



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS

QASM

Queensland Audit of Surgical Mortality



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Introduction

This booklet has been produced for Fellows and Trainees of the Royal Australasian College of Surgeons as a quality assurance activity.

Participation by Fellows in the Queensland Audit of Surgical Mortality (QASM) or the Northern Territory Audit of Surgical Mortality (NTASM) is now a Continuing Professional Development requirement.

You may know the mortality audit process well or this may be your first introduction. All the information we collect is covered by Qualified Privilege.

Although the cases mentioned are based on real patient scenarios, details that may identify a particular patient have been changed to maintain the de-identified status of our data.

My aim with this booklet is that we learn from each case and, as a consequence, provide better care for our patients in the future.

Thanks again.

John North
Clinical Director

*Scottish Architecture
Photograph taken by John North (September 2010).

*The Scottish Audit of Surgical Mortality (SASM) began in 1994. Both QASM and NTASM are modelled on SASM, and began in 2007 and 2010 respectively.

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Above-knee amputation is not necessarily a 'benign' condition

A middle-aged person was admitted to hospital via outpatients. The patient had a total knee replacement that had become infected. An attempt was made to treat this with a two-stage revision. This had been unsuccessful. It had been suggested that possible above-knee amputation may be appropriate.

The patient had a past history of recurrent pulmonary embolism and was on subcutaneous heparin. There were also multiple co-morbidities including hypertension, asthma, peripheral vascular disease, chronic pain syndrome, and anaemia.

The patient was appropriately reviewed by the orthopaedic team. The infectious diseases team also oversaw the treatment. The patient subsequently underwent an above-knee amputation.

This was performed without complication and reasonable progress followed the early post-operative course. The patient developed fever some days later and it was thought there may be an infection in the wound. The patient then went to have a series of washouts, and an ultrasound suggested there may have been a pseudo-aneurysm.

Slow but reasonable progress followed and with the assistance of vac dressings and a complex antibiotic program, the patient mobilised well.

Unfortunately, in the mobilising process the patient had a fall and bled profusely from the end of the stump. The patient was immediately taken to the intensive care unit (ICU) and had a cardiac arrest. The surgeons felt that surgical control of the bleeding was unlikely, and the patient was not able to be resuscitated.

Comment

This patient had multiple co-morbidities. With a background of pulmonary embolism and treatment for deep vein thrombosis (DVT), complications developed that contributed to the infection in the amputation stump.

Unfortunately, despite ICU supervision, progressive bleeding continued and cardiac arrest resulted.

It must be remembered that above-knee amputation is not necessarily a 'benign' condition and that progressive sepsis with catastrophic haemorrhage can occur.



Adequate diabetic control – not always that easy to manage

A middle-aged patient with a diabetic ulcer on one limb presented at a local clinic. Diabetic control had been suboptimal and compliance with medical advice also had been suboptimal. The ulcer progressed and

serious sepsis resulted. With the patient extremely ill, transfer to a regional hospital was undertaken, but it was too late to save the limb and an amputation was performed.

The post-operative course was a very stormy one and the patient finally died as a consequence of overwhelming sepsis and end-stage renal failure due to diabetic nephropathy.

Comment

Severe diabetes mellitus is always difficult to manage. The tyranny of distance compounds this problem of management for remote communities.

Late transfer of this patient led to amputation in an attempt to save life, but clearly the patient had overwhelming sepsis and tissue necrosis. The patient subsequently died.

Progressive ulceration and associated infection however, should encourage early referral to at least a regional hospital where appropriate management can be undertaken in a timely fashion.



An issue of consultant supervision

An elderly patient, undergoing pre-operative chemo-radiotherapy for rectal cancer, was admitted to hospital with a two-week history of abdominal pain. The patient

had a long past history of chronic atrial fibrillation but had recently stopped taking warfarin.

Oncology junior doctors recognised signs of peritoneal irritation and requested a surgical consultation. A surgical registrar saw the patient on the day of referral, ordered investigations, and a second surgical registrar discussed the CT findings with a radiology registrar.

It appears that neither registrar discussed the case with the consultant surgeon. It also appears that the second registrar took the patient to the operating theatre and discovered ischaemic bowel that was beyond help.

The data shows that the consultant surgeon was the only consultant who never saw the patient during this period in hospital. The significance of the abdominal pain, atrial fibrillation, and increasing analgesia requirements were not carefully considered.

The consultant surgeon was not present in the operating theatre nor did he take part in any portion of the operation according to the data.

Comment

The patient died as a consequence of having an ischaemic bowel and associated factors. The patient had significant co-morbidities. The fact that this patient had a laparotomy did not alter the natural history of the disease.

However, consultant surgeons are available for consultation and in this particular



circumstance, consultation did not occur. Consultants must be kept 'in the loop', so that they have the option of making a definitive contribution to the patient's care.



