



THE ROYAL AUSTRALIAN AND NEW ZEALAND COLLEGE
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ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS



The Royal Australian
and New Zealand
College of Obstetricians
and Gynaecologists
Excellence in Women's Health





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Chairman's Report

As doctors, we are constantly faced with the challenge of dealing with deaths, both expected and unexpected. This booklet characterises a number of cases which have been managed by Obstetricians and Gynaecologists and highlights some of the difficult challenges facing the care of our patients. There are lessons that can be drawn from all of these deaths and they should not be lost in our practice. We are very grateful to the support given by those who not only analyse the first-line assessments, but then provide the second-line assessments which are the basis of the reports developed in this collection.

Some mortality is unavoidable but does provide a valuable learning experience, in other situations it is quite clear that changes in care could have been conducted which may have led to a different outcome. It is to be hoped that we can all improve the outcomes for our patients from reading the experience of others and with this information provide an improved outcome for those under our care. As Sue Valmadre has said in her statement from RANZCOG, we would value any constructive feedback that would help us improve or modify the cases presented in this booklet or, indeed, any feedback on the conduct of the ongoing ANZASM/RANZCOG audit.



Professor Guy Maddern

Chair, Australian and New Zealand Audit of Surgical Mortality (ANZASM)

ANZASM RANZCOG Representative's Report

Review of adverse outcomes in one's practice is vital to optimising future patient care. To that end, involvement in ANZASM provides members of The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) an opportunity to participate in a rigorous quality assurance and educational process.

The cases detailed in this booklet are both gynaecological and obstetric and are gathered from all states and territories in Australia. The cases are chosen due to their relevance to the day-to-day practice of the obstetrician and gynaecologist. They cover such subjects as thromboembolic events, sepsis and haemorrhage, which are well known and commonly encountered factors causing morbidity and sadly mortality among our patients.

This booklet provides practitioners with an opportunity to reflect upon difficult and often complex cases and perhaps learn from them. These cases have been written by the treating practitioners and the first- and second-line assessors. I am very grateful that they have shared their very difficult cases and their opinions to create this booklet. There are bound to be differing opinions expressed by some readers about some of the cases, however this in itself is a valuable process.

I hope you find this National Case Note Review Booklet a worthwhile and educational opportunity, and would appreciate any constructive feedback.

Dr Sue Valmadre

ANZASM RANZCOG Representative

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. Clear communication by the surgeon with patients and family is always a wise investment. Good communication between surgeon colleagues, other specialists, junior staff, nursing staff and allied health staff remains a cornerstone for quality care, especially when a transfer of care or interhospital transfer is required for the critically ill patient. In trauma cases this is an essential element of proper care.
- All clinicians should provide clear and relevant records. Some of the cases in this report had record keeping deficiencies.
- Consultants should be actively involved in the care of their patients, including in the decision-making process. They have an obligation to make personal entries in the case record of the reasoning behind their decisions. They should also be willing to obtain other opinions if something is not right.
- Surgeons should carefully consider nonoperative management, or less extensive surgical options, in patients for whom advanced age or medical comorbidities may increase the risk of mortality associated with prolonged or difficult surgery. This is particularly relevant in cases in which the surgical goal is not to prolong life.
- Surgeons should be aware of all medications taken by their patients prior to surgery. Relatively novel anticoagulants are commonly used and may affect surgical risks. Surgeons may elect to involve perioperative specialists in appropriate cases.

Case study 1: Death from a pulmonary embolism – deep vein thrombosis prophylaxis missed?

Case summary:

A 60-year-old female underwent surgery for the removal of a large ovarian cyst that had the potential to be malignant. The patient collapsed on induction of the anaesthesia and could not be resuscitated. A postmortem revealed a massive pulmonary embolism (PE). This must have arisen from a pre-existing deep vein thrombosis (DVT), so any prophylactic measures to prevent a DVT would have been too late.

Clinical lessons:

This woman fell into a high-risk group for DVT and PE.

In the interests of inquiry the following observations are offered:

1. The patient had been on hormone replacement therapy for approximately 10 years. Although hormone replacement therapy has minimal impact on the development of DVT, should it have been stopped some weeks prior to surgery given the high risk?
2. The computed tomography (CT) scan performed the day before surgery showed bilateral ureteric obstruction and hydronephrosis. Knowing this, and that surgery was planned, did the radiologist view the scan for inferior vena cava (IVC) or iliac vein compression? If so, a retrievable

caval clip filter could have been put into position. This might have been life-saving.

3. It is not clear whether the patient had thromboembolic deterrent stockings. This should be routine for this type of surgery.
4. Preoperative subcutaneous heparin should have been considered. Although there are divergent opinions concerning the timing of heparin prior to an epidural, a dose the night before (i.e. true prophylaxis) and a second dose after the epidural was placed would have been acceptable to most anaesthetists. If there was still a concern, this case might have merited another form of analgesia delivery, such as patient-controlled analgesia, local anaesthetic infusion or pararectal nerve blocks at the time of surgery, and preoperative subcutaneous heparin.

Case study 2: Another death secondary to antiplatelet drugs?

Case summary:

A bed bound elderly lady with multiple medical problems underwent vaginal repair surgery for long-standing uterovaginal prolapse. The immediate postoperative period was complicated by a large retroperitoneal haemorrhage that was successfully stemmed by internal iliac artery embolisation. Bilateral nephrostomy tubes were inserted to relieve bilateral ureteric obstruction. Six days postoperatively, a nephrostogram showed persisting bilateral ureteric obstruction. A double J stent was inserted into the right ureter. The left nephrostomy tube was left in situ as a double J stent could not be passed.

