for surgery right now". A second CT scan showed progression of the bifrontal contusions, the largest of which increased to 2.7 cm. The other findings remained unchanged and there was no midline shift. The plan was to operate if there was deterioration.

At 20:15 hours, there was further deterioration with GCS of 8 "at best". The patient was intubated and transferred to ICU. No surgery was undertaken.

On day two at 07:00 hours, the GCS was 3 to 7, but there was discrepancy in the assessment as the patient was sedated. A CT scan showed further progression of the contusions. At 15:46 hours, there was noted "unlikely to be for surgical intervention". Thereafter, the patient received palliative care and died on day seven.

Surgical learnings

- Documentation. From the clinical notes, it is difficult to ascertain whether there was a decisive management plan formulated. The notes were "far from clear and confusing" and there was no record of the patient having been seen by a consultant (although the consultant may have seen the patient and it was not recorded in the notes). The second line assessor commented on the difficulty of following the computer medical records, e.g. "days and dates do not follow in order". The only handwritten note was on day one: "This is a system issue".
- Communication was poor between the neurosurgical team and the ICU staff as to the intent of the management plan. There was worsening of the clinical condition and the CT scan and yet, as the CHASM assessor commented, the option for surgery remained a possibility.
- The judgment of the managing clinicians at the time may have been that the patient (in her late 80s), if she survived the surgery, would be severely disabled and therefore surgery was not appropriate. However, the patient reflects the situation of very rapid and almost silent deterioration where patients may be seemingly well but then progress suddenly to death. This is often referred to as "talk and die". The decision making is also inadequately reflected in the clinical records. This highlights the importance of an adequate, clearly articulated management plan.

4 The Glasgow Coma Scale is a neurological scale that aims to give a reliable, objective way of recording the conscious state of a person for initial as well as subsequent assessment. A patient is assessed against the criteria of the scale, and the resulting points give a patient score between 3 (indicating deep unconsciousness) and 15.

5 ASA 2 denotes a patient with mild systemic disease.

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Holistic care

CASE 10

A patient in his sixties was transferred from a rural regional hospital to a metropolitan tertiary referral hospital for investigation and management of a lung lesion. A right upper lobe, and possibly a left lower lobe lesion, had been incidental findings on investigation of a 30 kilograms (kg) weight loss at the time of coronary artery surgery at another hospital six months earlier. No tissue diagnosis had been established and no cause for the weight loss was identified.

The patient had significant comorbidities. In addition to ischaemic heart disease for which the patient had undergone coronary artery bypass surgery, he had atrial fibrillation, hypertension, peripheral vascular disease and chronic obstructive pulmonary disease due to heavy cigarette smoking, in addition to his unchanged malnourishment.

There appeared to be a slight increase in size in the upper lobe lesion, hence the admission on this occasion. The patient was reviewed by cardiology, respiratory and allied health teams and all commented on the patient's malnourished status. No tissue diagnosis of the lung lesions was made as the patient was considered too high a risk for a pneumothorax from a fine needle biopsy. The upper lobe lesion was considered to be a neoplasm. A paramedical review was undertaken four days before surgery and it was deemed that the patient was fit for surgery although not keen to have the operation. Marked muscle wasting was still evident. The patient was seen by the respiratory team and a cardiothoracic fellow, both of whom stated that the patient was fit for surgery.

The patient underwent an uneventful right upper lobe lobectomy (histology later confirms carcinoma). Postoperatively, the patient developed sputum retention secondary to chronic airway disease, muscle weakness and pain. This eventually culminated in a cardiac arrest and neurological injury three weeks later, and a decision was made to follow a palliative course.

Surgical learnings

- Timing of surgery. Perhaps there should have been consideration given to postponing the surgery until a cause of the weight loss was established, nutritional status had improved and additional preoperative chest physiotherapy undertaken to maximise the respiratory reserves.
- It was unclear why the patient was referred to the metropolitan hospital rather than be admitted to the hospital where the coronary artery surgery had been undertaken, as the clinicians at the latter would have been in a better position to ascertain whether there had been any changes in the patient's physical state.
- Before transfer from the regional hospital, the appropriateness of the transfer seems not to have been questioned. The local clinicians may have been more favourably placed to investigate and comment on the patient's malnourished state.
- The second line assessor comments on the value of a holistic approach to the overall management of patient care.

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Replace the dislodged gastrostomy tube early

CASE 11

A patient was transferred from a nursing home to a hospital two days after a feeding gastrostomy tube was accidentally pulled out. Although not documented, several attempts were allegedly made in the hospital to reinsert the tube prior to referral to the surgical team.

A gastroscopy was unsuccessful due to a tight stricture at the cricopharyngeus muscle level. The following day, the patient was taken to the operating theatre where the tube was reinserted "easily".