Assessment of patients with multi-trauma

A middle-aged person was brought to the emergency department of a tertiary referral hospital by Queensland Ambulance Service (QAS), following a high-speed motorcycle accident. The patient was Glasgow Coma Scale 5, hypotensive, and bleeding from an open wound in the right lower thigh. Despite being treated with *early management of severe trauma* (EMST) principles and volumes of fluid and blood product, inadequate resuscitation forced the patient's transfer to theatre - all in an attempt to stop bleeding.

At laparotomy, a laceration of the liver was discovered and packed. There was no other obvious bleeding.

There was however, a complex pelvic fracture set and a fracture of the distal right femur.

The anaesthetic record in the operating theatre shows a progressive drop in blood pressure until cardiac arrest occurred several hours after the patient had been received at the emergency department. Large amounts of blood and blood products had been continually transfused but the patient's blood pressure did not ever rise above the mid-80s.

There was at least one asystolic cardiac arrest during the resuscitation, and defibrillation resulted in ventricular fibrillation with poor cardiac output.

The Coroner ordered an external post-mortem examination which included a CT scan. This showed multiple fractures of the face and sinuses, fractures of the mandible, and subarachnoid blood was noted in a number of areas.

Multiple fractures, scapular fractures, and fractures of the clavicles were also noted.

The patient had a small pneumothorax on one side. Abdominal examination showed nothing more than what was found at surgery.

Comment

This patient suffered a severe, high-speed motorcycle accident. Recovery was virtually impossible. In the haemodynamically unstable patient, multiple fractures such as these are life-threatening and hypovolaemia can be the cause of death.

As seen in this instance, all multi-trauma patients must be assessed by using EMST principles on admission.

Pelvic fractures may be usefully treated by a pelvic binder. Failure to control hypovolaemia may be assisted by the use of external fixation on pelvic and long-bone fractures.

In this case, all attempts at resuscitation seemed to fail. Unfortunately, there will be times when continued blood loss is greater than the resuscitation given.

A full autopsy may have uncovered major chest and brain injury which also, if present, would certainly have contributed to this patient's death.



Catastrophic bleed from a post-abdominal aortic aneurysm repair

A middle-aged patient was referred to a local hospital with uncontrolled hypertension and an incidental finding of a 6cm abdominal aortic aneurysm (AAA). The patient was admitted for blood pressure control and then transferred to the nearest vascular unit for further management of the AAA.

The patient was treated with a large range of anti-hypertensives and responded well.

The patient was scheduled for semi-urgent surgery to repair the AAA. CT findings suggested a saccular aneurysm that was juxtarenal and contained two layers of calcification. There was concern over the risk of rupture of this aneurysm and hence the urgent intervention. The patient had been asymptomatic.

At the time of surgery, a clamp was placed above the level of the right renal artery and a graft sutured below the renal artery. A tube graft of polytetrafluoroethylene (PTFE) was inserted. No comment on the nature of the aneurysm is recorded.

The post-operative course was complicated by acute renal failure, pulmonary oedema, atrial fibrillation, and a small troponin leak.

A number of transfusions were required and dialysis for the renal failure also instituted. Renal function slowly improved and the patient was subsequently discharged.

A CT scan, performed during the course of the first week, demonstrated a patent graft with no flow to the right renal artery. The patient was discharged home to their regional area.

The day following discharge the patient suffered a cardiac arrest and was resuscitated with cardiopulmonary resuscitation (CPR), intravenous fluids (IV), and adrenalin. A focused assessment with sonography in trauma (FAST) exam demonstrated a distended abdomen with a large amount of free fluid. The vascular unit was contacted. The patient was unfit to be transferred and the surgeon who performed the original operation felt that any surgery would be extremely difficult and would require a vascular surgeon. Unfortunately, the patient died shortly after.

Comment

The surgeon's QASM surgical case form was completed by the referring hospital and not by the hospital that performed the surgical procedure. This meant there was a shortage of information available to the QASM team.

The documents did not include an autopsy report. It is not clear whether one was actually performed. Therefore, cause of death is uncertain and could be related to a



number of complications, or indeed, acute myocardial infarction, pulmonary embolus, or catastrophic bleeding.

Although major bleeding associated with aortic aneurysm repair is an uncommon but a well recognised complication, it does not appear to have been the complication in this patient. With regards to pulmonary embolus, despite the treatment with subcutaneous heparin, there was no documentation to support that this continued after the patient was discharged to their home. Pulmonary embolus remains a possible cause of death in this patient.

However, the most likely cause of death is myocardial infarction. The patient did have a troponin rise in hospital, and the surgery was complicated by acute renal failure. The patient also had all the risk factors for coronary artery disease. An autopsy would have confirmed the cause of death and probably should have been undertaken as a matter of principle.