Two weeks postoperatively the patient developed swelling in the right leg. This was not investigated as it was considered that it would be inappropriate to commence anticoagulant therapy should a DVT be found. By postoperative week 3 the patient was refusing adequate oral sustenance and was largely unresponsive. There was persistent left renal obstruction. In discussion with her family a decision was made to ensure that she remained comfortable, and active therapeutic intervention was not pursued. She died a month following her admission for surgery.

Clinical lessons:

There are two issues of concern, as outlined below.

The first relates to consent. It is clear from the case record that both the surgeon and anaesthetic team considered that the proposed surgery carried a significant risk of death. Considerable effort was made to ensure that both the patient and her family understood this. It is not possible from the case notes provided to ascertain whether alternative conservative management, such as continuing with current nursing care, vaginal pessary treatment, or more conservative surgery was considered. If indeed the patient was insistent on proceeding with surgery in the face of alternative advice, it raises the question of where the medical team's responsibility lies when the patient's preferred choice of treatment is at odds with that considered safest by those caring for her.

The second issue of concern relates to preoperative assessment. The patient's medications included clopidogrel subsequent to an episode of acute coronary syndrome 4 months prior to her surgery. The significance of this antiplatelet medication was not noted by either the anaesthetic or surgical teams prior to admission, although in the 3 day admission period prior to surgery the patient was not prescribed

the medication. With an increasing list of agents with anticoagulant properties available for therapeutic use, or present in herbal preparations, the question arises as to whether there should be a continually updated checklist of these preparations included on preoperative assessment forms.

Cessation of the clopidogrel medication preoperatively may have lessened the risk of haemorrhagic complications from surgery. However, whether this would have changed the eventual outcome cannot be certain given the patient's inherent risk of postoperative complications. Although she survived the retroperitoneal haemorrhage, the patient's frailty limited the surgical team's options for dealing definitively with the ureteric obstruction that complicated her surgery. The gamble to pursue surgery in the hope of improving her quality of life proved unsuccessful in the end. That she would survive and gain significant benefit were unlikely from the start.

Case study 3: *Surgical technical error led to death*

Case summary:

An 88-year-old woman, bed bound in a nursing home, was admitted for elective surgery to control a uterovaginal prolapse with associated urinary incontinence (currently controlled with an indwelling urethral catheter). She had major comorbidities including controlled congestive cardiac failure, non-insulin dependent diabetes mellitus and anaemia. During a recent admission to hospital for acute myocardial infarction, a gynaecological consultation was requested regarding urinary incontinence and prolapse. Surgical correction was recommended. No specific investigations were documented regarding the aetiology of the incontinence.

A Manchester repair and anterior and posterior intravaginal sling procedures were performed. An intraoperative injury to the bladder base was noted and repaired in three layers. Within 2 hours of surgery she developed hypotension, which responded to fluid bolus challenges (total 4.2 L). She subsequently had further hypotension and, 6 hours postoperatively, was diagnosed as “clinically bleeding” with anaemia and a haemoglobin of 66 (pre-op: 128). Appropriate resuscitation with blood products was commenced. Clinical examination revealed no abdominal mass, but CT scan showed a large retroperitoneal pelvic haematoma with bilateral hydronephrosis.

Urgent pelvic angiography revealed bleeding from a branch of the anterior division of the left internal iliac artery, and this vessel was successfully embolised. Bilateral nephrostomies were placed (developing obstructive renal failure) the following day. On postoperative day 10 (9 days after the bilateral nephrostomies) a right ureteric stent was placed, but there was total occlusion of the left ureter at the bladder junction, suggesting ligature occlusion. Her subsequent course was medically complex, resulting in general deterioration and death due to congestive cardiac failure 30 days postoperatively. She remained incontinent of urine at the time of her death.

Clinical lessons:

This frail, aged woman was recommended to have a minimally invasive but complex surgical procedure. There was no documentation regarding specific investigation of the urinary incontinence, and this may have been useful in understanding why the decision was made to perform a potentially hazardous procedure to correct urinary incontinence.

The value of a posterior vaginal sling procedure is controversial and is possibly not indicated in this patient. While it is possible that the surgery may have improved her quality of life if she no longer required a urinary catheter, this was not the case. A simpler (less complex) procedure, or no operation at all, may have been more appropriate.

Any complication occurring in this woman had the potential to be life-threatening given her medical history.

This patient sustained an operative injury to the bladder base that required repair. Subsequent evidence (ureteric obstruction unable to be bypassed by ureteric stent) suggests that the repair of this injury may have ligated the ureter close to the ureterovesical junction. Furthermore, this woman suffered surgical injury, possibly related to the intravenous (IV) needles, to a branch of the left internal iliac artery. The resultant pelvic haematoma required transfusion of a total of 14 units of blood.

While these injuries are recognised complications of such surgery, the operating surgeon does not appear to recognise or consider that surgical injury had a causative relationship to the subsequent events that led to her death. Yet the evidence would indicate that these injuries did contribute substantially to her postoperative morbidity and death.

The surgeon commented that the patient was on anticoagulants at the time of surgery and that ceasing this medication may have altered the outcome, but there was no evidence in the medical record, drug chart or anaesthetic notes that any anticoagulant was given. It is much more likely that the haematoma was caused by direct vessel trauma.

