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Disclaimer: This booklet is produced for Fellows of the Royal Australasian College of Surgeons. Information is obtained under a quality assurance activity. Details that may identify individuals have been changed, although the clinical scenarios are based on real cases.



INTRODUCTION

The *Lessons from the Audit* (Volume 20) presents five case studies for Vascular Surgery.

Dr John Quinn (Vascular Surgeon) and I have jointly selected these case studies. I would like to thank Dr Quinn for his valued contribution to the audit process and the QASM team for their efforts in bringing you this publication.

To access all past *Lessons from the Audit* (Volume 1 – 20), use your College membership login at www.surgeons.org/qasm.

It is my hope that the following Vascular Surgery case studies will highlight a range of important issues for all surgical specialties and for all surgeons in Queensland and the Northern Territory.

As always, I welcome your feedback.

John North
Clinical Director
Queensland Audit of Surgical Mortality
Northern Territory Audit of Surgical Mortality

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SHORTENED FORMS

AAA	abdominal aortic aneurysm
CT	computed tomography
ICU	intensive care unit
INR	International Normalised Ratio



Case study 1: *What is complete preoperative cardiac assessment for major surgery?*

SUMMARY:

This 64-year-old male presented with progressive life-style limiting claudication.

The patient was an ex-smoker with multiple comorbidities (hypertension, hyperlipidaemia, mesenteric angina (stented coeliac artery), left subclavian artery stenosis (stented) and asymptomatic bilateral internal carotid artery (ICA) occlusion).

An aortic bifemoral bypass graft for occlusion of the infra-renal aorta was planned.

The initial attempt was aborted because the patient became hypotensive on induction. The cardiology team ruled out myocardial infarction and pronounced the patient fit for surgery. It appears that the patient had had a stress test which showed no reversible ischaemia and good left ventricular (LV) function.

Six weeks after the first attempt at graft, there was a second attempt at aortic bifemoral bypass graft. This operation lasted 4.5 hours and was satisfactory.

The clamping was infra-renal. The superior mesenteric artery (SMA) was mobilised during the procedure but the plan to do a skip graft was abandoned because the patient became hypotensive.

The blood pressure was labile intraoperatively. The patient became anuric. The troponin levels were high at this point. An anterior infarct was diagnosed. Inotropic support was required.

The patient died on the following day from cardiogenic shock and multiple organ failure. Post-mortem findings given verbally indicated an acute myocardial infarction and severe coronary disease.

CONSIDERATIONS:

It is not clear how the patient was investigated following the first aborted attempt. If the cause was not thought to be cardiac, it is not clear what investigations were done to exclude other causes.

The first aborted attempt should have provoked a thorough evaluation of the cause of hypotension on induction (this could have included a coronary angiogram). It does appear that the patient had undergone a Persantin stress test which showed no reversible ischaemia. The patient also had good LV function.

When the mesenteric disease had been successfully treated by stenting of the coeliac axis, what was the need to mobilise the SMA?

COMMENTS:

This patient seemed to have been keen to have the operation and seemed to have been well informed of the risks.

Aortic surgery is associated with mortality (even with complete cardiac preparation).

RECOMMENDATIONS:

Complete preoperative cardiac assessment is important and should always be considered.

Cardiac-revascularisation before major surgery saves lives in some circumstances.



Case study 2: *The importance of haemostatic agent therapy in emergency surgery for the reversal of therapeutic anti-coagulation.*

SUMMARY:

This 86-year-old man was transferred from a district hospital with a suspected ruptured abdominal aortic aneurysm.

Although he had a history of emphysema and atrial fibrillation (on warfarin), he was considered well until a syncopal episode on the afternoon of presentation.

At the district hospital, his INR was 3.6 and he was given Vitamin K. During his air transfer to a major metropolitan teaching hospital he was haemodynamically stable and comfortable.

At this initial assessment in the emergency department, the aneurysm was evident on physical examination. The patient was normotensive and comfortable, so routine blood tests, crossmatch, and urgent CT scanning were organised. No further measures appear to have been taken to manage his known anti-coagulation.

CT scanning was obtained expeditiously which revealed soft

tissue stranding confirming a contained rupture from the large aneurysm. During his transfer to theatre, the patient deteriorated and suffered an episode of ventricular tachycardia requiring cardioversion.