Co-morbidities can be a challenge

An elderly person was admitted for elective total hip replacement. The patient had been treated conservatively for this osteoarthritic condition. The patient had been assessed and because of the increasing pain, surgery for the arthritic hip was recommended.

Although the patient had some significant risks, a full pre-anaesthetic assessment suggested surgery was reasonable (from an anaesthetic-risk point of view). The pre-anaesthetic self-assessment form that the patient completed did not identify any significant risk factors or cardiac issues.

It was noted however, that the patient had previously been treated by a vascular surgical team for carotid atherosclerosis and this was considered stable and not warranting any surgery. Previously, the patient had peripheral vascular disease which was again considered stable, and was on aspirin as the only treatment. The patient had mild aortic stenosis with an ejection fraction of 65 per cent, again not considered worthy of significant treatment.

The patient underwent a standard, uncemented total hip replacement and anaesthetic progress through the procedure was uneventful.

There was no excessive blood loss. The reinfusion drain collected only 200mL of blood.

The patient remained stable throughout the course of the operation and the recovery room observations. The patient then returned to the ward. Post-operatively, the patient deteriorated rapidly and suffered a large myocardial infarction with subsequent cardiogenic shock.

In spite of appropriate care in the ICU, the patient went on to multiple organ failure and died shortly thereafter.

The post-operative thromboembolism prophylaxis given was in keeping with the Health Quality and Complaints Commission (HQCC) guidelines.

The patient also had an appropriate use of analgesic medications in the post-operative period. There were no significant disruptions to the biochemistry or full blood count in the immediate post-operative period.

Comment

This patient clearly had a pre-existing condition involving their vascular tree, and despite the absence of cardiac symptoms, may have had coronary artery disease.

The decision to operate seemed reasonable and the patient progressed well. A consultant performed the procedure and it did not take excessive time. No autopsy was performed but all parameters point to a substantial myocardial infarction with cardiogenic shock and death.

There will be times when despite a well done operation and a well performed anaesthetic, the post-operative course will bring to light co-morbidities that previously had not troubled the patient. Weighing risks against potential benefits of any surgical procedure is always wise. Communicating risks to the patient is essential.



Co-morbidities need to be weighed against the potential benefits of surgery

A middle-aged patient with chronic renal failure recently had a kidney transplant which was rejecting. A number of co-morbidities were present in this patient. It was decided that the patient should begin chronic haemodialysis and a fistula was constructed.

The patient developed widespread sepsis and was treated with antibiotics via a central line. The central line was subsequently changed and found to be a possible cause of continuing sepsis. The sepsis together with the co-morbidities finally led to the patient's death.

Comment

Patients with multiple co-morbidities who have been on, or continue on, immunosuppressant agents following transplant have a high risk of complications.

The co-morbidities in such patients need to be carefully weighed against the potential benefits that may be achieved from any surgical intervention.

This patient suffered recognised complications associated with treatment for their renal failure, transplant rejection and sepsis, and despite there being no surgical misadventure, died as a consequence of these factors. Complex patients with many



co-morbidities will still require surgical interventions but may have a higher mortality rate than many of our other surgical patients.



Death after laparotomy

An elderly patient in reasonably good health presented several times to the emergency department of a regional hospital with abdominal pain, constipation, and red blood per rectum. The patient had a past history of many co-morbidities including asthma and chronic obstructive pulmonary disease (COPD) as a consequence of smoking. The patient also has a past history of intra-abdominal operations by a number of specialists.

A Meckel's diverticulum scan demonstrated increased activity in the mid-to-lower abdomen, and it was thought that the patient probably had ectopic gastric mucosa in a Meckel's diverticulum. There was no obstruction on small bowel series.

It was decided to do a semi-urgent laparotomy and consider resection of the diverticulum. Pre-operative bowel preparation was undertaken and anaesthetic review booked a high dependency unit (HDU) bed post-operatively.

The patient proceeded to surgery. Laparoscopy initially showed multiple adhesions and conversion to laparotomy soon followed. Extensive adhesions and a frozen pelvis were found.

There were some tears noted in the distal small bowel. No Meckel's diverticulum was found but a 20cm portion of small bowel was resected with a stapled anastomosis. An appendectomy was also performed.

Despite a cephalosporin allergy, the patient was given ceftriaxone as antibiotic prophylaxis which resulted in a marked facial rash. The patient also received post-operative antibiotics and DVT prophylaxis.

The post-operative course was managed by the acute-pain service. Immediately after the operation, total parenteral nutrition (TNP) was started through a peripherally inserted central catheter (PICC) line.

The patient was returned to the ward stable but appeared confused.

Shortly thereafter, the patient was reviewed with tachycardia and significant hypoxia.

The patient remained afebrile but the abdomen was distended and the wound erythematous.

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

Comment

The indication for this procedure must be questioned. There was a history of melaena but the patient was haemodynamically stable and the haemoglobin was normal.