The surgeon also stated that the urinary and faecal incontinence were cured. Despite the fact that this statement is contradicted by the hospital record, this comment suggests a way of thinking that

supports the statement “the operation was a success but the patient died”. The documentation and management of the postoperative complications in this case were timely and appropriate by all concerned. I do not believe that any more could or should have been done. The patient and her family (who gave consent) were aware of the potential hazards of surgery.

This case demonstrates the hazards associated with a specific surgical procedure and patient selection for surgery. It is important that the risk/benefit ratio be carefully considered and documented prior to proceeding with surgery in such high-risk patients.

Case study 4: Fatal PE after delivery could not be prevented

Case summary:

A 26-year-old female was found to have an intra-abdominal mass when 22 weeks pregnant. The likely ultrasonic diagnosis was a retroperitoneal sarcoma. Because of the baby, the general surgeon who reviewed her made a deliberate decision not to perform either a CT or magnetic resonance imaging (MRI) scan.

The obstetrician and general surgeon agreed that the pregnancy should carry to 34 weeks. The baby was then delivered by elective caesarean section with both the obstetrician and general surgeon in attendance. They found that the mass was retroperitoneal and not readily accessible, and the assessment was therefore terminated.

The patient collapsed 48 hours later and could not be resuscitated. A postmortem (attended by both obstetrician and general surgeon) showed the cause of death was secondary to a “well formed” PE. There was no statement as to the degree of organisation within the embolus. The PE appeared to have arisen from an extensive thrombosis in both femoral veins. There was branching thrombosis into the pelvic veins. The lower IVC showed patchy thrombosis against the wall. The mass had displaced the right kidney and renal vein and was lying behind the IVC that was stretched over the top.

Clinical lessons:

The obstetrician completing the surgical case form made two statements that merit comment:

1. The obstetrician regretted that subcutaneous heparin was not commenced prior to delivery. Presumably the obstetrician felt that, in theory at least, prophylactic subcutaneous heparin might have prevented the thrombosis. I doubt this is so. The purpose of prophylactic subcutaneous heparin is to prevent the formation and propagation of thrombosis and so reduce the risk of a PE. Although there is no way of knowing with certainty (see point 2 below), I strongly suspect that the thrombosis was present prior to delivery and the opportunity for prophylaxis long gone.
2. The obstetrician suggested it would have been helpful if the thrombosis could in some way be dated, presumably to determine if it was generated before or after the delivery and thus indicate whether prophylactic subcutaneous heparin would have been of value. Venous thrombosis can be dated to some extent by the degree of organisation. It is not clear whether the pathologist did this. The description “well formed” could apply to the degree of organisation, or that it was a large, complete thrombosis that had not broken up. If the former, then clearly

the thrombosis was present prior to delivery. Given the circumstances a clear statement by the pathologist as to the degree of organisation would have been useful, and undoubtedly reassuring to the obstetrician.

I suspect the thrombosis was caused by compression of the IVC, either directly by the tumour pushing it forward or perhaps by entrapment between the mass and the uterus. Either could have prevented embolisation up the IVC prior to delivery. The removal of the baby would have relieved the entrapment and reduced the compression. Assessment of the mass may have fractured the thrombosis, hence the PE.

The only way the PE could have been prevented would have been by the pre-delivery placement of an IVC filter. This would require the thrombosis to have been anticipated prior to the delivery, which is an unreasonable expectation made with the advantage of hindsight. I would be reluctant to criticise the clinicians for not considering this pre-delivery.

Detection of the retroperitoneal mass was presumably based on the predelivery abdominal and pelvic ultrasound study. Duplex vascular ultrasound, as a component of that examination, may have demonstrated intracaval thrombus, or thrombus within the iliac or femoral vein

MRI scans should not be undertaken in the first trimester, but are safe thereafter. The decision not to do the MRI scan was made by the general surgeon who would presumably not be familiar with the safety of MRI scans during pregnancy.

It might be argued that the obstetrician could have advised that a MRI scan is safe after the first trimester.

If an MRI scan had been performed at 22 weeks (to diagnose the mass) and had revealed a thrombosis an IVC filter would undoubtedly have been considered. However, a 22 week uterus would have been much smaller, as would the tumour, and I doubt the thrombosis would have been present – not least because if present at 22 weeks it probably would have embolised before delivery at 34 weeks – and the clinicians would not have considered an IVC filter.

There is reference in the notes to an ultrasound being performed 4 days prior to the delivery, but the original report was not available. Although this was a potential opportunity to identify an IVC thrombosis it is likely that the ultrasound was focused on the baby. If available, it might be worth reviewing.

This is obviously a tragic outcome, but even with the advantage of hindsight I do not believe the care of this patient can be criticised.

Case study 5: Preeclampsia: the chameleon of pregnancy

Case summary:

A previously well 37-year-old woman (gravida 2 para 0) was admitted to hospital at 36 weeks and 5 days gestation, 1 day prior to a planned elective caesarean section in a monozygotic twin pregnancy. She had phoned to report severe upper abdominal pain and was advised to present for review. Following admission for observation, her surgery was performed the following day as planned.

Four hours postpartum the woman experienced a hypertensive crisis complicated by a seizure and a severe intracranial haemorrhage. Findings of thrombocytopaenia and abnormal liver function were consistent with severe preeclampsia as the underlying illness. Despite intensive care and neurosurgical intervention, the cerebral injury proved catastrophic and death was certified 4 days postpartum.