On the next day, nursing notes documented that the patient complained of abdominal pain when fluids were introduced via the gastrostomy tube. A junior medical officer recorded the complaints of pain but stated that the patient would not allow abdominal examination to be undertaken. Low oxygen saturation was noted and a respiratory cause was assumed. Gastrostomy feeds were ceased overnight.

The following day, the patient required regular morphine and endone when the tube feeds were reintroduced. Later that evening, the patient had signs of an acute abdomen and evidence of septic shock. An abdominal CT scan revealed three litres of fluid plus gas in the peritoneal cavity. Following resuscitation, there was a delay of four hours before the patient was taken to the operating theatre because of a more urgent case.

A laparotomy revealed a perforation of the fistula at the junction with the stomach. The gastrostomy tube was in the peritoneal cavity together with a large volume of enteral feed. The fistula was repaired and a peritoneal lavage was undertaken. The patient died seven hours later.

Surgical learnings

- Replacing a gastrostomy tube. If a gastrostomy tube falls out, it needs to be replaced very soon after, otherwise the track rapidly narrows.
- The perforation may have been caused by the multiple attempts to replace the gastrostomy tube and this may have accounted for the tube being able to be "easily" replaced. A radiological study should have been considered to ensure the correct placement of the tube (especially with the history of multiple previous unsuccessful attempts).
- Abdominal pain, requiring substantial narcotics for relief, should have been a prompt for an evaluation of the abdomen and ascertaining a cause for the problem.
- Delay to surgery. The four-hour delay was unlikely to have been a significant factor in the patient's demise but, nevertheless, having another operating theatre available to promptly attend to the patient could have been considered.

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Many deaths analysed by the CHASM process reveal timely and appropriate care

CASE 12

A patient in his late fifties presented to hospital with ischaemic gut and ischaemic leg. A CT angiogram showed a chronic type A dissection down to the aortic bifurcation and a right common iliac artery aneurysm.

Emergency surgery was performed and the superior mesenteric artery (SMA) was noted to be occluded. A retrograde SMA stent was inserted. The patient recovered postoperatively.

The patient elected to have his type A dissection repaired. The surgery involved cardiopulmonary bypass, freestyle aortic root (tissue), an ascending aortic Gore-Tex graft, bifurcated aortic arch replacement, left atrial appendage ligation, and on-pump coronary artery grafting. There was significant intra- and postoperative bleeding. The patient had reversal and recombinant activated factor V without success (bleeding was generalised and from suture holes). Multi-organ failure ensued.

The notes stated that a discussion was held with the patient and his wife. The pathological process was explained and the risk of further dissection or rupture leading to death was a possibility. The indication for further surgery was to prevent these complications. The risk of death, stroke and prolonged ventilation was also explained and documented in the progress notes.

Coronary artery bypass was performed because the coronary angiogram showed a 70 per cent stenosis in the proximal third of the left anterior descending (LAD) coronary artery. A 70 per cent stenosis was also found in the proximal third of the circumflex with a graftable posterolateral branch. The right coronary artery had a 60 per cent stenosis at its distal third with a graftable posterior descending artery.

On admission, the type A aortic dissection extended from proximal ascending aorta to common iliac arteries bilaterally. There was extension to the origins of the brachiocephalic, left common carotid, and left subclavian arteries. Transthoracic echocardiogram and preoperative transoesophogeal echocardiogram (TOE) showed the aortic valve was not able to be preserved and so the Bentall procedure was performed. The arch was replaced due to the extension of the dissection flap. The technique used was a frozen elephant trunk which would minimise operative time and treat the extension of the dissection into the descending aorta.

The notes also stated that there was significant postoperative coagulopathy with institution of massive transfusion protocol. Multiple rounds of blood products were given including factor VII. Due to decrease in cardiac output and increase in inotrope requirements, the patient was appropriately re-opened with good effect. Haemodynamic stability was achieved.

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Following the massive transfusion, the patient sustained an acute lung injury causing decrease in saturations, despite FiO_2[6] being 100 per cent. Due to a lack of improvement, despite maximal support, V-V ECMO[7] was appropriately instituted with immediate improvement in saturations.

The management of this patient was appropriate and instituted in a timely manner.

The treating team, as stated in the notes, had appropriate discussions with the patient and family members. It was a complicated decision process and multiple factors were taken into account. Nonetheless, for this patient's long term survival, the operation that was performed was appropriate. However, due to the risk of bleeding and other complications which was explained preoperatively to the patient and family, he was not able to survive.

Surgical learnings

- Good communication allows the patient and their family to understand even the most difficult clinical scenarios.
- Appropriate documentation allows complex clinical situations to be properly evaluated, with praise where praise is due, even when the outcome is death.