Gastrointestinal bleeding has many causes in the elderly patient. Most do not benefit from surgery.

The diagnosis of 'bleeding diverticulum' was a 'long shot'. As surgeons, we need to think very carefully about operating on the elderly when they are stable and perhaps have very limited indications for serious surgery. The most difficult lesson we need to learn, and the hardest lesson to teach our registrars, is when *not* to operate.



Death in hospital following a fall at home

An elderly patient suffered knee and apparent rib injuries after a fall at home. The patient was admitted to an orthopaedic ward. No abdominal signs were apparent on admission. The patient was treated with analgesia and physiotherapy. There were no complaints from the patient.

Several days after hospital admission, the patient's general condition caused the nurses to report to the patient's medical officer and a physician's assessment was arranged. Further investigations suggested some medical problems and IV fluids were initiated.

A general surgeon saw the patient and abdominal signs were obvious. Plain X-ray showed gas under the diaphragm but by this time the patient's condition was extreme. Resuscitation did not improve the situation and the decision was made not to operate. Death followed rapidly.

Comment

This patient should have had daily medical assessments with a full clinical examination and careful history about any symptoms. A possible abdominal viscus perforation would have been suspected much earlier if a reasonable history had been taken by the resident and/or the registrar. Failure to obtain an early surgical consultation almost certainly resulted in the patient's death.

Having the patient in an orthopaedic ward did not help, and it is possible but unfortunate that historical questions about abdominal pain were not forthcoming from the junior medical officer on the orthopaedic team.

This case highlights the difficulty in diagnosis in the elderly, especially if the individual is rather stoical. It also highlights the necessity for repeated examinations in patients following any trauma.

Perhaps if the patient had not been placed in an orthopaedic bed, the focus of attention might have been much broader.

In such circumstances, perhaps multiple surgical assessments or indeed a general surgical assessment within 24 hours of admission might have been prudent. Daily clinical examinations with a careful history of other symptoms, rather than orthopaedic dilemmas only, may have brought an earlier diagnosis to the surface.





Hip fractures can be ‘end of life’ events

An elderly person was admitted via the emergency department having sustained a sub-trochanteric fracture of the right femur.

The patient had a very significant medical history of co-morbidities which included insulin-dependant diabetes mellitus.

Radiological assessment in the emergency department was undertaken. The patient also suffered a head injury with a laceration and this was sutured in the emergency department.

The patient was a permanent high-care resident in a nursing home. The patient was assessed by the emergency department medical officer and the anaesthetic department medical officer. It was thought that invasive ventilation was not appropriate.

However, the patient was scheduled for surgery for internal fixation of the fractured hip but due to the severity of the aortic stenosis, the anaesthetic department thought the patient should be transferred to a larger hospital. A letter with regard to transfer was written. Transfer, however, did not occur as the patient died on the ward unexpectedly.

The last recorded observations in the medical record were available for the second-line assessor and there was clear evidence that the patient’s blood sugar level was abnormally high. The patient was

recorded as sleeping/snoring several times during the night, but when approached in the early hours was unresponsive.

Comment

Although the patient was clearly a surgical patient and admitted to a surgical bed, this patient had very complex and severe co-morbidities. The injuries sustained in the fall were clearly a ‘pre-terminal event’. With the co-morbidities and the haemodynamic changes, it appears that despite skin traction for the fracture while waiting for surgery other factors exceeded the patient’s ability to remain alive. Although reasonable observations were undertaken, death came relatively quickly.

In such patients, fat embolus syndrome, myocardial infarction, or indeed pulmonary embolism might be a reasonable cause. In this case no autopsy was undertaken. The Coroner was contacted with respect to this unexplained death.



Serious multi-trauma patients need serious measures

A young adult suffered very serious head and facial injuries in a cycling accident. The patient arrested at the scene and CPR was performed by the ambulance service.

The patient was rapidly transferred to a tertiary referral hospital. Ventilation and perfusion during transfer were reasonable.

Management in the emergency department maintained high-level oxygen saturations.

Haemorrhage from the head and neck was uncontrollable however, and transfer to theatre did not completely deal with continued blood loss. Transfer to ICU was achieved but brain death occurred within 24 hours.

Comment

This patient was almost certain to die as a consequence of the severe head injury and substantial facial injuries. A number of other spinal injuries resulted from the accident, but none were life or limb threatening.

High quality ambulance service triage, emergency department assessment and treatment, and transfer to the operating theatre allowed partial control of severe head and neck haemorrhage but were all in vain.

In this case, surgical intervention took a patient who was almost certain to die, attempted to stabilise them, and allowed them to be transferred to ICU.





"Happy is the man who finds wisdom,
and the man who gains understanding.
For her proceeds are better than the profits of silver,
and her gain than fine gold."

Proverbs 3: 13-14



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