He recovered sufficiently adequately to proceed to surgery. There is no record that he received any further agents to reverse his known anticoagulation either in the emergency department or in theatre.

At laparotomy, a large retroperitoneal haematoma was found that was not seen on the preoperative CT scan. The patient received 5000 units of anti-coagulant after aortic clamping. A short time later, during performance of the proximal anastomosis, he suffered a sudden haemodynamic collapse. This was associated with an episode of ventricular fibrillation, which was successfully resolved by defibrillation. In the operative notes, haemostasis was described as “good” and 4 units of fresh frozen plasma were administered upon restoration of haemodynamic stability.

Post-operatively in ICU, the patient rapidly became hemodynamically unstable requiring volume support with fluid and blood transfusion, as well as high dose inotrope infusion. There was clinical evidence

of intra-abdominal bleeding with increased abdominal girth and dropping haemoglobin level despite transfusion. A conservative course was decided upon with consultation of family. The patient died 8 hours after return from theatre.

CONSIDERATIONS:

The only correctable comorbidity which may have affected this patient's outcome was reversing his pre-existing anticoagulation. The referring doctor at the district hospital had administered Vitamin K. However, this could not be expected to reverse the effects of warfarin in the few hours between its administration and surgery.

Further measures such as administration of a haemostatic agent or fresh frozen plasma preoperatively should have been considered to correct his anticoagulation in the rapid timeframe required for his urgent surgical procedure. There is no evidence that these measures to correct this patient's known anticoagulation took place when he arrived at the receiving hospital.

COMMENT:

Prothrombinex haemostatics are rapid and effective reversers of anticoagulants which could have easily been administered in the

preoperative period. It is likely that this patient's contained rupture became a complete uncontained rupture during his transfer from the emergency department to the operating theatre. Pre-existing correction of his known anticoagulation may have limited blood loss and hence reduced the haemodynamic consequences which were also contributory to this patient's outcome.

The model of care may have been compromised for this patient because of the complexity of transferring a bleeding patient and the complexity of his coagulation issues.

RECOMMENDATIONS:

Finding the balance between coagulation and anticoagulation is crucial in many complex patients.

Managing a patient in transition needs ownership by a consultant.



Case study 3: *Early Consultant input is critical in managing the elderly patient in transition from chronic to acute deterioration.*

SUMMARY:

A 76-year-old female presented to a small hospital. She had critical ischaemia of her left foot, cellulitis, heel pressure injury and an interdigital ulcer of her left foot. She was a current smoker.

Four weeks prior to this hospital admission, she had had blunt trauma to the left foot. She thought there was some improvement on oral antibiotics. She had absent pulses below the femoral pulse on the left side.

She was on medication for hypertension and on Tamoxifen for breast Cancer (left mastectomy).

Five months prior to this hospital admission, she had had a fall (fractured pubic ramus with suprapubic catheter).

On that admission, she had been treated preoperatively prophylactically with antibiotics and thromboprophylaxis.

Five days after this admission, the absent pulses were noted. A vascular referral was made seven days after admission.

Due to logistical issues, the patient was seen by the vascular team in the outreach clinic 12 days after admission.

She was then transferred to the main hospital. An attempted angioplasty on the same day failed. During investigations, the patient was found to have multilevel disease and was deemed not suitable for open revascularisation.

An above-knee amputation was offered but was declined by the family. The palliative care team saw the patient and started her on an analgesic infusion. The patient died after 34 days in hospital.

Notable events included three in-hospital falls. No acute intracranial injury was demonstrated after any of these falls.

CONSIDERATIONS:

The pulse status was not recorded on admission. In fact, it was the wound-care nurse who noticed the absent pulses five days post-admission.

The time between the recognition of critical ischaemia and transfer to the main hospital was too long (more than a week). Immediate transfer rather than waiting for the outreach clinic would have been more appropriate.

The patient had three in-hospital falls. These should have been preventable.

Transition from chronic to acute vascular disorder is often accepted without action.

RECOMMENDATIONS:

Early vascular consultant (or Nurse consultant) reviews are needed for this type of deteriorating patient.

Immediate transfer is important in complex patients.

Consultants should manage the patients who progress from chronic condition to acute condition.

Nurse Managers can assist elderly unfit patients to improve their fitness for surgery.