Clinical lessons:

Death did not result from a complication of surgery but from a complication of fulminating preeclampsia. With respect to the surgery, the only issue for consideration is whether there was any indication to intervene earlier. The decision and timing of the caesarean section appear related to the risks of late fetal complications associated with monochorionic twin pregnancies. The timing of the surgery for near 36 weeks gestation following a course of steroid

injections to reduce the risk of neonatal respiratory distress, is consistent with current monochorionic twin pregnancy management practice.

Preeclampsia is a pregnancy disorder associated with multisystem dysfunction affecting approximately 5% of pregnant women. The illness is more common with nulliparous women and in multiple pregnancies. It can present in many guises, with evidence of clinical progression over weeks, days or hours. The most common clinical feature is hypertension. In the majority of women who experience this illness, the diagnosis is made antepartum and the evolution is such that there is time for intervention, including expediting childbirth to ameliorate the impact on mother and baby. In approximately 5% of cases, the features of preeclampsia first become evident in the postpartum period. Preeclampsia with severe features, associated with potentially fatal consequences, complicates up to 1% of pregnancies. The only curative treatment for preeclampsia is childbirth.

Antihypertensive treatment is used to help minimise the risk associated with escalating hypertension until such time as the child is born and the preeclampsia has resolved. In the case under review, blood pressure was monitored regularly following hospital admission and there was no clear indication for antihypertensive treatment until the postpartum hypertensive crisis.

Proteinuria is a common feature of preeclampsia and can precede other signs and symptoms of the disease. It was documented at least 5 days prior to admission and investigated as a possible urinary tract infection (UTI). Proteinuria in the absence of hypertension and other evidence of preeclampsia would not necessarily be an indication for immediate intervention to expedite childbirth.

Other evidence to support preeclampsia as a possible cause of proteinuria can be maternal symptoms, evidence of intrauterine growth restriction and/or biochemical or haematological changes associated with preeclampsia can be headache, altered vision, vomiting and upper abdominal pain. Blood changes seen with preeclampsia can be hyperuricaemia, abnormal liver function, rising creatinine, thrombocytopenia, haemoconcentration and anaemia secondary to haemolysis.

Abdominal pain is a very common symptom throughout the course of pregnancy. Most commonly, the source of pain is non-sinister and the pain can be managed with simple measures, e.g. antacid treatment for oesophageal reflux associated pain; paracetamol, posture modification and support garments for musculoskeletal pain. Abdominal pain associated with preeclampsia, most commonly with the preeclampsia variant known as HELLP (haemolysis, elevated liver enzymes, low platelets) syndrome, typically has an early morning onset, can be severe and may or may not predate other features of the disease, including evidence of abnormal liver function. HELLP syndrome can evolve

quickly and is not always associated with hypertension.

In the case under review, there was a possible window for earlier intervention when the patient presented with abdominal pain on the morning prior to the day of her planned caesarean section. The reviewing clinician, who was not the patient's usual obstetrician, considered requesting blood tests but decided against it in the absence of pressing evidence of liver dysfunction. There are several references in the hospital record to the patient's severe needle phobia. The patient was normotensive. It is not clear that the history of proteinuria was brought to the attention of the reviewing doctor. There was no place to record urinalysis on the inpatient observation chart; urinalysis was recorded on a separate inpatient-care flow chart. Proteinuria was recorded later in the day, following admission, by which time borderline hypertension was recorded and the abdominal discomfort had resolved.

Severe thrombocytopenia and liver dysfunction was diagnosed following the postpartum hypertensive crisis. A normal platelet count had been recorded on a routine full blood count on the morning of surgery suggesting a rapid progression of the preeclamptic process on that day. Given the unpredictable course of preeclampsia, abnormal liver function may or may not have been evident if biochemical features of preeclampsia had been sought the day prior. Had severe liver function derangement been evident suggesting HELLP syndrome, earlier delivery would likely have followed, albeit the risk of hypertensive crisis in the early

postpartum period would not necessarily have been avoided.

Timely diagnosis and management of preeclampsia can be challenging. The symptoms of preeclampsia are commonly reported during pregnancy and are usually triggered by processes with a very small risk of serious consequence. Given the serious health risks associated with preeclampsia, and the chameleon nature of the disease, there is wisdom in having a low threshold for comprehensive clinical, haematological and biochemical assessment when symptoms of preeclampsia are encountered. There were a number of factors that contributed to the delayed diagnosis of preeclampsia on this occasion. Had an atypical presentation of preeclampsia been considered earlier, earlier diagnosis may have been possible.

Case study 6: Massive haemorrhage after retained placenta

Case summary:

This 38-year-old Indigenous woman was admitted to hospital as an emergency with a presumptive diagnosis of pyelonephritis at 16 weeks gestation of pregnancy. She was multiparous and had a history of several spontaneous miscarriages. The pregnancy had been diagnosed several weeks before this presentation but she had not been referred for antenatal care despite her high-risk situation. Her risks related to maternal age, alcohol consumption, domestic violence, previous pregnancy loss with excessive blood loss, vaginal colonisation with group B *Streptococcus* and possible cardiac disease.

She had presented several hours prior to admission and was discharged from the emergency department (ED) having given a history of abdominal pain and fluid loss per vagina the day before. A foetal heartbeat was detected. She re-presented several hours later by ambulance with further abdominal pain and backache.