6 Fraction of inspired oxygen.

7 Venous-venous extracorporeal membrane oxygenation.

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Septic arthritis - early diagnosis and management are important

Septic arthritis has been highlighted by several cases over the last twelve months. The two cases below show the need of having a high level of suspicion in elderly patients. The second case in particular highlights the challenges in managing septic arthritis in patients with multiple comorbidities.

CASE 13

A patient in the ninth decade was previously a reasonably well man. He presented to hospital with a history of diabetes and a high International Normalised Ratio (INR)[8]. He had pain in his shoulder and developed acute renal failure. There was a delay in transfer of the patient between hospitals, and in managing the septic joint. The arthrotomy and irrigation, unfortunately, did not prevent the patient's death.

Surgical learnings

- In a review of acute septic arthritis, Shirtliff and Mader (2002) reported that the risk of death from established septic arthritis in elderly patients is up to 20 per cent and, rather alarmingly, the incidence has not changed in more than 40 years. Moreover, a permanent reduction on joint function is seen in approximately 40 per cent of patients.
- The second line assessor commented on the timing and impact on management of a not-for-resuscitation (NFR) order, which had been made following discussion with the family prior to transfer to another hospital. The orthopaedic surgeon at the second hospital was not aware of the NFR order and in those circumstances, it is not certain as to how this may have influenced the decision to operate or not. This highlights the importance of documentation and a succinct discharge summary when transferring a patient to another hospital and ensuring that it includes information which may have a significant impact on decisions regarding the care of the patient.

8 International Normalised Ratio (INR) is a measure of how long it takes for blood to clot. The higher the INR, the longer it takes for blood to clot.

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CASE 14

A patient with multiple comorbidities (diabetes, hypertension, obesity, obstructive sleep apnoea and atrial fibrillation) presented for an elective right total knee replacement. The patient had been well assessed preoperatively and the surgery proceeded uneventfully. Postoperatively, the patient was electively admitted to the ICU. Unfortunately, the patient developed an infection in the knee one week later and required three washouts and a poly liner exchange. The patient subsequently developed a perforated duodenal ulcer requiring a laparotomy and an omental patch repair. Thereafter, the patient continued to deteriorate, probably due to ongoing joint sepsis and died from multi-organ failure.

Surgical learnings

- The second line assessor reflected that a proteus and pseudomonas infection in a diabetic patient is difficult to overcome and earlier removal of the prosthetic component in a similar case in the future could be considered.
- According to Clerc et al (2011, p.1168), high risk patients such as rheumatoid arthritics, diabetics, those with pre-existing joint disease or infection elsewhere in the body, immunosuppressed patients, intravenous drug users and elderly patients, have up to 10 times the risk of developing septic arthritis, compared to the normal population. Interestingly, they reported that only 57 per cent of these patients presented with a fever.
- Patients with multiple comorbidities quite often are only given one opportunity to adequately manage a severe infection, and early aggressive surgical and medical management is the key to managing these cases.

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Small Bowel Obstruction

CASE 15

A man in his seventies with multiple comorbidities was admitted for management of lower limb cellulitis. During the admission, he developed a small bowel obstruction in an incisional hernia. Surgery was commenced at midnight and he aspirated a large volume of gastric content on induction. Surgery was completed, but the initial chest x-ray on arrival at the ICU postoperatively showed the tip of the nasogastric (NG) tube in the distal oesophagus. Despite ICU management, he eventually died of multi-organ failure.

CASE 16

An elderly man was admitted with multiple injuries after a motor vehicle accident. He initially received non-operative management of his fractures and an NG tube was inserted due to an ileus. Despite aspirates over 2000 millilitres (ml) in 24 hours, the tube was removed after several days. The patient was still receiving intravenous opiates for a pelvic fracture. After removal of the NG tube, he vomited and aspirated. He had a cardiac arrest and was unable to be resuscitated.

CASE 17

An elderly woman was admitted with abdominal pain. On day four, a small bowel obstruction was diagnosed and surgery scheduled for later that day. The patient vomited and aspirated on induction, despite a rapid sequence induction. An NG tube was then inserted by the anaesthetist. The patient did not recover from surgery.

Surgical learnings

- Small bowel obstruction (SBO) is a common condition with approximately 26,000 hospital separations per year nationally[1] and surgery is frequently required. There were 13 cases in the past year where a second line assessment was performed for a patient whose death related to the management of SBO.
- The diagnosis of SBO can be difficult and is not always able to be made on plain radiographs. CT scanning with a water soluble contrast agent is usually diagnostic and may be therapeutic[2,3,4].
- Patients often have comorbidities that make them unable to cope with adverse events such as aspiration. Optimisation of conditions, such as daytime surgery and adequate preoperative preparation, is essential[5]. In this series, aspiration was associated with absent or misplaced NG tubes in every case.

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