Case study 4: An elderly patient may have suffered unreasonable delays in many areas – a plan to delay surgery may become a plan to palliate.

SUMMARY:

This 84-year-old female was readmitted to a tertiary referral hospital with persisting ischaemic left leg pain and a heel ulcer.

Her comorbidities included ischaemic heart disease, occasional angina, chronic obstructive pulmonary disease, hypertension and non-insulin dependent Type 2 diabetes.

Three months prior, at the tertiary referral hospital, she had right femoro-anterior tibial artery bypass grafting.

One month prior, at the tertiary referral hospital, she had a percutaneous left superficial femoral artery thrombolysis and stenting. She was discharged to her regional hospital and Clopidogrel was added to her other medications. She had continuing left foot pain with a heel ulcer.

On the final readmission to the tertiary referral hospital, she had had a 48-hour-history of increasing ischaemic pain in a cold, pale left foot. She had been commenced on

Heparin at the regional hospital.

It was determined that there was no acute emergency and Heparin was continued.

Overnight, she suffered some rectal bleeding and the following morning she was booked for a sigmoidoscopy and a left femoral angiogram.

The sigmoidoscopy was not carried out until late the following afternoon. It was negative.

Three days post-admission, the following delay issues were documented:

- taking blood samples to monitor her Heparin therapy
- obtaining surgical ward calls to adjust her Heparin therapy
- attending to her pain issues.

Her pain control was problematic despite “generous use” of narcotics.

Five days post-admission, the angiogram was carried out. It revealed the earlier superficial femoral artery stent to be patent with diffuse proximal popliteal artery disease and distal popliteal artery occlusion.

There was reperfusion of the anterior tibial artery by collaterals and it appeared that revascularisation would have required femoro-distal anterior tibial artery bypass grafting. A below knee amputation was also raised as a possibility.

She was placed on the emergency list for theatre (eight days post-admission). On arrival in the operating theatre, the anaesthetists deemed her unfit for surgery because of cardiac failure. Relevant anaesthetic notes relating to that decision were not present in the hospital chart.

Following this non-surgery decision, despite maximal medical treatment, her condition failed to improve. Two weeks after admission, she died with palliative care team involvement. Her hospital course was noteworthy for the lack of significant pain control and help with breathing difficulties.

CONSIDERATIONS:

The relative paucity of the surgical team's notes, during the patient's early part of her admission, limited the ability of a chart review to fully consider the surgical team's clinical assessment, priorities and overall management.

The nursing notes are detailed and describe a patient suffering increasingly frequent episodes of severe distress (foot pain and breathing difficulties). They also document repeated delays in obtaining after-hours medical reviews and venous access.

Chart review, however, did identify apparent system and other errors

which impacted on the standard of care received by this patient during her final admission.

These errors related to apparent deficiencies occurring at multiple levels and involved documentation, pain management, preoperative assessment, fluid balance, after-hours care, X-ray delays and questionably late decision to involve teams in pain management and palliative care.

Eliminating blocks is important. While the elderly patient is not being "supervised", they could be suffering an UTI, myocardial infarct or chest infection. This compromises their fit-for-surgery state.

COMMENT:

Any surgical procedure offered to this patient would have been of high risk (at any time during her admission) though particularly by the time she eventually made it to the operating theatre. It seems entirely appropriate that the planned surgery was cancelled.

Delays are critical in the elderly patient. Find the fast track. Blocks to the fast track could involve:

- hours of duty
- access to emergency departments
- never seeing the consultant.



Case study 5: Systemic sepsis may be associated with rupture of pre-existing abdominal aneurysm in hospital.

SUMMARY:

A 82-year-old male was admitted to a district hospital with sudden onset of back pain. This was on a background of a known AAA that had been planned for elective surgery.

In addition, the patient had been discharged 2 days prior (after an admission with sepsis secondary to perforated gall bladder). He had required an ICU admission and developed acute renal failure, pulmonary oedema and rapid atrial fibrillation.

On admission for sudden onset back pain, he was transferred to a tertiary referral hospital in a timely fashion and no apparent delays were noted.

On arrival at the tertiary referral hospital, he was stable, and a CT scan was ordered. This confirmed the diagnosis of a ruptured AAA and emergency surgery was undertaken.

The surgery was complicated by very low blood pressure on induction and cross clamping. He became coagulopathic and was transferred to ICU.