She was then admitted with a diagnosis of pyelonephritis and inevitable miscarriage and was treated with antibiotic therapy. The foetal heart was heard. She was seen by a locum specialist later in the day who confirmed the diagnosis of pyelonephritis and inevitable miscarriage. This was a weekend and no definitive decision to empty the uterus was undertaken.

There was haematological evidence of infection (elevated C-reactive protein and white cell count with neutrophilia) although she remained clinically well with no definitive signs of infection beyond her bilateral flank tenderness.

Her specialist reviewed her, after returning from weekend leave, when she had been an inpatient for more than 48 hours on antibiotic therapy. He discovered a turbid vaginal discharge, a positive foetal heart and the body of the foetus in the upper vagina and cervix. He ordered the use of uterotonic agents to expel the conceptus from the uterus and vagina. This took the form of an oxytocic infusion. She expelled the foetus within 3 hours although the placenta was retained. It is estimated that her blood loss at this stage was approximately 450 mL. She was treated with further uterotonic agents and scheduled for surgical evacuation of her uterus as a category 2 case.

There was further heavy blood loss and a delay in getting into the operating theatre. The surgical evacuation was complicated by continuing heavy vaginal bleeding resulting from a hypotonic uterus. Attempts were made to quell the blood loss by using intrauterine packing and balloon tamponade along with further uterotonic agents. The massive haemorrhage protocol was instituted. This was to no avail and she had a cardiac arrest with vigorous attempts at resuscitation. She succumbed

despite cardiopulmonary resuscitation, transfusion of blood agents, infusions to restore circulatory volume, adrenaline and other cardio stimulatory therapy.

Clinical lessons:

This case highlights the fact that haemorrhage is still a major factor in most cases of maternal mortality. The challenge for carers is the infrequency with which individual clinicians are exposed to massive haemorrhage and its management. A well-drilled approach to the timely recognition and management of these catastrophic events is essential if death from this complication is to be avoided.

Interventional radiological techniques of acute haemorrhage control for exsanguinating uterine haemorrhage should be incorporated in treatment protocols.

My impression is that there may have been issues with respect to communication between team members in the resuscitation in this case and in recognising the original volume depletion and then the amount of fluid which was infused into the circulation. The implementation of mandatory simulated practice drills relating to both this and other obstetric disasters would allow clinicians to become more familiar with the requirements. This, in turn, will assist in achieving satisfactory outcomes when confronted with these catastrophic and often unpredictable events.

Case study 7: *Cardiopulmonary arrest at elective caesarean*

Case summary:

This 44-year-old woman was pregnant following in-vitro fertilisation and had an expected due date in August. Her pregnancy had been progressing in an uncomplicated fashion until early July, when she was admitted to hospital following a small antepartum haemorrhage at home. This was thought to be due to a placenta praevia, recorded in the hospital notes as grade 2.

She was managed conservatively in hospital and was taken to the operating theatre for a caesarean section. She was about 36 weeks pregnant at that stage. To reduce the risks of respiratory difficulties in her newborn she was given a course of betamethasone injections in the week prior to her operation.

She was anaesthetised and the procedure commenced. Soon after the successful delivery of the baby she suffered a cardiopulmonary arrest. She was immediately resuscitated but did not respond despite skilled resuscitation. Her liver was ruptured during the resuscitation and this was oversewn. After 40 minutes of cardiopulmonary resuscitation with no response, a multidisciplinary decision was taken by the doctors present to cease resuscitation attempts and the patient died soon after.

Clinical lessons:

On admission to hospital it was recorded on her admission form that she was taking “blood thinning medication”, though there was no entry in the hospital records that this medication was prescribed. Due to the bleeding placenta praevia she was advised to rest in bed and she was fitted with thromboembolic deterrent stockings. There was no record in her chart suggesting other methods of thromboprophylaxis were considered, despite the patient having a number of risk factors for venous thromboembolism: advanced age, obesity (BMI of 34), pregnancy and prolonged bed rest.

It is possible the treating doctor did not want to prescribe prophylactic heparin because of the placenta praevia and the risk of bleeding, as there was the potential that surgery could be required at any time. There are obvious risks associated with operating on a patient who has been anticoagulated, especially with a placenta praevia, but there was no evidence that it was considered or discussed.

The risks around her placenta praevia were managed appropriately. The surgeon had made timely notification to the anaesthetist, consented the patient and warned her of the risks (including emergency hysterectomy), and had scheduled the surgery appropriately. The surgeon also had an experienced assistant and had other equipment in theatre, such as a cell saver, which was appropriate.

The anaesthetist had scheduled sufficient time and also had appropriate equipment available. When the patient had a cardiac arrest, the surgeon rightly summoned senior help. From the notes it appears that the surgery was carried out appropriately, as was the resuscitation after the cardiac arrest. Liver rupture with cardiac massage has been reported on many occasions, and this may be more likely to occur in pregnancy. It is unlikely that this affected the final outcome too much.

While the conduct of the surgery was appropriate, the diagnosis was more contentious. Amniotic fluid embolus is a rare but often catastrophic complication of pregnancy, occurring in about 6 per 100,000 pregnancies. It is usually accompanied by rapid onset of disseminated intravascular coagulation with a subsequent coagulopathy. There was no evidence that this happened based on the operating and other records.

PE from pelvic or peripheral leg veins are much more common, and DVT is the leading cause of maternal death. The incidence of DVT in pregnancy is about 1:100-1,500. Given that she was hospitalised for a long time preoperatively, and that she had the risk factors mentioned above, it is possible that she suffered a PE rather than an amniotic fluid embolus, and that this led to the cardiopulmonary arrest.

An autopsy is the only way that a definitive diagnosis could have been obtained in this case, again emphasising the importance of autopsy in these sorts of cases, even when the cause of death seems obvious. If she

did die of a PE, prescribing prophylactic low molecular weight heparin when she was an antenatal inpatient may have saved her life. The problem with this would have been the risk posed to her by being on such medication when in hospital with a placenta praevia that had recently bled. Given that it had bled recently, it was likely that it could do so again, and at present, there is no medication that can reverse the effects of low molecular weight heparin. Operating on a patient with a bleeding placenta praevia who was partially anticoagulated may have been fatal.

The other possibility was prescribing heparin. Heparin would have necessitated twice daily injections, but could have been easily reversed in an emergency with protamine sulphate. I do note that the patient had a needle phobia, and provision of this sort of treatment may have been difficult.

If she did die of an amniotic fluid embolism, nothing could have been done to predict, prevent or treat it in a better way than that which was done. Amniotic fluid embolism is a rare and frequently fatal condition occurring in obstetrics. It should be confirmed by autopsy if the woman dies, as there are more common causes, such as PE, which can mimic it.

Autopsy is critical in maternal death in pregnancy, even when the cause of death is reasonably certain, to establish accurately the cause of death. It should have been carried out in this case. Patients admitted to hospital antenatally should have adequate prophylaxis for DVT.

Case study 8: *Peritonitis with pyometra*

Case summary:

A 20-year-old female patient presented to her physician with malaise, diarrhoea and possible abdominal pain. The patient was examined and told to attend the ED if the condition worsened. She was taken to the ED later that day. The time is not noted but was probably late evening. The patient had Rubinstein-Taybi syndrome and was intellectually disabled and non-verbal. Her temperature was 38 degrees, pulse rate 160, BP 80 systolic and SpO₂ 88%. Her abdomen was slightly tender and her peripheries were mottled. She was diagnosed as being in septic shock and resuscitation was commenced. She was not referred to the surgical unit until the early hours of the following day where her condition remained unchanged.

The surgeon advised a CT scan of the abdomen and transfer to the intensive care unit (ICU). It appears she was not reviewed by the surgical team until the following morning when the surgeon found her still in the ED. The patient was described as being moribund. An on-call surgeon was requested and arranged an urgent laparotomy with both surgeons attending the procedure. At operation, 1 to 2 L of pus was found in the peritoneum. The omentum, gallbladder and appendix were ischaemic and were excised.

There was pus oozing from a defect in the left cornu of the uterus. An intraoperative gynaecological consultation was arranged and a hysterectomy was not advised.

Vaginal examination revealed pus exiting the cervical os. It was noted that the vagina was small and easily traumatised. The peritoneum was lavaged. It is not stated if the muscle layers were closed. A vacuum assisted closure (VAC) dressing was applied and the patient was transferred to ICU. The patient died despite vigorous attempts at resuscitation.

Clinical lessons:

There are a number of issues with this case. Firstly, there was a delay in arranging a CT scan and this should not have happened. At night a CT scan will generally take 1 to 2 hours to arrange, perform and be reported on, and even this delay would have been too long. The patient should have also been assessed by a surgeon soon after admission and had a laparoscopy or laparotomy.

I consider that the delay in operating on the patient is an adverse event that contributed to the death of the patient. The initial delay would be an area for consideration. The second delay would be an area of concern. The third, and final, delay in this escalation of seriousness was an adverse event. Delays in decision making while waiting for CT scans and other imaging are increasingly common problems. There seems to be reluctance, especially amongst junior staff, to make a diagnosis without some form of imaging. The surgery was appropriate. There is a general reluctance to perform a hysterectomy on a 20-year-old and

it would be expected that pelvic inflammatory disease could be managed conservatively with antibiotics.

Further, a hysterectomy would have increased the operative time. If all the non-viable tissue was removed, the peritoneum lavaged and adequately drained, the pelvic inflammatory disease should not have increased the risk significantly. It is not stated if the peritoneal cavity was closed. A VAC dressing was applied but it is not stated if this was just a wound dressing or a general peritoneal VAC dressing. Closing the peritoneal cavity in the presence of an uncontrolled source of infection would have increased the risk of a bad outcome.

Other areas that are worth noting include:

- What was the cause of this acute abdomen? A “defect in the left cornu of the uterus” suggests iatrogenic trauma during termination of pregnancy. If this suspicion is correct, clostridial infection could explain the rapid demise.
- Hysterectomy is unlikely to have been helpful unless *Clostridium* was responsible. However, dilatation and curettage are mandatory if there is any suspicion of products of conception. If a complicated termination of pregnancy was the cause, the likely mechanism for the peritonitis is bowel damage from a curette or sponge holder (through an unrecognised uterine perforation).

Case study 9: *Abnormal tumour of retroperitoneal space*

Case summary:

An 86-year-old woman with a history of ischemic heart disease, congestive cardiac failure, permanent pacemaker, atrial fibrillation and renal impairment was admitted to hospital with anaemia (haemoglobin of 96) and unsteadiness on her legs. A CT of brain, chest and abdomen were performed and showed two right upper lobe pulmonary nodules and dilated left renal pelvicalyceal system. There was noted renal impairment with a creatinine of 150. The patient's medications included Warfarin, Metoprolol, Digoxin, Lasix and glyceryl trinitrate (patch).