After discussions with the family, active treatment was withdrawn, and the patient died.

CONSIDERATIONS:

The district hospital was not able to appropriately treat such a patient and the transfer was appropriate and timely.

With regards to the CT scan, training in Vascular Surgery, historically, was to take any patient with suspected ruptured AAA directly to theatre to avoid delays. This was long before the current range of high-speed CT scanners and before the positioning of CT scanners in emergency departments, and before the availability for endovascular repair.

As can be seen from this case, the CT scan really did not add a great deal of time to the transfer and the information provided can be very important.

The recent intra-abdominal sepsis and surgery may have caused numerous other pathologies that may have prompted the presentation. Again, a CT scan was important in such a setting.

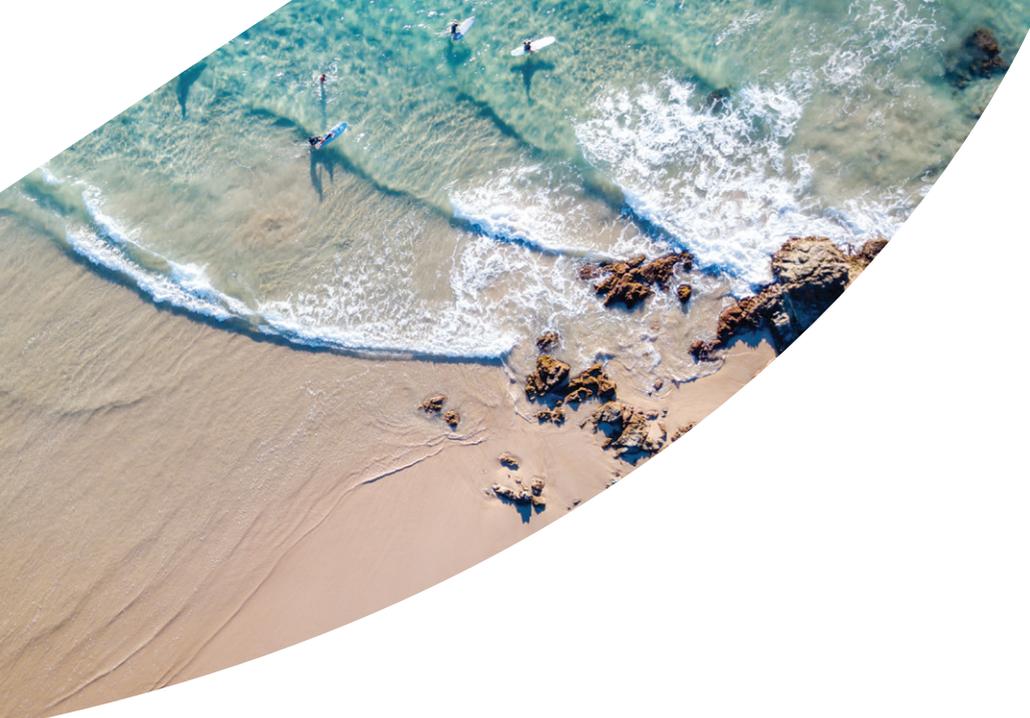
The management was appropriate. The unfortunate outcome in this case is in part reflected by the patient's recent severe septic illness that would have greatly decreased his

prognosis and would have certainly contributed to the aneurysm's rupturing.

COMMENT:

CT scanning in the setting of a ruptured aneurysm does have a place in stable patients, particularly in those who have had previous complex surgery or recent intra-abdominal sepsis.

Awareness of the adverse influence of sepsis and the increased risk of rupture in such circumstances should have placed this patient on close clinical supervision and early vascular follow-up. Appropriate consideration of endovascular repair in such circumstances may have changed the clinical course.



Contact

Queensland Audit of Surgical Mortality (QASM)

Telephone: 07 3249 2971

Facsimile: 07 3391 7915

Email: qasm@surgeons.org

Post: PO Box 7476, East Brisbane QLD 4169

Web: www.surgeons.org/qasm

Northern Territory Audit of Surgical Mortality (NTASM)

Telephone: 07 3249 2973

Facsimile: 07 3391 7915

Email: ntasm@surgeons.org

Post: PO Box 7385, East Brisbane QLD 4169

Web: www.surgeons.org/ntasm