While in hospital a CT abdomen showed a pelvic mass. She had a gastroscopy that showed oesophagitis and gastritis. Her clotting was corrected and she was taken to the operating theatre for a total abdominal hysterectomy and bilateral salpingo-oophorectomy. There were complications during the procedure and, as a result, she subsequently died in ICU.

Clinical lessons:

Constructive comments on the preoperative results and workup:

1. The patient had a midstream urine taken and it was reported as a UTI. There was no evidence that this was treated and it may have been the cause of her unsteadiness.
2. There was no evidence that she was seen by a physician prior to having an operative procedure. Given her age and multiple comorbidities, it is concerning that an operation was considered necessary and likely to improve her wellbeing.
3. An 86-year-old woman does not grow fibroids postmenopausally. There would be a high index of suspicion that this mass was cancerous. She had slightly abnormal liver function, nodules in her lung and a slightly elevated CA 125. This could have been explained by her comorbidities and general age; however, one would have taken a provisional diagnosis of cancer as the first diagnosis to be disproved prior to any operative procedure. Consultation with a gynae-oncologist and, if the decision was made to undertake an operative procedure, then would have had the gynae-oncologist present at the operation, at minimum.
4. Attempts to get any previous ultrasounds to see if her ureteric dilation was pre-existing or recent would have been valuable. If there was a previous ultrasound that showed her ureter was normal, then there would have had an even higher index of suspicion that this was a fast growing mass, and therefore quite likely to be malignant. It would have been a consideration to do a hysteroscopy, dilation of cervix and curettage of uterus and ureteric stent, which could be done under sedation, to attempt to get a sample and possibly a biopsy for possible

histopathology prior to doing an operative procedure.

5. This patient clearly had a poor prognosis. While it could be argued that her death was preventable, not doing the procedure would have simply deferred her death by only a short time. It is important to emphasise that the death was ultimately not preventable, as her prognosis was very poor.

Patients with multiple medical problems, or older patients (or both), to have a fixed preoperative workup by a physician experienced in that specialty prior to any procedure; perhaps a geriatrician as well in this instance.

Case Study 10: Major surgery in a complicated patient should be performed at a major hospital

Case summary:

A 59-year-old woman with a known history of hepatitis C cirrhosis and some evidence of decompensation (international normalised ratio [INR] 1.6 preoperative, and evidence of portal hypertension – dilated intra-abdominal veins and ascites noted at laparotomy) presented with bleeding per vaginum that failed to respond to embolisation. Other significant comorbidities were type 2 diabetes, hypertension, chronic obstructive pulmonary disease, bipolar affective disorder and gastro-oesophageal reflux.

The patient underwent elective total abdominal hysterectomy and bilateral salpingo-oophorectomy at regional Hospital A. This was complicated by large volume bleeding, for which repeat laparotomy was performed the following day. At laparotomy, 3 to 4 L of blood were evacuated and a bleeding ovarian pedicle was underrun. Liver and renal failure subsequently developed.

Haemofiltration was instituted, the patient was intubated and the patient was transferred to the ICU at Hospital B, under the care of the liver transplant unit on day 4 postsurgery. Ongoing support of renal, respiratory and circulatory systems was undertaken. Broad spectrum IV antibiotics (vancomycin and piperacillin [Tazocin]) and IV fluconazole were given. Fourteen days post-surgery, bleeding into the rectus sheath

and peritoneal cavity were identified in the lower abdomen. The patient underwent laparotomy and evacuation of haematoma. Bleeding from the inferior epigastric vessels was identified and haemostasis was performed.

Consideration was given to liver transplantation and daily assessments were made regarding the patient's fitness for the procedure in light of the high operative risk. Cardiology assessment was performed and the patient was deemed fit for transplantation. A suitable, standard criteria (i.e. good quality) liver donor became available and liver transplantation was performed on day 16. The native liver was small with evidence of micronodular cirrhosis. Haemoperitoneum of 1.5 L was noted and evacuated at the start of the procedure. Liver transplantation was performed expeditiously, with a cold ischaemia time of only 4.4 hours. During the transplantation, following implantation, there was evidence of right heart failure with rapid swelling of the liver. This was managed by off-loading volume via the haemofilter and administration of milrinone.

Following transplantation the patient remained critically unwell, despite good liver function, with ongoing need for haemofiltration. Disseminated *Candida glabrata* infection was identified. Maximal medical therapy was continued with the assistance of the infectious diseases unit. CT abdomen revealed

low density throughout the spleen and there was concern that the spleen might be a source of ongoing candidaemia. Therefore, laparotomy and splenectomy were performed – *Candida glabrata* was grown from the spleen, confirming this as a site of *Candida* infection. Unfortunately candidaemia continued despite the medical and surgical management and aortic valve endocarditis was identified.

The treating surgeon was on annual leave from day 45, therefore knowledge of the patient's subsequent course was based on a review of the notes. The patient continued to deteriorate and did not recover from multi-organ failure. After consultation with the patient's family, life sustaining therapy was withdrawn and the patient died 75 days later in ICU.

Clinical lessons:

General surgical perspective

There were no concerns regarding the management of this patient at Hospital B where she was treated by a surgical unit. The records regarding the treatment at the regional Hospital A were not available.

The area of concern in this case was the decision to proceed with a necessary operative procedure at a regional hospital in the setting of Child's C cirrhosis with a known preoperative clotting disorder (INR 1.6) and portal hypertension. This patient may have been better managed in a major metropolitan hospital, where there were more available resources and the opportunity to consult rapidly with appropriate specialists. However, the outcome may have been the same

given the underlying disease processes and comorbidities.

Gynaecological perspective

There were several areas of concern with this case. The first area of concern was the decision to proceed with major surgery in the presence of liver failure secondary to hepatic cirrhosis. This was a significant risk factor for a bleeding disorder, especially in a regional centre without an ICU experienced in managing such cases or the back-up of a liver unit. Consideration should have been given for transfer to a tertiary centre with stabilisation prior to surgery and planned postoperative ICU admission.

The second area of concern was the postoperative care in the first 24 hours, with long delays in diagnosing the postoperative intraperitoneal bleeding and delays in returning to theatre. The delays contributed to the patient's deterioration following the second procedure and the multi-organ failure that necessitated an urgent liver transplant. This patient was anuric overnight, with no senior clinical input into her care, and delays in returning to theatre to manage postoperative bleeding.

Finally, there were significant comorbidities existing in this patient that considerably increased the risks of surgery. The final result may have occurred regardless of the patient's intraoperative and postoperative care.

High-risk patients have a higher risk of bleeding and should have a laparotomy considered earlier. A negative laparotomy is better than a long delay

before complications are diagnosed, with no capacity to recover from physiological insult.

1. Hysterectomy should be considered only when other treatment options have failed or are contraindicated.
2. Preoperative assessment and stabilisation should be planned for any patient with a medical comorbidity.
3. Surgical cases likely to require postoperative ICU care should be managed in centres where those facilities are easily accessed.
4. Early return to theatre in an unstable patient should be considered.¹

Reference:

1. National Institute for Health and Care Excellence. Heavy menstrual bleeding: assessment and management. UK: National Institute for Health and Care Excellence; 2007 [cited 2016 16 Dec 2016]; Available from: <https://www.nice.org.uk/guidance/CG44>.

Case Study 11: Elderly patient with metastatic uterine cancer suffering from a UTI

Case summary:

This 89-year-old female patient had a known diagnosis of uterine cancer with suspected nodal involvement. On initial diagnosis she had declined hysterectomy, electing to be treated conservatively with a Mirena intrauterine device. She continued to have heavy per vaginal bleeding despite the Mirena, and the recommendation from the gynaecological oncology, multi-drug therapy was to again offer hysterectomy for symptomatic control.

Her only significant past medical history was of hypertension. She was preoperatively reviewed by the high risk clinic and given the all clear to proceed with a laparotomy. Preoperative CT scan suggested metastatic spread to para-aortic lymph nodes and deep myoinvasion of the uterine tumour.

She was admitted 2 days preoperatively for bowel prep and had an iron transfusion just prior to this admission. Her haemoglobin 10 days preoperatively was 104, but there was no record of her haemoglobin immediately prior to surgery (and following the iron transfusion).

On the day prior to surgery she was found to be confused. Examination was unremarkable but a midstream urine specimen taken on the morning of theatre was discovered postoperatively to show an *Escherichia coli* UTI. She proceeded to surgery and an apparently uneventful total abdominal hysterectomy

and bilateral salpingo-oophorectomy, pelvic node dissection and omental biopsy were performed. She was given IV Cephazolin intraoperatively and postoperatively for prophylaxis and treatment of her UTI.

Initial postoperative progress appeared uneventful but on day 3 postoperatively the patient became tachycardic, diaphoretic and clammy. She was reviewed by the perioperative high risk team and a ventilation perfusion scan was ordered (which was negative for a PE). She continued to deteriorate with dyspnoea, tachycardia and confusion. She was reviewed by the medical team after a medical emergency team call was placed and, as per the patient and her family's wishes, it was agreed that the patient was for comfort measures only. She continued to deteriorate and passed away soon after.

Clinical lessons:

There were no adverse events or significant areas of concern in this case. She had failed medical management and the symptoms that were affecting her quality of life could be helped with surgical management. She had been deemed fit to undergo general anaesthetic and laparotomy.

Areas of consideration are whether this elderly patient should have undergone surgery at all for her metastatic cancer, or whether other medical measures such as

radiotherapy could have been utilised to alleviate her symptoms of vaginal bleeding.

The other area for consideration is whether the elective surgical procedure should have been delayed because of her preoperative confusion, which was found to be secondary to a urinary infection. A delay would have allowed the UTI to be treated prior to subjecting the patient to a general anaesthetic and operation, particularly as the procedure required insertion of an indwelling catheter, which may have contributed to difficulties in treating the UTI.

Overall, this patient received reasonable care. She had a serious condition and symptoms that would have been helped by surgery and had been reviewed preoperatively and thought fit to undergo the procedure.

Shortened Forms

ANZASM	Australian and New Zealand Audit of Surgical Mortality
CT	computed tomography
DVT	deep vein thrombosis
ED	emergency department
HELLP	haemolysis, elevated liver enzymes, low platelets
HRT	hormone replacement therapy
ICU	intensive care unit
INR	international normalised ratio
IV	intravenous
IVC	inferior vena cava
MRI	magnetic resonance imaging
PE	pulmonary embolism
RANZCOG	The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
UTI	urinary tract infection
VAC	vacuum assisted closure



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